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A REPORT TO THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

ON

JAMAICA

PRIVATE SECTOR ENERGY CREDIT FUND PROJECT

Prepared by

First Washington Associates
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JAMAICA

PRIVATE SECTOR ENERGY CREDIT FUND PROJECT

INTRODUCTION TO REPORT

VOLUME ONE

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I. BACKGROUND

On February 9, 1982, FWA signed a contract with U.S. AID Jamaica to undertake a study and prepare a report on the demand for a private sector loan fund to stimulate investments in energy conservation and alternative energy projects. Under this contract, FWA has done a complete analysis of demand for the following elements which might be included in a joint U.S. AID-GOJ energy project:

- auditing and retrofitting for industrial/commercial enterprises;
- industrial/commercial solar water heating;
- residential solar water heating;
- energy conservation industry development; and
- capacity expansion of solar equipment manufacturers.

Specific tasks performed by FWA included the following:

A. FWA analyzed the existing availability of credit in Jamaica for elements listed above from Jamaican financial institutions, the World Bank, the Inter-American Development Bank, other donors, etc.

B. For each of the above-listed five credit activities, FWA conducted interviews with a suitable number of representative firms to determine whether or not there is a demand for credit by the target group for the programs proposed and the magnitude of that demand.

C. Prior to carrying out interviews with firms to determine the demand for the auditing/retrofitting program, FWA carried out five energy audits of representative firms in order to develop firm cost estimates and data on economic analyses. The results of these audits were used in carrying out the interviews with the selected firms.

D. FWA formulated proposed funding levels for each type of activity, which appeared adequate and reasonable to meet program objectives, giving appropriate justification. FWA also estimated, with supporting justification, the average size of the sub-loans.

E. Through interviewing techniques and market analysis, FWA determined appropriate interest rates and terms for sub-borrowers to be applied to each of the credit programs.

F. FWA developed sub-borrower eligibility criteria to be applied to each of the credit programs, including purposes for which the funds can be used (especially what portion of the sub-loan must be used for energy retrofitting), maximum loan size, etc.

G. FWA recommended what financial arrangements should be established to assure that the monetary value of the credit funds will be maintained while at the same time allowing the GOJ to recover its administrative costs.

H. FWA also recommended incentives (fiscal and others) which would help to stimulate and reinforce the demand for the credit programs.

The results of all this work are incorporated in the report which follows, which was completed and presented to U.S. AID on June 30, 1982.

II. GENERAL ECONOMIC CONTEXT

Much of Jamaica's industrial development took place during the 1960's--a period of inexpensive petroleum-sourced energy. Because energy efficiency was not a major concern, the industrial base of the country was built on equipment which is now expensive to operate and frequently not competitive with newer systems. As a result, Jamaica has had an extraordinary dependence on imported oil during a period of rapidly increasing energy costs. This has had a significant, negative impact on the Jamaican economy. Payment for oil imports has diverted resources which would otherwise be available for general developmental purposes.

Specifically, with the drastic increase in oil prices, Jamaica's import bill for oil has risen from 9 percent of all imports in 1972 to 32 percent in 1980. Jamaica's energy utilization per capita is now among the highest in the developing world. As stated in Jamaica's Ministry Paper No. 19, with little proven conventional energy resources, the development of a well coordinated energy policy is essential "if Jamaica is to survive and achieve a smooth transition from almost total reliance on oil, to other sources of energy, without adversely affecting the economic and social goals of the country."

Jamaica's total energy demand (excluding the bauxite/alumina industry) is expected to increase almost 60 percent from 1980 to 1990, i.e., from 7.7 million barrels of oil equivalent to 12 million barrels of oil equivalent. It is estimated that an ambitious and properly-structured energy conservation and alternative energy program can help reduce Jamaica's dependency on oil from the present situation where it meets 97 percent of energy

needs to a more balanced equation where it would meet 64 percent of energy needs, which it is believed can be accomplished by 1990.

III. U.S. AID PUBLIC SECTOR ENERGY PROGRAM

U.S. AID has worked closely with the Government of Jamaica over the past two years to provide technical assistance in the formulation of a National Energy Plan, to be followed by a program of financial assistance to help the public and private sector meet the goals of that plan.

U.S. AID has provided a number of energy consultants to the Ministry of Mines and Energy and has also worked with the Petroleum Corporation of Jamaica and private sector organizations to define energy problems and potentials and to draft a meaningful program for helping to meet Jamaica's critical energy needs. In June 1981, U.S. AID approved a loan for Jamaica for public sector energy development, which incorporates an ambitious program of financial and technical assistance to help solve Jamaica's energy problems.

U.S. AID's public sector loan is designed to achieve the following goals:

- to reduce Jamaica's dependence on imported oil;
- to expand and improve the Government of Jamaica's energy conservation program;
- to strengthen the Government of Jamaica's institutional capacity to plan and manage energy programs; and
- to establish alternative energy sources.

The overall goal of AID's energy intiative in cooperation with the Government of Jamaica is freeing-up foreign exchange for investment in sound industrial development programs such as appropriate maintenance,

repair, and expansion of existing manufacturing equipment and expansion of commercial enterprises.

In order to achieve these goals in cooperation with the Government of Jamaica, AID has undertaken specific assistance programs in the following areas:

- Evaluation of energy plans;
- Training energy personnel in planning, technical areas such as conservation, utility rate structuring and alternate energy systems such as biogas, solar, etc.; and
- Evaluation of energy alternatives.

IV. U.S. AID PRIVATE SECTOR ENERGY PROGRAM

As AID assistance has emphasized general programs for energy conservation and alternative energy systems, especially those that may be at least partly based on Jamaican sourcing, new approaches have been sought to encourage private initiatives in these areas.

Based on prior evaluations made by AID and its contractors and by AID's GOJ counterparts, the concept of a "credit window" was developed to assist and encourage private sector initiatives in:

- energy audits;
- retrofitting; and
- conservation.

It should be noted that a survey undertaken by the Jamaica Manufacturers Association and others specifically indicated that the private sector would cooperate and make the necessary capital investment to support improved energy utilization if meaningful incentives were provided. A viable credit window based on reasonable terms and conditions was seen as a first step in this process. A major objective of the FWA study was to determine the basis for a credit window and define the appropriate terms and conditions for such an operation.

Actually, the energy conservation process is a systematic procedure requiring a number of inputs in order to realize the final goal of reduced energy consumption. An important input to the system is capital, in order to finance the engineering studies, retrofitting improvements and domestic energy industry development that can pay off with future energy savings.

The first step for a successful U.S. AID private sector energy program is a broad-scale business and government commitment to energy conservation and to the systematic methods by which it can be realized. Energy audits must be performed by technicians to collect data on plant energy consumption and costs. The audit data, together with detailed in-plant measurements, should be used by engineers experienced in energy conservation to identify and evaluate potential energy conservation opportunities (ECO's). These ECO's may include alternative energy projects, such as solar water heating or crop drying, if appropriate and economically feasible. Based on a review of these candidate ECO's with regard to the funding available, a portfolio of the most economically attractive projects can be selected. These projects are next carried out in the retrofitting phase, with equipment being purchased and installed. The result will be a marked improvement in the private sector's energy efficiency.

Another important area of investigation for ECO's are operations and maintenance (O & M) procedures. Often there are a number of simple measures which can be performed around a plant at little or no cost to improve its energy efficiency. A number of these O & M ECO's can result in overall plant savings of 5 percent, or more. Often these ECO's have payback periods of only a few months, or even weeks. In addition, operations and maintenance practices are also extremely important following the capital ECO retrofits in order to ensure that equipment keeps running and saving energy.

In order to stimulate the system, inputs are needed at each step, as shown below:

Management commitment - motivated by U.S. AID/GOJ programs and by high energy costs

Energy audit technicians - trained under GOJ programs

Technical assistance engineers - qualified local consulting engineers with help from U.S. AID consultants

Retrofitting foreign products and services - financed by foreign exchange from U.S. AID/GOJ project

Retrofitting local products and services - financed by plant or by local currency loan

O & M spare parts - financed by foreign exchange from U.S. AID/GOJ project, or local if possible

O & M services - mainly local, financed by plant

Some of the inputs above require financing in foreign exchange, while certain of them can be financed locally, Because of the difficulty in obtaining foreign exchange, it is preferable for the private sector (and for GOJ) to finance as much as possible locally. Therefore, local products, spare parts, installation services, and maintenance services must be made available if the national goals of energy conservation are to be met.

The extreme importance of this point can be shown if these national goals are considered in light of recent energy conservation studies in Jamaica, which identified potential energy projects and examined the economics of these projects. Based on these studies, it can be concluded that a 20 percent reduction in energy consumption by the commercial and industrial sector is possible, with a likely average foreign exchange payback period of about 2.5 years. Estimates are that the commercial and industrial sector in Jamaica consumes about three million barrels of oil equivalent (BOE) annually. The foreign exchange cost of this oil is approximately $100 million (U.S.) per year. National energy goals in Jamaica speak of

a 10 percent reduction in consumption. Because residential and transportation sectors are not likely to meet their 10 percent goals unless further hardship is imposed, the commercial and industrial (C & I) sector is expected to compensate. With total (non-bauxite/alumina) annual consumption of about eight million BOE, the goal is then 800,000 BOE savings. A 20 percent reduction in the C & I sector can deliver a savings of 600,000 BOE, or 75 percent of the goal. This 20 percent savings would result in foreign exchange savings of US$20 million annually.

Because of the strict limitations on the amounts of U.S. AID funding which might be made available for this program, FWA has concentrated in this report on designing a pilot project for energy conservation and alternative energy development. After the U.S. AID private sector energy credit sector program has proven successful, it should serve as the nucleus for an expanded and extended financial program to encourage full private sector participation in the achievement of Jamaica's long-term energy goals.

V. ORGANIZATION OF REPORT

This report is organized into six volumes, including this introductory volume, with a total of 349 pages. Volume I (14 pages) and Volume VI (7 pages) together comprise what may be regarded as an executive summary of the entire report.

Volume II (147 pages) presents the detailed results of FWA's energy audits of five representative firms. This gives numerous concrete examples of the types of energy conservation and alternative energy investments which may be undertaken by Jamaican companies.

Volume III (62 pages) is, to the best of our knowledge, the most complete and up-to-date evaluation of the financial system in Jamaica. It explores in depth the terms and conditions of lending to the private business sector and evaluates alternatives to U.S. AID funding of an energy conservation program.

Volume IV (84 pages) gives the results of FWA's intensive interviews with forty-nine manufacturing, commercial, hotel, and other firms to ascertain their demand for energy-saving investments and how the availability of a credit program would affect that demand.

Volume V (35 pages) presents a summary statement of policies and procedures, or credit program guidelines, that should be followed by the Jamaican executing agency of the proposed U.S. AID private sector energy loan.

FWA is under separate contract with the Ministry of Mining and Energy to prepare a detailed evaluation of how the National Development Bank could administer this loan, using the private commercial banks as intermediaries. A separate report will be completed by FWA prior to July 30, 1982,

detailing the proposed mechanics of NDB involvement, and outlining the institutional steps necessary at NDB and the commercial banks to assure program success. This subsequent study will be a logical follow-on to Volume VI of the present report.

VI. ACKNOWLEDGMENTS

FWA wishes to acknowledge the invaluable contributions made to this report by business firms, financial institutions and individuals in Jamaica and the United States.

First of all, FWA is heavily indebted to Touche, Ross, Ogle and Co. of Kingston, its Jamaican partner in this venture, which provided help in survey design, execution, and evaluation. We are equally appreciative of the role played by our American partner, Georgia Tech, which carried out the engineering audits and advised on the technical aspects of energy conservation and alternative energy development.

Secondly, FWA wants to note the excellent support received from U.S. AID in Jamaica and Washington, and from the Ministry of Mining and Energy in Jamaica.

The private sector in Jamaica cooperated fully with this survey. The Jamaica Manufacturers Association helped with comments and suggestions, and forty-nine private sector firms donated generously of their time to complete the survey questionnaire and give us the benefit of their opinions and recommendations.

Government agencies which were especially helpful included Petroleum Corporation of Jamaica, Jamaica Public Service, the Bank of Jamaica, the Jamaica Export Credit Insurance Corporation, and Jamaica National Investment Promotions.

The commercial banking sector was also most supportive. All eight banks provided information and commentary, with the National Commercial Bank spending most time with the FWA team. Merchant banks and other financial institutions also gave us their suggestions.

The National Development Bank gave FWA complete access to its officers and information and was very helpful, particularly in the latter stages of the project.

On the international scene, FWA notes with appreciation the help received from staff of the World Bank, the Inter-American Development Bank, and the International Monetary Fund.

FWA hopes that the report that follows will help to serve as the basis for an innovative and highly beneficial new type of credit program. We would like to thank U.S. AID for the opportunity to participate in this most interesting and challenging assignment.

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JAMAICA

PRIVATE SECTOR ENERGY CREDIT FUND PROJECT

ENERGY AUDIT RESULTS

VOLUME TWO

15

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I. INTRODUCTION

Five energy audits of companies in Jamaica's private sector were performed by the staff of the Energy Conservation Division, Technology Applications Laboratory, Engineering Experiment Station (EES), Georgia Institute of Technology, on a subcontract basis to First Washington Associates (FWA), prime contractor to the United States Agency for International Development (U.S. A.I.D.). Site visits and follow-up research were performed by Research Engineers Larry E. Banta, Hank Z. Jackson, and David A. Keith, Project Director, all of whom have been conducting energy audits in the United States continously for the past three years.

The goals of the project were to identify energy conservation opportunities in Jamaica and to develop cost and benefit data for each of these opportunities. The results of the energy audits will be used by First Washington Associates in conducting a survey of the demand for credit to be applied to energy conservation investments in the Jamaican private sector. The energy audit reports will also be useful to U.S. A.I.D. in demonstrating the potential value of energy audits in Jamaica and other developing countries. If the results of the energy audits and the credit demand survey demonstrate to U.S. A.I.D. that a need exists for credit for energy conservation and solar water heating investments in the private sector, a pending loan fund may be awarded to Jamaica.

The project was divided into three phases. The first phase was plant selection, second were the site visits and research in Jamaica, and third was report writing, including finalizing the technical description of the energy conservation opportunities (ECO) and analyzing the potential cost and benefit of each ECO.

II. DEFINITION - ENERGY AUDIT

The term "energy audit" is used throughout this report to describe the entire project procedure. However, it is generally the case in energy conservation engineering that an enery audit report describes the plant equipment in great detail and documents the plant's energy consumption history. Only those ECO's that are obvious to the energy auditor are identified, and these are generally operations and maintenance procedures and little or no supporting documentation is provided. The energy audit is generally performed by technicians, with engineers following up on the audit to identify retrofitting ECO's. This engineering phase is often called "technical assistance" and results in a set of detailed ECO reports, including technical design information as well as economic feasibility data. From the standpoint of energy conservation potential, it is the technical assistance phase which is the most important. It is also the most manpower-intensive and therefore the most expensive. In the five Jamaican private sector energy audits, the bulk of the work was done in the technical assistance phase.

III. PLANT SELECTION

The plant selection phase was carried out in Jamaica from February 22-26 by the Project Director. During this period, interviews were conducted with a number of prominent Jamaicans in order to determine the industries to be audited.

The three main industries in Jamaica are bauxite (and alumina), tourism, and agriculture. In addition, there are a number of manufacturers of consumer goods and a commercial sector. Bauxite as a potential industry was discarded because it is operated by multinational organizations which purchase their own supplies of oil. These purchases do not influence the Jamaican balance of payments, and bauxite is therefore not considered a candidate for the U.S. A.I.D. loan fund. Using data generated in previous FWA studies for the Jamaican Export Credit Insurance Company, the following list of private sector industries was developed:

Tourism - hotels, restaurants
Agriculture - sugar and rum, banana, vegetables
Food - baking, canning, processing, bottling
Garments and textiles - shoes, clothing
Commercial - offices, retail stores
Chemicals and pharmaceuticals
Paper and paper products
Metal products
Building products
Rubber products
Laundries
Furniture
Plastics

Several large industries were not considered either because they have significant government ownership, are unique on the island and therefore not representative, or have their own engineering staff capable of providing the necessary expertise. Examples of such plants are Carib Cement, Esso Refinery, Ariguanabo Textiles, Carib Steel, and West Indies Glass.

In order to reduce the number of industries to five candidates for energy audits, interviews were held with Jamaicans involved in energy conservation in both the public and private sectors. The project was discussed with the following individuals, in addition to the U.S. A.I.D. project monitor:

Mrs. Avis Henriques, President, Private Sector Organisation of Jamaica

Mr. Tony Williams, President, Jamaica Manufacturers Association

Mr. Earl Taylor, Vice President, JMA, Chairman, JMA Energy Conservation Committee

Hon. Douglas Fletcher, Chairman, National Energy Conservation Committee

Mr. Derek Brown, Chairman, National Sugar Board

Mr. Earl Sutherland, Ministry of Mining and Energy, USAID/GOJ Project Director

Mr. V. Scantlebury, Ministry of Mining and Energy, Director of Energy Conservation

Mr. Claon Rowe, Ministry of Mining and Energy, Chief Energy Conservation Engineer

Topics discussed in these interviews included amount and form of energy consumed in the various industries, the number of firms in each industry and examples of representative firms, and the likely age and condition of the plants. Suggestions for candidate firms were solicited.

Following the interviews and using the discussions as a basis, the five industries and plants were selected by the Project Director. These seletions were made based on the number of firms in the industry (a minimum of four plants required), the estimated energy consumed (must be a medium to large or a mechanized plant), and the similarity of the plant to others in the sector. The field was reduced to the following five plants:

Tourist hotel

Sugar and rum factory and estate

Food product manufacturer

Commercial office building

Chemical manufacturing plant

Because the energy audits reveal detailed information concerning the plant operations and condition which may be considered proprietary or confidential, the actual names of the companies are not released, except as authorized by the companies and the sponsor, U.S. A.I.D.

The plant selection phase was completed on February 26, 1982, and was submitted to the U.S. A.I.D. project monitor for approval.

IV. ENERGY AUDIT METHODOLOGY

Approval of the list of companies was granted, and the five plant visits were scheduled for one each day during the week of March 8-12, 1982. The team of three energy conservation engineers visited each plant. They were accompanied by energy audit technicians from the Ministry of Mining and Energy (MME) on two of the visits. The energy conservation instruments owned by MME were graciously loaned to the project team, and they were used in collecting data at each plant.

The general schedule during the site visits was for the team to arrive early in the morning and spend the entire day at the plant. The methodology began with an interview of the plant manager and other key personnel, held with all three team engineers. This interview provided background to the plant processes, operations, and conditions. Previous efforts in energy conservation (if any) were discussed. These interviews lasted from one to two hours, depending on the level of detail at the particular plant. During the remaining portion of the day, the three team members inspected the facilities. First, a brief walk-through of the plant was made, with the plant manager leading the team around and describing the plant equipment. This generally lasted about one hour. During the remainder of the day, the team split up and went about the plant making measurements and collecting data. The plant was sometimes divided into sections, with each engineer being assigned a part of it. At other plants, the plant was divided according to the data required, with one engineer making electrical measurements, another analyzing thermal energy usage (boilers, refrigeration, etc.), and the third tabulating energy consumption from the plant's accounts payable receipts. The instruments used in the course of the audits were as follows:

- boiler combustion gas analysis kit
- digital thermometer
- pyrometer
- velometer
- digital voltmeter/ammeter
- power factor meter
- sling psychrometer
- light meter

During the plant visits, the team of engineers made inspections and measurements to quantify potential energy conservation opportunities (ECO's). The identification of ECO's is the most important part of the energy audit, as these recommendations are what will ultimately help the plant to conserve energy. The extensive experience of the team engieers was an important creative factor in recognizing potential ECO's and in determining what measurements to make in order to quantify their potential savings.

During the evenings following the plant visits, team meetings were held to discuss the plant, review the data, and formulate the list of potential ECO's to be evaluated later. Often it was found that certain data were missing and that further measurements or accounting data were required. This often occurs during the course of energy audits; ideas are formulated after visiting the plant and the plant must be revisited to quantify the new ideas for ECO's. This likelihood was factored into the project plan, and the team remainded in Jamaica for a second week.

During the week of March 15-19, 1982, the team revisited four of the five companies for additional interviews and data collection. Also, Jamaican suppliers of energy conservation equipment and services were contacted during this week to check the local prices and availability of certain products. These contacts included Appliance Traders, Ltd. (solar water heating equipment, air conditioning equipment), Citrad, Ltd. (lighting fixtures), Sea-Land (freight and shipping), Plastic and Metal Works, Ltd. (welding and sheet metal fabrication), Alcan Products of Jamaica (aluminum extrusions), Dunn's Equipment Engineering (engineering consultants), and Electrical Manufacturers (Jamaica), Ltd. (electrical switchgear and apparatus).

Upon returning to Atlanta, the energy conservation team worked on preparing the project reports during the three week period March 22-April 9, 1982. This phase is always the most labor-intensive part of any energy audit, as the accounting data obtained must be collated, the ECO's must be formulated in detail including engineering estimates of capital cost and energy savings, and the reports must be written and typed. It is not unusual for an engineer to spend an entire man-day or more on designing, formulating, estimating, and evaluating a single major ECO which is specific to the particular plant under study. For those ECO's which are generic (such as insulation,

lighting, or high efficiency motors) calculations and procedures have been developed over the years at EES to permit a more rapid evaluation. However, the analyses of all ECO's on this project have been complicated by a number of factors not considered in U.S. reports, such as duty, freight, U.S. contractor installation costs (travel, per diem, etc.), Jamaican labor costs and productivity, and foreign exchange requirements.

An individual report, including a description of the retrofit and engineering calculations, was prepared for each ECO. In cases where one or more ECO's interacted and the savings from one ECO were dependent on whether another ECO had been enacted, it was assumed that the ECO with the shortest simple payback period was carried out first, then subsequent ECO's were adjusted to compensate for the impact of the more economical ECO's. A standard summary sheet was prepared and used for each ECO. This summarizes the type of ECO, a description of the measure, an estimate of the savings, and cost data to be used in the economic analysis, including capital costs, foreign exchange, duty, maintenance costs, expected life, and salvage value. The simple payback period is also shown on each summary. A discounted cash flow analysis was also performed for each ECO, taking other factors such as loan payments, taxes and depreciation, inflation, and the time value of money. This analysis was performed using an EES computer program on the Control Data Cyber 74, and gives as results the net present value, after tax return on investment, after tax simple payback, and after tax discounted payback for each investment. A sensitivity analysis was performed using the interest rate of the loan as an independent variable, with values of 9% (variable change number 1), 12% (number 2), and 15% (number 3).

The energy audit reports prepared for the plants studied are made up of an executive summary, description of the facilities, energy consumption history, and the individual ECO reports. The executive summary lists the plant's energy consumption for the past year and the ECO's, and describes what percentage of the plant's energy could be saved by enacting all ECO's. Total costs for all ECO's and the aggregate payback period for all projects are given, as are foreign exchange costs and imported petroleum cost savings, showing a rate of return on Jamaica's foreign exchange investment for this plant.

The executive summary and summary sheets for all ECO's identified for each plant are included in Annexes "A" through "E" of this report.

V. PROJECT RESULTS

Energy audits were carried out for five companies in five different industries in the Jamaican private sector. The results of these energy audits are summarized in Tables 1, 2, and 3.

The present annual energy consumption of the five plants is about 6 million kilowatt-hours (KWH) of electricity and 175,000 million British thermal units (MMBTU) of fuel; see Table 1. The sugar plant is a special case because it is significantly larger than the other plants, has waste material (bagasse) available for use as fuel, and generates 100% of its own electricity on-site, using bagasse, diesel oil, and Bunker "C" as fuel. For this reason, all totals are given both including and excluding the sugar plant. The four remaining plants used about 6 million KWH of electricity and 41,000 MMBTU of fuel during 1981. A total of 33 ECO's were identified, evaluated, and found to be economically attractive enough to include in this report, 28 of these in the non-sugar industries. A number of other ECO's were evaluated and discarded, for either economic or technical reasons. The projected energy savings for all ECO's were nearly 2 million KWH per year and about 63,000 MMBTU per year. This amounts to a 32% savings in electricity and 36% savings in fuel consumption. Excluding sugar, the electric savings remain 2 million KWH/yr (32%) and the fuel savings total 9400 MMBTU, or a 23% savings in fuel consumption. Projected electric savings ranged from 14% for the commercial building, which had already enacted some of the best available ECO's for this industry (solar control tinted window film and timers on air conditioning equipment), to 65% for the chemical plant, mainly due to an opportunity to generate electricity on-site using waste heat from an exothermic chemical reaction. Projected fuel savings ranged from an increase of 3% for the food plant, mainly resulting from an ECO to cogenerate electricity and process hot water on-site using a diesel generator, to a 49% savings for the hotel, largely due to waste heat recovery from air conditioning systems and laundry wastewater.

The present annual energy costs for all five plants totaled over $3,600,000 (J), see Table 2. Excluding sugar, the energy costs totaled very nearly $2,000,000 (J). Total annual energy cost savings projected for all 33 ECO's are over $1,100,000 (J) per year. For the 28 non-sugar ECO's, the

TABLE 1

PROJECTED ENERGY SAVINGS FROM ECO's

JAMAICAN PRIVATE SECTOR

PLANT TYPE	PRESENT CONSUMPTION		ECO's	PROJECTED SAVINGS		PERCENT SAVINGS	
	Elect (KWH)	Fuel (MMBTU)	(No.)	Elect (KWH/Yr)	Fuel (MMBTU/Yr)	Elect (%)	Fuel (%)
Comm'l	1,082,000	0	6	154,600	N/A	14	N/A
Hotel	1,497,600	7,741	10	252,000	3,793	17	49
Food	1,729,345	8,333	6	434,680	(250)	25	(3)
Sugar	0	134,750	5	N/A	53,900	N/A	40
Chem	1,671,500	24,992	6	1,082,700	5,878	65	24
Totals	5,980,445	175,316	33	1,923,980	63,321	32	36
Totals (Ex. Sugar)	5,980,445	40,566	28	1,923,980	9,421	32	23

TABLE 2

PROJECTED COST SAVINGS FROM ECO's
JAMAICAN PRIVATE SECTOR

PLANT TYPE	PRESENT ENERGY COST (J $)	PROJECTED COST SAVINGS (J $/Yr)	PERCENT COST SAVINGS (%)	FOREIGN EXCHANGE COST SAVINGS (US $/Yr)
Comm'l	239,822	34,110	14	13,150
Hotel	475,144	116,440	25	43,000
Food	533,642	87,080	16	35,500
Sugar	1,649,755	561,519	34	305,613
Chem	750,766	325,500	43	125,000
Totals	3,649,129	1,124,649	31	522,250
Totals (Ex. Sugar)	1,999,374	563,130	28	216,663

projected annual cost savings total over $560,000 (J) per year. Foreign exchange cost savings resulting from the ECO's total over $500,000 (U.S.) per year for all plants and over $200,000 (U.S.) per year, excluding the sugar plant. The percentage cost savings averaged 31% for all plants and 28% for the non-sugar industries. Percentage cost savings varied from 14% for the commercial building to 43% for the chemical plant.

Table 3 describes the projected economics for the ECO's. The total capital cost of all 33 ECO's is over $2,800,000 (J), of which about $970,000 (U.S.) is in foreign exchange costs. Excluding sugar, the total cost is about $940,000 (J), with about $330,000 (U.S.) being in foreign exchange. Using the cost savings from Table 2, the simple payback of all projects is about 2.5 years. Excluding the sugar plant, the average simple payback is 1.7 years. This skewing occurred because of a single very large ($1,600,000 (J)) ECO project at the sugar plant with a 4.0 year payback. Looking at the critical foreign exchange payback, the average is 1.9 years for all projects and 1.5 excluding sugar. In addition, well over $1 million (J) is added to the economy in local costs, mainly in labor costs and duty, through the implementation of the 33 ECO projects.

Shown in Table 4 are the operations and maintenance (O&M) ECO's found. A total of seven O&M ECO's were identified in the five plants. The cost to implement these ECO's is $51,200 (J), of which only $15,630 (U.S.) is in foreign exchange. The potential savings are $68,000 (J) in energy costs to the plants and $28,500 (U.S.) in imported petroleum costs. The project payback is an average of about 9 months to the plants and less than 7 months on the foreign exchange cost and savings to the nation.

TABLE 3

PROJECT ECONOMICS - ALL ECO's

JAMAICAN PRIVATE SECTOR

PLANT TYPE	CAPITAL COST ALL ECO's (J $)	COST SAVINGS ALL ECO's (J $/Yr)	SIMPLE PAYBACK (Yrs.)	FOREIGN COST (US $)	FOREIGN SAVINGS (US $/Yr)	SIMPLE PAYBACK FOREIGN (Yrs)	LOCAL COST & DUTY (J $)
Comm'l	49,821	34,110	1.5	21,780	13,150	1.7	11,053
Hotel	261,500	116,440	2.2	69,300	43,000	1.6	138,146
Food	305,000	87,080	3.5	115,400	35,500	3.3	99,588
Sugar	1,905,938	561,519	3.4	635,753	305,613	2.1	774,298
Chem	323,816	325,500	1.0	127,920	125,000	1.0	96,118
Totals	2,846,075	1,124,649	2.5	970,153	522,263	1.9	1,119,203
Totals (Ex. Sugar)	940,137	563,130	1.7	334,400	216,650	1.5	344,905

TABLE 4

OPERATIONS & MAINTENANCE ECO's
JAMAICAN PRIVATE SECTOR

PLANT TYPE	ECO DESCRIPTION	COST (J $)	FX (US $)	ENERGY SAVINGS (Per Year)	COST SAVINGS (J $/Yr)
Comm'l	Building operations	0	0	9,200 KWH	2,000
Hotel	Electric power dist.	500	0	28,000 KWH	5,800
Hotel	Probable oil tank leak	25,200	9,100	10,400 IG (ADO)	29,400
Hotel	Room A/C controls	4,700	530	16,800 KWH	3,528
Food	Boiler clean-up	1,000	0	900 IG (ADO)	2,500
Food	Compressor operations	4,800	500	41,000 KWH	8,610
Sugar	Boiler oxygen analyzer	15,000	5,500	9,500 IG ("C")	17,100
Totals	Seven O&M ECO's	51,200	15,630	95,000 KWH 11,300 IG diesel 9,500 IG Bunker "C"	68,938

IMPORTED PETROLEUM SAVINGS = 5033 Million BTU/yr

FOREIGN EXCHANGE SAVINGS = $28,500/yr.

VI. ENERGY CONSERVATION OPPORTUNITIES

Opportunities for improvement in energy efficiency were found in a wide variety of different areas. Nine different types or categories of ECO's were represented by two or more proposed changes.

Operations and Maintenance (7 ECO's)

Methods of controlling or operating buildings, processes, or energy consuming equipment were identified which could be improved to conserve energy. Equipment which could potentially save energy was found out of service due to a lack of maintenance or inability to obtain spare parts. The difficulty in acquiring foreign exchange for these parts often contributed to the maintenance problem.

Heat Recovery (5 ECO's)

The opportunity to make use of waste heat from existing processes was one of the most promising retrofit ECO's identified. In hotel buildings, the waste heat rejected from air conditioning system condensers can be used to provide hot water for rooms and kitchens. In laundries, hot wash water dumped to the drain can be used to preheat incoming water to be used in the next cycle. In food processing plants, waste heat from refrigeration machine condensers can be used to heat clean-up water. In boilers, economizers can be installed to preheat boiler feedwater using the boiler exhaust stack gas as a heat source.

Insulation (5 ECO's)

High temperature insulation was found missing or ragged in some areas, such as steam lines and process heating equipment such as boilers and melters. The addition of insulation can save significant amounts of fuel oil and results in a simple payback period of about one year.

High Efficiency Electric Motors (4 ECO's)

It is likely that over half of the electric energy consumed in Jamaica is used in electric motors, therefore there is a great potential for energy

conservation if the efficiency of these motors can be improved. Although efficiencies vary with the size of the motor and the manufacturer, the average industry standard efficiency is about85% at full load. High efficiency motors improve this efficiency to about 92% at full load, representing an energy savings of about 8% at the point of use. When coupled with the losses suffered by the power company in generation and transmission, this savings becomes even greater. In one-shift operation plants, the incremental cost of purchasing a new high efficiency motor over local rewinding of the old, failed motor is returned with a one-year payback in energy savings. However, when duty is applied to the new motor cost, the payback is about four years (see Conclusions and Recommendations). For a motor operated continuously, the payback is between one and two years.

Air Conditioning (3 ECO's)

Controls on air conditioning units were found to be malfunctioning or out of calibration, resulting in energy waste. The cleaning of the inside surfaces of heat transfer surfaces can result in improved air flow and system efficiency. Also, in some instances the installation of a new system of higher efficiency can be justified rather than repair of the existing unit.

Solar Water Heating (3 ECO's)

The use of flat plate solar collectors for water heating is an attractive opportunity for those cases in which water is presently heated electrically. The simple payback period for such investments ranges from two to three years. As a retrofitting opportunity to replace fuel oil, however, the payback period is much longer, on the order of six to nine years, depending on maintenance costs. Given that the useful life of the collectors may not greatly exceed the payback period, such investments must be very carefully scrutinized.

Lighting (2 ECO's)

Opportunities exist to upgrade lighting systems by means of more efficient bulbs and luminaires. Incandescent lighting can be replaced by fluorescent fixtures in commercial settings and high intensity discharge

fixtures in industrial plants. Existing fluorescent lighting can be improved through relamping with high efficiency bulbs.

Cogeneration (2 ECO's)

The generation of electric power in the plant can be an attractive opportunity if a need exists for the waste heat. Excess steam generated by an exothermic chemical reaction can be used to drive a steam turbine generator. A diesel generator can be cost-effective if the heat rejected in the cooling water or exhaust stack can be used for process water heating.

Controls (2 ECO's)

The upgrading of system controls can save substantial amounts of energy in those cases in which manual control is used. Boiler air-to-fuel ratios can be continuously adjusted by means of stack gas oxygen analyzers and combustion air dampers. Air conditioning controls can be installed to sense room occupancy and adjust thermostat settings.

VII. DISCUSSION

General mechanical equipment conditions at the five plants studied were quite good. In all cases, the level of upkeep of the plants was about as good as team members have observed in energy audits of similar plants in the U.S. The level of maintenance expertise available at each plant was also about the same as is typical in the U.S. As a result, the types of ECO's developed were similar to those that might result in a U.S. audit.

There were indications of the national foreign exchange deficit influencing plant maintenance. At least three instances were found in which substantial amounts of energy could be saved if spare parts could be ordered. Plant operating and maintenance personnel were well aware of the potential savings possible by restoring the equipment, but face very long lead times to obtain a foreign exchange license.

In contrast to the good operations and maintenance expertise found, there were indications in two or three of the five plants that better accounting procedures could be of benefit. It was apparent, in these cases, that the work done by the energy audit team members represented the first time that the plant's energy consumption and cost data had been collected and tabulated in a rational format. Such a procedure is an important part of an overall energy management program, as trends in the energy consumption figures can be used to pinpoint possible plant operating and maintenance problems, as well as the billing errors that seem to occur all too often. Developing tabulated, or graphical, energy data and making it available to plant personnel can be an effective energy conservation strategy. Plant personnel can thereby set goals and can track their performance, especially on a per unit basis (such as KWH per pound of product). This awareness and accountability often leads to great savings, as unnecessary equipment is shut off immediately. Because of the accounting procedures found, plant managers in some instances had only a vague idea of their plant's energy consumption.

In all cases, the plant managers were quite enthusiastic about the need for energy conservation and were very interested in the potential U.S. A.I.D. project. Their cooperation with the energy audit team members and their

willingness to open their files and to help the team by giving plant tours were excellent.

VIII. ECONOMIC FEASIBILITY

Each ECO was evaluated individually using before-tax simple payback methods. The simple payback period was used as a relative screening tool to determine the feasibility of each ECO. Any ECO having a payback period of over eight years was discarded, except in one case.

After completion of the ECO reports, the data was fed into a computer program in order to determine the following economic evaluation criteria:

- simple payback
- after tax discounted payback
- after tax return on investment
- net present value

The following inputs, specific to each ECO evaluated, were made to the program:

- capital cost of retrofit
- energy savings (monthly basis) less maintenance
- salvage value
- life of equipment

The following inputs were held constant for each ECO evaluated:

- down payment (0%)
- loan amount (100%)
- loan interest rate (9%)
- loan term (6 years)
- annual inflation rate (18%)
- discount, or present value, rate (10%)
- tax credit (0%)
- depreciation (double declining balance)
- tax bracket (45%)
- life of study (6 years)

In addition, a sensitivity analysis was performed, varying the loan interest rate and measuring the effect on return on investment, simple payback, and discounted payback. The variations were:

Variable change no. 1	(9% interest)
Variable change no. 2	(12% interest)
Variable change no. 3	(15% interest)

The investments were not particularly sensitive to changes in the loan interest rate. The return on investment generally was reduced by less than 1% for each 3% change in the interest rate. The discounted payback changed only slightly in most cases.

The results of the discounted analyses are given in Annexes "A" through "E" following each ECO summary sheet. The various terms listed in the computer program are defined in Annex "F". A listing of the program is also included in Annex "F".

IX. CONCLUSIONS AND RECOMMENDATIONS

The general conclusion can be drawn that there exists an excellent opportunity for energy conservation in the private sector. Furthermore, it is apparent that investments to improve energy efficiency are very attractive, with high rates of return.

One fact that became apparent in the economic evaluations of the ECO's is that a substantial part of the cost of the retrofitting projects was duty. A total of 30% duty was used in the calculations on the CIF cost of imported equipment. This represents 5% customs duty, 15% consumption tax, and 10% ad valorem (stamp duty). Many ECO's had a high foreign exchange component, and the 30% duty represented a 20-25% increase in project costs. One potential project that could save substantial amounts of energy and is generic to most industries is the introduction of high efficiency electric motors. Most industries now have their old, inefficient motors rewound locally, perpetuating energy waste. Comparing the incremental cost of purchasing a high efficiency motor over the local rewind cost, energy savings result in a simple payback of less than one year in single-shift plants. However, when the duty of 30% is applied to the entire new motor first cost (rather than the incremental cost), the payback increases to about four years for single shift operations. Hence, a good energy-saving investment has been made much less attractive, simply because of local duty. In order to encourage energy conservation investments, it is recommended that retrofitting equipment purchases authorized on the U.S. A.I.D. loan project be permitted to enter Jamaica duty free.

One other problem that was discovered is the lack of a base of energy conservation service industries and equipment manufacturers in Jamaica. For example, in order to perform a specialized maintenance procedure on the commercial office building (cleaning of air conditioning coils, fans, ductwork, and registers), high powered industrial vacuum equipment must be brought in from the U.S., along with skilled personnel. Such a service could readily be provided by a Jamaican company if it had the necessary equipment and expertise. Another example is the case of heat exchangers, which were identified in a number of heat recovery opportunities. If these heat

exchangers could be fabricated in Jamaica, using local skilled labor such as welders and sheet metal workers, the projects could be performed at substantially reduced costs. Most significantly, foreign exchange would be saved and local employment would be stimulated.

ANNEX "A"

COMMERCIAL OFFICE BUILDING

KINGSTON, JAMAICA

EXECUTIVE SUMMARY

Energy consumption at your plant for the twelve-month period December 1980 through November 1981 consisted of:

1,082,000 KWH of electricity

Total energy costs for the period were $239,822.02.

The electric energy conservation opportunities (ECO's) contained in this report could save an estimated 154,600 KWH each year, or 14% of your total electric usage. The annual cost savings for all ECO's would amount to approximately $34,100 (J), or 14% of your annual energy costs. This figure is based on average energy costs for the past twelve month period. The estimated total cost of all ECO's is $49,821 (J), for an average simple payback of 1.5 years for the projects.

The ECO's in this report could save an estimated 2319 million BTU's each year in the form of petroleum imported to Jamaica. This would save $13,150 (U.S.) per year of foreign exchange. The foreign exchange cost of the ECO's in this report totals $21,780 (U.S.), thereby providing a net 60% rate of return on the foreign exchange investment to Jamaica.

The recommendations are:

		Energy Savings	Cost Savings
1.	Keep all doors closed	9,200 KWH	$ 2,000 (J)
2.	Replace motors	10,000 KWH	2,170
3.	Replace fluorescent lamps	18,000 KWH	4,932
4.	Repair air conditioner controls	35,000 KWH	7,600
5.	Clean up air conditioner air distribution system	68,600 KWH	14,406
6.	Install solar hot water system	13,800 KWH	3,002

Job Commercial Bldg.

ECO No. 1

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 1

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Door on ground floor is left open during occupied hours.

2. Recommendation:

Keep doors closed.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	9200			
Cost Reduction	$ 2000			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 0 (J)

B. Foreign exchange component of A. above $ 0 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 0 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation N/A years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{0}{2000} = 0$ years

Job Commercial Bldg.

ECO No. 2

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 13

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Existing motors are of old, standard efficiency type.

2. Recommendation:

Replace motors with new, high efficiency types instead of rewinding old motors.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	10,000			
Cost Reduction	$ 2170			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 8,900 (J)

B. Foreign exchange component of A. above $ 7,800 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 4,200 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ -0- (J)

E. Estimated useful life of recommendation 10 years

F. Salvage value (or disposal cost) $ 1100 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{8900}{2170} = 4.1$ years

ECONOMIC ANALYSIS FOR: COMMERCIAL BUILDING

THE PRICE OF THE PLANT = 8900.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 8900.00
THE TERMS OF THE ORIGINAL LOAN ARE: 10 YEARS, AT 9.0 PERCENT.
THE YEARLY INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE PLANT PRICE WAS DEPRECIATED FOR 10 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE MONTHLY INCOME = 180.80
THE SALVAGE VALUE = 1100.00
THE LIFE OF THIS STUDY IS 10 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	YEARLY INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	8900.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	8314.	2188.	2560.	0.	1387.	1173.	1456.	0.	1173.	1067.	1067.
2	7676.	4717.	3021.	0.	1387.	1634.	1191.	199.	1435.	1186.	2253.
3	6980.	7643.	3565.	0.	1387.	2178.	974.	542.	1636.	1229.	3482.
4	6221.	11034.	4206.	0.	1387.	2820.	797.	910.	1909.	1304.	4786.
5	5394.	14967.	4964.	0.	1387.	3577.	780.	1258.	2318.	1440.	6226.
6	4493.	19533.	5857.	0.	1387.	4470.	780.	1660.	2810.	1586.	7812.
7	3510.	24840.	6911.	0.	1387.	5524.	780.	2135.	3390.	1739.	9551.
8	2440.	31014.	8155.	0.	1387.	6768.	780.	2695.	4074.	1900.	11452.
9	1272.	38203.	9623.	0.	1387.	8236.	780.	3355.	4881.	2070.	13522.
10	-0.	46581.	11355.	0.	1387.	9969.	780.	4135.	5834.	2249.	15771.

RETURN ON INVESTMENT = 5.88 %

SIMPLE PAYBACK = 5.5 YEARS.

DISCOUNTED PAYBACK = 6.6 YEARS.

SENSITIVITY ANALYSIS

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	5.9 %	5.5 YEARS	6.6 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	5.4 %	5.6 YEARS	7.0 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	[illegible]	[illegible] YEARS	[illegible] YEARS

CASH FLOW ANALYSIS FOR: COMMERCIAL BUILDING, ECO NO. 2

THE PRICE OF THE PLANT = 8900.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 8900.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 2170.00
THE SALVAGE VALUE = 1100.00
THE LIFE OF THIS STUDY IS 10 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	8900.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	7717.	1183.	2170.	0.	1984.	186.	2119.	0.	0.	0.	0.
2	6428.	2579.	2561.	0.	1984.	577.	1512.	0.	0.	0.	0.
3	5022.	4226.	3022.	0.	1984.	1038.	1300.	0.	0.	0.	0.
4	3490.	6170.	3565.	0.	1984.	1581.	1300.	126.	1455.	994.	994.
5	1820.	8463.	4207.	0.	1984.	2223.	1300.	415.	1808.	1123.	2116.
6	-0.	11170.	4964.	0.	1984.	2980.	1300.	756.	2224.	1256.	3372.
7	0.	14363.	5858.	0.	0.	5858.	0.	2636.	3222.	1653.	5025.
8	0.	18132.	6912.	0.	0.	6912.	0.	3111.	3802.	1774.	6799.
9	0.	22578.	8157.	0.	0.	8157.	0.	3671.	4486.	1903.	8701.
10	0.	27825.	9625.	0.	0.	9625.	0.	4331.	5294.	2041.	10742.

PROJECT HAS YET TO BREAK EVEN.

SIMPLE PAYBACK = 7.5 YEARS.

DISCOUNTED PAYBACK = 9.1 YEARS.

SENSITIVITY ANALYSIS

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	1.9 %	7.5 YEARS	8.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	1.7 %	7.5 YEARS	7.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	.7 %	7.5 YEARS	6.1 YEARS

.383 CP SECONDS EXECUTION TIME.

Job Commercial Bldg.

ECO No. 3

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 3

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Standard efficiency fluorescent lamps are in use, 40 eatts each.

2. Recommendation:

Replace with higher efficiency lamps, 34 watts each.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	18,000			
Cost Reduction	$4932			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 4970 (J)

B. Foreign exchange component of A. above $ 2230 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 1000 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 3 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{4970}{4932} = 1$ years

CASH FLOW ANALYSIS FOR: COMMERCIAL BUILDING, ECO NO. 3

THE PRICE OF THE PLANT = 4970.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 4970.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 4932.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 6 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	4970.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	4309.	661.	4932.	0.	1108.	3824.	1183.	1189.	2635.	2396.	2396.
2	3589.	1440.	5820.	0.	1108.	4712.	844.	1740.	2972.	2456.	4852.
3	2804.	2360.	6867.	0.	1108.	5759.	829.	2219.	3541.	2660.	7512.
4	1949.	3445.	8103.	0.	1108.	6996.	829.	2775.	4220.	2883.	10394.
5	1016.	4726.	9562.	0.	1108.	8454.	829.	3431.	5023.	3119.	13513.
6	-0.	6237.	11283.	0.	1108.	10175.	829.	4206.	5969.	3370.	16883.

RETURN ON INVESTMENT = 22.59 %

SIMPLE PAYBACK = 1.9 YEARS.

DISCOUNTED PAYBACK = 2.0 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	22.6 %	1.9 YEARS	2.0 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	22.3 %	1.9 YEARS	2.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	22.0 %	1.9 YEARS	2.1 YEARS

.366 CP SECONDS EXECUTION TIME.

Job Commercial Bldg.

ECO No. 4

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 6

1. Building Envelope
2. Insulation
3. Lighting
4. Hot water
5. Food services
6. Air conditioning
7. Ventilation
8. Process heating
9. Production equipment
10. Heat recovery
11. Solar
12. Operations and maintenance
13. Motors
14. Power factor
99. Miscellaneous

1. Existing conditions:

Air conditioner controls are in poor repair, and are out of calibration.

2. Recommendation:

Recondition or replace, and calibrate air conditioner controls.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	35,000			
Cost Reduction	$ 7600			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 8500 (J)

B. Foreign exchange component of A. above $ 2000 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 1068 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 1000 (J)

E. Estimated useful life of recommendation 10 years

F. Salvage value (or disposal cost) $ 350 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{8500}{6600} = 1.3$ years

CASH FLOW ANALYSIS FOR: COMMERCIAL BUILDING, ECO NO. 4

THE PRICE OF THE PLANT = 8500.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 8500.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 1000.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 7600.00
THE SALVAGE VALUE = 350.00
THE LIFE OF THIS STUDY IS 10 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	8500.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	7370.	1130.	7600.	1000.	1895.	5705.	2022.	1657.	4048.	3680.	3680.
2	6139.	2463.	8968.	1180.	1895.	7073.	1444.	2533.	4540.	3752.	7432.
3	4796.	4036.	10582.	1392.	1895.	8687.	1359.	3298.	5389.	4049.	11481.
4	3333.	5892.	12487.	1643.	1895.	10592.	1359.	4155.	6437.	4397.	15878.
5	1738.	8083.	14735.	1939.	1895.	12840.	1359.	5167.	7673.	4765.	20642.
6	-0.	10668.	17387.	2288.	1895.	15492.	1359.	6360.	9132.	5155.	25797.
7	0.	13718.	20517.	2700.	0.	20517.	0.	9232.	11284.	5791.	31588.
8	0.	17317.	24210.	3185.	0.	24210.	0.	10894.	13315.	6212.	37799.
9	0.	21564.	28567.	3759.	0.	28567.	0.	12855.	15712.	6663.	44463.
10	0.	26575.	33709.	4435.	0.	33709.	0.	15169.	18540.	7148.	51611.

RETURN ON INVESTMENT = 19.76 %

SIMPLE PAYBACK = 2.0 YEARS.

DISCOUNTED PAYBACK = 2.3 YEARS.

SENSITIVITY ANALYSIS

	RETURN ON INVESTMENT		DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO		9.:	
VARIABLE CHANGE NO. 1:	18.0 %	2.5 YEARS	2.6 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO		12.:	
VARIABLE CHANGE NO. 2:	17.9 %	2.5 YEARS	2.7 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO		15.:	
VARIABLE CHANGE NO. 3:	17.8 %	2.6 YEARS	2.7 YEARS

.406 CP SECONDS EXECUTION TIME.

Job Commercial Building

ECO No. 5

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 6

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Air handler fans, housings, and ductwork are dirty.

2. Recommendation:

Clean up air conditioning air distribution system.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	68,600			
Cost Reduction	$14,406			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 14,931 (J)

B. Foreign exchange component of A. above $ 8850 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 0 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 3 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{14,931}{14,406} = 1.1$ years

CASH FLOW ANALYSIS FOR: COMMERCIAL BUILDING, ECO NO. 5

THE PRICE OF THE PLANT = 14931.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 14931.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 3 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 3 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 14406.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 6 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	14931.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	12946.	1985.	14406.	0.	3328.	11078.	4977.	2745.	8332.	7575.	7575.
2	10783.	4326.	16999.	0.	3328.	13671.	4977.	3912.	9759.	8065.	15640.
3	8425.	7090.	20059.	0.	3328.	16730.	4977.	5289.	11442.	8596.	24236.
4	5855.	10351.	23670.	0.	3328.	20341.	0.	9153.	11188.	7641.	31877.
5	3054.	14198.	27930.	0.	3328.	24602.	0.	11071.	13531.	8402.	40279.
6	-0.	18739.	32957.	0.	3328.	29629.	0.	13333.	16296.	9199.	49478.

RETURN ON INVESTMENT = 22.10 %

SIMPLE PAYBACK = 1.8 YEARS.

DISCOUNTED PAYBACK = 1.9 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	22.1 %	1.8 YEARS	1.9 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	21.8 %	1.8 YEARS	1.9 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	21.5 %	1.8 YEARS	2.0 YEARS

349 CP SECONDS EXECUTION TIME.

Job Commercial Building

ECO No. 6

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 11-5

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Domestic hot water is supplied by electric resistance heaters. Cafeteria uses 200 IG of hot water per day, 5 days per week.

2. Recommendation:

Install a solar hot water system to provide 85% of the domestic hot water needs. If cafeteria were open 7 days a week, payback would in 2.7 years.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	13,800			
Cost Reduction	$3002			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 10,620 (J)

B. Foreign exchange component of A. above $ 900 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 480 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 250 (J)

E. Estimated useful life of recommendation 12 years

F. Salvage value (or disposal cost) $ 2500 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{10,620}{2,752} = 3.9$ years

CASH FLOW ANALYSIS FOR: COMMERCIAL BUILDING, ECO NO. 6

THE PRICE OF THE PLANT = 10620.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 10620.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 250.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 3002.00
THE SALVAGE VALUE = 2500.00
THE LIFE OF THIS STUDY IS 12 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERATIONAL COSTS	AMORTIZATION	CASH FLOW	DEPRECIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	10620.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	9208.	1412.	3002.	250.	2367.	635.	2527.	0.	0.	0.	0.
2	7670.	3077.	3542.	295.	2367.	1175.	1804.	0.	0.	0.	0.
3	5993.	5043.	4180.	348.	2367.	1813.	1354.	207.	1606.	1207.	1207.
4	4165.	7362.	4932.	411.	2367.	2565.	1354.	545.	2020.	1380.	2586.
5	2172.	10099.	5820.	485.	2367.	3453.	1354.	945.	2508.	1557.	4144.
6	-0.	13328.	6868.	572.	2367.	4500.	1354.	1416.	3084.	1741.	5885.
7	0.	17139.	8104.	675.	0.	8104.	0.	3647.	4457.	2287.	8172.
8	0.	21636.	9563.	796.	0.	9563.	0.	4303.	5260.	2454.	10626.
9	0.	26942.	11284.	940.	0.	11284.	0.	5078.	6206.	2632.	13258.
10	0.	33203.	13315.	1109.	0.	13315.	0.	5992.	7323.	2823.	16081.
11	0.	40591.	15712.	1308.	0.	15712.	0.	7070.	8642.	3029.	19110.
12	0.	49309.	18540.	1544.	0.	18540.	0.	8343.	10197.	3249.	22359.

RETURN ON INVESTMENT = 6.40 %

SIMPLE PAYBACK = 6.6 YEARS.

DISCOUNTED PAYBACK = 8.0 YEARS.

SENSITIVITY ANALYSIS

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	5.6 %	6.8 YEARS	8.4 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	5.0 %	7.5 YEARS	9.0 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	4.9 %	7.5 YEARS	9.1 YEARS

.394 CP SECONDS EXECUTION TIME.

ANNEX "B"

TOURIST HOTEL

OCHO RIOS, JAMAICA

EXECUTIVE SUMMARY

Energy consumption at your plant for the twelve month period February 1981 through January 1982 consisted of:

- 1,497,600 KWH of electricity
- 35,762.9 imperial gallons of LP gas (butane/propane)
- 22,262 imperial gallons of #2 fuel oil (diesel)
- 0 imperial gallons of #6 fuel oil (Bunker C)

Total energy costs for the period were $475,144.05 (J).

The electric energy conservation opportunities (ECO's) contained in this report could save an estimated 252,000 KWH each year, or 17% of your total electric usage. Fuel ECO's could save an estimated 3793 million BTU's each year, or 49% of your total fuel usage. The annual cost savings for all ECO's would amount to approximately $116,440 (J), or 25% of your annual energy costs. This figure is based on average energy costs for the past twelve month period. The estimated total cost of all ECO's is $261,500 (J), for an average simple payback period of 2.3 years for all projects.

The ECO's in this report could save an estimated 7573 million BTU's each year in the form of petroleum imported to Jamaica. This would save $43,000 (U. S.) per year of foreign exchange. The foreign exchange cost of the ECO's in this report totals $69,300 (U. S.), thereby providing a net 62% rate of return on the foreign exchange investment to Jamaica.

The recommendations are:

		Energy Savings	Cost Savings J$
ECO-1.	Balance voltages	28,000 kwh	$ 5,880
ECO-2.	Replace incandescent lighting	31,800 kwh	6,670
ECO-3.	Investigate hot water energy	10,400 IG	29,400
ECO-4.	Repair door switches	16,800 kwh	3,530
ECO-5.	Laundry heat recovery	2,190 IG*	6,160
ECO-6.	Air conditioner heat recovery	5,100 IG	14,400
ECO-7.	New chiller with heat recovery	63,000 kwh	13,000
		2,700 IG	7,640
ECO-8.	Room climate control	84,000 kwh	17,600
ECO-9.	Solar water heaters	28,600 kwh	6,000
ECO-10.	Solar water heater (laundry)	2,190 IG*	6,160
	Σ =	252,000 KWH	
		22,580 IG	$ 116,440

* during 1981, propane gas was consumed for these applications, 3227 IG, $9,165. each. Hotel has since converted to oil.

JOB Hotel

ECO No. 1

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 12

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions: Measurements on the electric power distribution system indicate that the three phase mains voltages are unbalanced, causing motors to run inefficienty.

2. Recommendation: Retap step down transformer and balance phase to phase voltages.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	28,000			
Cost Reduction	$5,880			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 500.00 (J)

B. Foreign exchange component of A. above $ 0 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 0 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 0 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{500}{5800} = 0.1$ years

Job Hotel

ECO No. 2

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 3

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Hallways are lit by incandescent lamps burning continuously.

2. Recommendation:

Replace incandescents with lower wattage fluorescent fixtures.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	31, 764			
Cost Reduction	$6,670			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 6,350.00 (J)

B. Foreign exchange component of A. above $ 0 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 0 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 989.00 (J)

E. Estimated useful life of recommendation 10 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{6350}{7659} = 0.83$ years

CASH FLOW ANALYSIS FOR: TOURIST HOTEL, ECO NO. 2

THE PRICE OF THE PLANT = 6350.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 6350.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 989.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 6670.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 10 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	6350.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	5506.	844.	6670.	989.	1416.	5254.	1511.	1685.	3570.	3245.	3245.
2	4586.	1840.	7871.	1167.	1416.	6455.	1079.	2419.	4036.	3335.	6581.
3	3583.	3015.	9287.	1377.	1416.	7872.	1059.	3066.	4806.	3611.	10191.
4	2490.	4402.	10959.	1625.	1416.	9543.	1059.	3818.	5725.	3910.	14102.
5	1299.	6038.	12932.	1917.	1416.	11516.	1059.	4706.	6810.	4229.	18330.
6	-0.	7969.	15259.	2263.	1416.	13844.	1059.	5753.	8090.	4567.	22897.
7	0.	10248.	18006.	2670.	0.	18006.	0.	8103.	9903.	5082.	27979.
8	0.	12937.	21247.	3150.	0.	21247.	0.	9561.	11686.	5452.	33431.
9	0.	16109.	25072.	3718.	0.	25072.	0.	11282.	13789.	5848.	39279.
10	0.	19853.	29584.	4387.	0.	29584.	0.	13313.	16271.	6273.	45552.

RETURN ON INVESTMENT = 21.77 %

SIMPLE PAYBACK = 1.8 YEARS.

DISCOUNTED PAYBACK = 1.9 YEARS.

SENSITIVITY ANALYSIS

		SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO	9.:		
VARIABLE CHANGE NO. 1:	19.8 %	2.0 YEARS	2.3 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO	12.:		
VARIABLE CHANGE NO. 2:	19.7 %	2.4 YEARS	2.3 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO	15.:		
VARIABLE CHANGE NO. 3:	19.6 %	2.4 YEARS	2.4 YEARS

.409 CP SECONDS EXECUTION TIME.

Job Hotel

ECO No. 3

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 12

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Fuel consumption for hot water appears excessive, about twice what is expected from engineering estimates.

2. Recommendation: Investigate cause of excessive consumption. Underground fuel tanks may be leaking or hidden hot water lines may not be insulated. Replacement of the two fuel tanks with fiberglass tanks, which are not prone to rusting out in the beach environment, is the higher cost of the two projects, and is assumed in the following cost estimate.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction			10,400	
Cost Reduction			29,400	

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 25,200 (J)

B. Foreign exchange component of A. above $ 9,100 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 5,000 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 15 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$25,200}{\$29,400/\text{yr}} = 0.9$ years

CASH FLOW ANALYSIS FOR: TOURIST HOTEL, ECO NO. 3

THE PRICE OF THE PLANT = 25200.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 25200.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 29400.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 15 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERATIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	25200.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	21850.	3350.	29400.	0.	5618.	23782.	5996.	8004.	15779.	14344.	14344.
2	18199.	7302.	34692.	0.	5618.	29074.	4280.	11157.	17917.	14808.	29152.
3	14220.	11966.	40937.	0.	5618.	35319.	4200.	14003.	21316.	16015.	45166.
4	9882.	17469.	48305.	0.	5618.	42688.	4200.	17319.	25368.	17327.	62493.
5	5154.	23964.	57000.	0.	5618.	51382.	4200.	21232.	30151.	18721.	81214.
6	-0.	31627.	67260.	0.	5618.	61642.	4200.	25849.	35794.	20205.	101419.
7	0.	40669.	79367.	0.	0.	79367.	0.	35715.	43652.	22400.	123819.
8	0.	51339.	93653.	0.	0.	93653.	0.	42144.	51509.	24029.	147849.
9	0.	63930.	110510.	0.	0.	110510.	0.	49730.	60781.	25777.	173626.
10	0.	78786.	130402.	0.	0.	130402.	0.	58681.	71721.	27652.	201277.
11	0.	96318.	153875.	0.	0.	153875.	0.	69244.	84631.	29663.	230940.
12	0.	117004.	181572.	0.	0.	181572.	0.	81708.	99865.	31820.	262760.
13	0.	141415.	214255.	0.	0.	214255.	0.	96415.	117840.	34134.	296894.
14	0.	170219.	252821.	0.	0.	252821.	0.	113770.	139052.	36617.	333511.
15	0.	204208.	298329.	0.	0.	298329.	0.	134248.	164081.	39280.	372790.

RETURN ON INVESTMENT = 19.67 %

SIMPLE PAYBACK = 1.7 YEARS.

DISCOUNTED PAYBACK = 1.7 YEARS.

SENSITIVITY ANALYSIS

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	19.7 %	1.7 YEARS	1.7 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	19.6 %	1.7 YEARS	1.8 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	19.6 %	1.7 YEARS	1.8 YEARS

.411 CP SECONDS EXECUTION TIME.

Job Hotel

ECO No. 4

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 12

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions: Switches are installed on veranda sliding glass doors to turn off room air conditioner when door is open, however many of these are not in operating condition.

2. Recommendation: Repair or replace systems to restore to operation in all rooms. Repeat complete system check every five years, with annual spot checks.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	16,800			
Cost Reduction	$3,528			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $4,700 (J)

B. Foreign exchange component of A. above $ 530 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 300 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 200 (J)

E. Estimated useful life of recommendation 5 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$\ 4,700}{\$\ 3,328} =$ 1.4 years

CASH FLOW ANALYSIS FOR: TOURIST HOTEL, ECO NO. 4

THE PRICE OF THE PLANT = 4700.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 4700.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 200.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 5 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 5 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 3528.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 6 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERATIONAL COSTS	AMORTIZATION	CASH FLOW	DEPRECIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	4700.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	4075.	625.	3528.	200.	1048.	2480.	1252.	553.	1928.	1752.	1752.
2	3394.	1362.	4163.	236.	1048.	3115.	940.	979.	2137.	1766.	3518.
3	2652.	2232.	4912.	278.	1048.	3865.	940.	1316.	2549.	1915.	5433.
4	1843.	3258.	5797.	329.	1048.	4749.	940.	1714.	3035.	2073.	7506.
5	961.	4469.	6840.	388.	1048.	5792.	940.	2183.	3609.	2241.	9747.
6	-0.	5899.	8071.	458.	1048.	7023.	0.	3161.	3863.	2181.	11927.

RETURN ON INVESTMENT = 16.78 %

SIMPLE PAYBACK = 2.5 YEARS.

DISCOUNTED PAYBACK = 2.6 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	15.6 %	2.6 YEARS	2.8 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	15.2 %	2.6 YEARS	2.8 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	14.8 %	2.6 YEARS	2.9 YEARS

.360 CP SECONDS EXECUTION TIME.

Job. Hotel

ECO No. 5

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 10

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Hot water from hotel laundry being dumped to drain.

2. Recommendation:

Install heat exchanger to preheat fresh makeup water.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction			2,190	
Cost Reduction			$6,160	

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 9,544 (J)

B. Foreign exchange component of A. above $ 1,700 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 414 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 150/yr (J)

E. Estimated useful life of recommendation 15 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{9,544}{6,010} = 1.59$ years

CASH FLOW ANALYSIS FOR: TOURIST HOTEL, ECO NO. 5

THE PRICE OF THE PLANT = 9544.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 9544.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 150.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 6160.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 15 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	9544.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	8275.	1269.	6160.	150.	2128.	4032.	2271.	793.	3240.	2945.	2945.
2	6893.	2766.	7269.	177.	2128.	5141.	1621.	1584.	3557.	2940.	5885.
3	5385.	4532.	8577.	209.	2128.	6450.	1591.	2186.	4263.	3203.	9088.
4	3743.	6616.	10121.	246.	2128.	7994.	1591.	2881.	5112.	3492.	12580.
5	1952.	9076.	11943.	291.	2128.	9815.	1591.	3701.	6114.	3797.	16377.
6	-0.	11978.	14093.	343.	2128.	11965.	1591.	4668.	7297.	4119.	20495.
7	0.	15403.	16629.	405.	0.	16629.	0.	7483.	9146.	4693.	25189.
8	0.	19444.	19623.	478.	0.	19623.	0.	8830.	10792.	5035.	30223.
9	0.	24212.	23155.	564.	0.	23155.	0.	10420.	12735.	5401.	35624.
10	0.	29839.	27322.	665.	0.	27322.	0.	12295.	15027.	5794.	41418.
11	0.	36478.	32240.	785.	0.	32240.	0.	14508.	17732.	6215.	47633.
12	0.	44313.	38044.	926.	0.	38044.	0.	17120.	20924.	6667.	54300.
13	0.	53558.	44892.	1093.	0.	44892.	0.	20201.	24690.	7152.	61452.
14	0.	64467.	52972.	1290.	0.	52972.	0.	23837.	29135.	7672.	69124.
15	0.	77340.	62507.	1522.	0.	62507.	0.	28128.	34379.	8230.	77354.

RETURN ON INVESTMENT = 14.97 %

SIMPLE PAYBACK = 2.8 YEARS.

DISCOUNTED PAYBACK = 3.1 YEARS.

SENSITIVITY ANALYSIS

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	14.8 %	2.8 YEARS	3.2 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	14.7 %	2.9 YEARS	3.3 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	14.7 %	2.9 YEARS	3.4 YEARS

.420 CP SECONDS EXECUTION TIME.

Job Hotel

ECO No. 6

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 6-10-4

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Hot water for the kitchen and west wing is provided by an oil-fired boiler.

Showerhead nozzles deliver high flow rate of hot water.

2. Recommendation:
Install waste heat recovery system to heat domestic hot water using heat rejected in air conditioning refrigerant desuperheater and condenser sections. Install flow restricting bathroom showerheads.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction			5,100	
Cost Reduction			14,400	

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 28,600 (J)

B. Foreign exchange component of A. above $ 10,000 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 3,800 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 200 (J)

E. Estimated useful life of recommendation 10 years

F. Salvage value (or disposal cost) $ 1,000 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$28,600}{\$14,200/\text{yr}} = 2.0$ years

CASH FLOW ANALYSIS FOR: TOURIST HOTEL, ECO NO. 6

THE PRICE OF THE PLANT = 28600.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 28600.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 200.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 14400.00
THE SALVAGE VALUE = 1000.00
THE LIFE OF THIS STUDY IS 10 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	28600.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	24798.	3802.	14400.	200.	6376.	8024.	6805.	549.	7476.	6796.	6796.
2	20655.	8287.	16992.	236.	6376.	10616.	4858.	2591.	8025.	6632.	13428.
3	16138.	13580.	20051.	278.	6376.	13675.	4600.	4084.	9591.	7206.	20635.
4	11215.	19826.	23660.	329.	6376.	17284.	4600.	5708.	11576.	7907.	28542.
5	5849.	27197.	27918.	388.	6376.	21543.	4600.	7624.	13919.	8642.	37184.
6	-0.	35894.	32944.	458.	6376.	26568.	4600.	9886.	16683.	9417.	46601.
7	0.	46156.	38874.	540.	0.	38874.	0.	17493.	21380.	10972.	57572.
8	0.	58266.	45871.	637.	0.	45871.	0.	20642.	25229.	11769.	69342.
9	0.	72555.	54128.	752.	0.	54128.	0.	24357.	29770.	12625.	81967.
10	0.	89416.	63871.	887.	0.	63871.	0.	28742.	35129.	13544.	95511.

RETURN ON INVESTMENT = 12.81 %

SIMPLE PAYBACK = 3.5 YEARS.

DISCOUNTED PAYBACK = 4.0 YEARS.

SENSITIVITY ANALYSIS

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	12.6 %	3.6 YEARS	4.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	12.5 %	3.6 YEARS	4.2 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	11.5 %	4.4 YEARS	5.1 YEARS

.406 CP SECONDS EXECUTION TIME.

Job Hotel

ECO No. 7

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 6-10-4

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions: Chiller system for air conditioning serving east end of new wing of hotel is in need of extensive repair. Hot water supplied to the rooms is provided by an oil-fired boiler. Showerhead nozzles deliver high flow rate of hot water.

2. Recommendation: Replace chiller system with new unit incorporating modulating controls and heat recovery to heat domestic hot water using heat rejected in the refrigerant desuperheater and condenser sections. Install flow restricting bathroom showerheads.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	63,000	2,700		
Cost Reduction	$13,000	$ 7,640		

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 66,500 (J)

B. Foreign exchange component of A. above $ 23,500 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 7,500 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 200 (J)

E. Estimated useful life of recommendation 10 years

F. Salvage value (or disposal cost) $ 4,500 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$66,500}{\$20,840/\text{yr}} = 3.2$ years

CASH FLOW ANALYSIS FOR: TOURIST HOTEL, ECO NO. 7

THE PRICE OF THE PLANT = 66500.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 66500.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 200.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 20640.00
THE SALVAGE VALUE = 4500.00
THE LIFE OF THIS STUDY IS 10 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	66500.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	57661.	8839.	20640.	200.	14824.	5816.	15823.	0.	0.	0.	0.
2	48026.	19269.	24355.	236.	14824.	9531.	11295.	0.	0.	0.	0.
3	37524.	31577.	28739.	278.	14824.	13915.	10334.	1612.	12303.	9244.	9244.
4	26077.	46100.	33912.	329.	14824.	19088.	10334.	3939.	15149.	10347.	19590.
5	13600.	63237.	40016.	388.	14824.	25192.	10334.	6686.	18506.	11491.	31081.
6	-0.	83459.	47219.	458.	14824.	32395.	10334.	9928.	22467.	12682.	43763.
7	0.	107321.	55719.	540.	0.	55719.	0.	25073.	30645.	15726.	59489.
8	0.	135478.	65748.	637.	0.	65748.	0.	29587.	36161.	16870.	76359.
9	0.	168703.	77583.	752.	0.	77583.	0.	34912.	42671.	18096.	94455.
10	0.	207909.	91548.	887.	0.	91548.	0.	41196.	50351.	19413.	113868.

RETURN ON INVESTMENT = 5.53 %

SIMPLE PAYBACK = 5.9 YEARS.

DISCOUNTED PAYBACK = 7.4 YEARS.

SENSITIVITY ANALYSIS

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	5.4 %	6.0 YEARS	7.5 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	5.2 %	6.5 YEARS	7.6 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	5.0 %	6.5 YEARS	7.7 YEARS

.383 CP SECONDS EXECUTION TIME.

Job Hotel

ECO No. 8

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 6

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions: Power bills do not correlate with occupancy; instead they correspond to weather data. This indicates that air conditioning is in use during unoccupied periods. Thermostats broken in some rooms.

2. Recommendation: Install occupancy detectors and setback thermostats to reduce air conditioning usage during empty periods. System will also allow more accurate control than presently possible with damaged thermostats.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	84,000			
Cost Reduction	$ 17,640			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 52,900 (J)

B. Foreign exchange component of A. above $ 18,800 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 10,000 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 1,500 (J)

E. Estimated useful life of recommendation 8 years

F. Salvage value (or disposal cost) $ 10,000 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$52,900}{\$16,140/\text{yr}} = 3.3$ years

CASH FLOW ANALYSIS FOR: TOURIST HOTEL, ECO NO. 8

THE PRICE OF THE PLANT = 52900.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 52900.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 1500.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 17640.00
THE SALVAGE VALUE = 10000.00
THE LIFE OF THIS STUDY IS 8 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERATIONAL COSTS	AMORTIZATION	CASH FLOW	DEPRECIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	52900.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	45869.	7031.	17640.	1500.	11792.	5848.	12587.	0.	0.	0.	0.
2	38204.	15329.	20815.	1770.	11792.	9023.	8985.	17.	9006.	7443.	7443.
3	29850.	25119.	24562.	2089.	11792.	12769.	7150.	2529.	10241.	7694.	15137.
4	20744.	36672.	28983.	2465.	11792.	17191.	7150.	4518.	12672.	8655.	23792.
5	10819.	50305.	34200.	2908.	11792.	22408.	7150.	6866.	15542.	9650.	33443.
6	-0.	66391.	40356.	3432.	11792.	26564.	7150.	9636.	18928.	10684.	44127.
7	0.	85373.	47620.	4049.	0.	47620.	0.	21429.	26191.	13440.	57567.
8	0.	107771.	56192.	4778.	0.	56192.	0.	25286.	30905.	14418.	71985.

RETURN ON INVESTMENT = 3.92 %

SIMPLE PAYBACK = 5.5 YEARS.

DISCOUNTED PAYBACK = 6.7 YEARS.

SENSITIVITY ANALYSIS

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	1.2 %	6.5 YEARS	7.6 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	.9 %	6.5 YEARS	7.7 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	.5 %	6.6 YEARS	7.8 YEARS

.36

P SECONDS EXECUTION TIME.

Job Hotel

ECO No. 9

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 11

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions: Apartment buildings have electric hot water heaters. Roofs are south sloping with good exposure.

2. Recommendation: Install solar hot water systems on each of the three apartment buildings. A collector array of 165 sq. ft. is recommended for each building to provide 85% of the building's hot water.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	28,600			
Cost Reduction	$ 6,000			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 19,800 (J)

B. Foreign exchange component of A. above $ 1,680 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 900 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 525 (J)

E. Estimated useful life of recommendation 12 years

F. Salvage value (or disposal cost) $ 4,500 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}}$ = $\frac{\$19,800}{\$\ 5,475/\text{yr}}$ = 3.6 years

CASH FLOW ANALYSIS FOR: TOURIST HOTEL, ECO NO. 9

THE PRICE OF THE PLANT = 19800.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 19800.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 525.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 6000.00
THE SALVAGE VALUE = 4500.00
THE LIFE OF THIS STUDY IS 12 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	19800.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	17168.	2632.	6000.	525.	4414.	1586.	4711.	0.	0.	0.	0.
2	14300.	5737.	7080.	620.	4414.	2666.	3363.	0.	0.	0.	0.
3	11173.	9402.	8354.	731.	4414.	3941.	2550.	626.	3315.	2491.	2491.
4	7764.	13726.	9858.	863.	4414.	5444.	2550.	1302.	4142.	2829.	5320.
5	4049.	18829.	11633.	1018.	4414.	7219.	2550.	2101.	5118.	3178.	8498.
6	-0.	24849.	13727.	1201.	4414.	9313.	2550.	3043.	6270.	3539.	12037.
7	0.	31954.	16197.	1417.	0.	16197.	0.	7289.	8909.	4571.	16608.
8	0.	40338.	19113.	1672.	0.	19113.	0.	8601.	10512.	4904.	21512.
9	0.	50230.	22553.	1973.	0.	22553.		10149.	12404.	5261.	26773.
10	0.	61904.	26613.	2329.	0.	26613.		11976.	14637.	5643.	32416.
11	0.	75678.	31403.	2748.	0.	31403.	0.	14131.	17272.	6054.	38469.
12	0.	91932.	37056.	3242.	0.	37056.	0.	16675.	20381.	6494.	44963.

RETURN ON INVESTMENT = 7.07 %

SIMPLE PAYBACK = 6.5 YEARS.

DISCOUNTED PAYBACK = 7.7 YEARS.

SENSITIVITY ANALYSIS

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	6.2 %	6.7 YEARS	8.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	6.1 %	6.7 YEARS	8.2 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	5.5 %	6.9 YEARS	8.7 YEARS

.397 CP SECONDS EXECUTION TIME.

Job Hotel

ECO No. 10

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 11

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions: Assuming ECO-5 is enacted, hot water for the laundry will be preheated to 110°F using the waste washwater stream. The oil-fired boiler will be required to heat the water to the final 150°F temperature before washing.
2. Recommendation: Install solar panels for final heating of water to 150°F. A collector array of 1,180 sq. ft. will displace 85% of the oil that would have been used. A small additional amount of electricity will be required for pumping.
3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	- 876		2,190	
Cost Reduction	- $184		$6,175	

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 47,400 (J)

B. Foreign exchange component of A. above $ 4,000 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 2,100 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 500 (J)

E. Estimated useful life of recommendation 12 years

F. Salvage value (or disposal cost) $ 8,000 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$47,400}{\$5,491/\text{yr}} = 8.6$ years

CASH FLOW ANALYSIS FOR: TOURIST HOTEL, ECO NO. 10

THE PRICE OF THE PLANT = 47400.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 47400.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 500.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 5991.00
THE SALVAGE VALUE = 8000.00
THE LIFE OF THIS STUDY IS 12 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	47400.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	41100.	6300.	5991.	500.	10566.	-4575.	11278.	0.	0.	0.	0.
2	34232.	13735.	7069.	590.	10566.	-3497.	8051.	0.	0.	0.	0.
3	26747.	22508.	8342.	696.	10566.	-2225.	6567.	0.	0.	0.	0.
4	18587.	32859.	9843.	822.	10566.	-723.	6567.	0.	0.	0.	0.
5	9694.	45074.	11615.	969.	10566.	1049.	6567.	0.	0.	0.	0.
6	-0.	59488.	13706.	1144.	10566.	3140.	6567.	0.	0.	0.	0.
7	0.	76496.	16173.	1350.	0.	16173.	0.	7278.	8895.	4565.	4565.
8	0.	96566.	19084.	1593.	0.	19084.	0.	8588.	10496.	4897.	9461.
9	0.	120248.	22519.	1879.	0.	22519.	0.	10134.	12386.	5253.	14714.
10	0.	148194.	26573.	2218.	0.	26573.	0.	11958.	14615.	5635.	20349.
11	0.	181169.	31356.	2617.	0.	31356.	0.	14110.	17246.	6045.	26393.
12	0.	220080.	37000.	3088.	0.	37000.	0.	16650.	20350.	6484.	32877.

PROJECT HAS YET TO BREAK EVEN.

SIMPLE PAYBACK = 10.5 YEARS.

DISCOUNTED PAYBACK = 13.2 YEARS.

SENSITIVITY ANALYSIS

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	-3.7 %	10.5 YEARS	12.2 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	-3.7 %	10.5 YEARS	11.2 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	-3.7 %	10.5 YEARS	10.2 YEARS

.405 CP SECONDS EXECUTION TIME.

ANNEX "C"

FOOD PRODUCTS MANUFACTURER

KINGSTON, JAMAICA

EXECUTIVE SUMMARY

Energy consumption at your plant for the twelve month period January 1981 through December 1981 consisted of:

- 1,729,345 kWh of electricity
- 8908 U. S. gallons of LP gas (butane/propane)
- 29,000 imperial gallons of #2 fuel oil (diesel)
- 14,000 imperial gallons of gasoline

Total energy costs for the period were $533,642.50.

The electric energy conservation opportunities (ECO's) contained in this report could save an estimated 434,680 kWh each year, or 25% of your total electric usage. However fuel usage would increase an estimated 250 million Btu's each year, or 3% of your present fuel usage. The annual cost savings for all ECO's would amount to approximately $87,080 (J), or 16% of your annual energy costs. This figure is based on average energy costs for the past twelve month period. The estimated total cost of all ECO's is $305,000 (J), for an average simple payback period of 3.5 years for the projects.

The ECO's in this report could save an estimated 6270 million Btu's each year in the form of petroleum imported to Jamaica. This would save $35,500 (U. S.) per year of foreign exchange. The foreign exchange cost of the ECO's in this report totals $115,400 (U. S.), thereby providing a net 31% rate of return on the foreign exchange investment to Jamaica.

The recommendations are:

		Energy Savings	Cost Savings $
ECO - 1	Boiler Maintenance	900 IG	$ 2,500
ECO - 2	Refrigeration Operations	41,000 kWh	8,610
ECO - 3	Steam Line Insulation	545 IG	1,540
ECO - 4	High Efficiency Motors	19,280 kWh	4,050
ECO - 5	Heat Recovery for Hot Water	5,555 IG	15,700
ECO - 6	Cogeneration With Heat Recovery	-8,490 IG	-23,940
		374,400 kWh	78,620

Job Food

ECO No. 1

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 12

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:
   Oil-fired steam boiler exhaust temperature was measured as 600°F.

   This is indicative of reduced heat transfer efficiency, as may occur if excessive fire-side carbon deposits have built-up. Water-side deposits were recently removed during tube cleaning.
2. Recommendation:
   Inspect and clean boiler, as necessary, to reduce temperature to 450°F.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction			900	
Cost Reduction			$2500	

4. Cost analysis:

   A. Estimated cost for design, acquisition, and installation of recommended change $ 1000 (J)

   B. Foreign exchange component of A. above $ 0 (U.S.)

   C. Duty (customs, consumption, stamp taxes) on B above $ 0 (J)

   D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

   E. Estimated useful life of recommendation 2 years

   F. Salvage value (or disposal cost) $ 0 (J)

   G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}}$ = $\frac{\$1000}{\$2500/yr}$ = 0.4 years

Job Food

ECO No. 2

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 12

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:
New ammonia refrigeration systems are planned to serve the plants. However these systems will be operating lightly loaded at times of the day when only the ice builders are running.

2. Recommendation:
Cross-connect systems so that only one centrifugal compressor is operated. An increase in operating efficiency will result by running one compressor at nearer to its related load rather than two compressors at light load.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	41,000			
Cost Reduction	$8610			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 4800 (J)

B. Foreign exchange component of A. above $ 500 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 270 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 20 years

F. Salvage value (or disposal cost) $ 200 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$4800}{\$8610} = 0.6$ years

THE PRICE OF THE PLANT = 4800.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 4800.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 8610.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 20 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	4800.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	4162.	638.	8610.	0.	1070.	7540.	1142.	2879.	4661.	4237.	4237.
2	3467.	1391.	10160.	0.	1070.	9090.	816.	3723.	5366.	4435.	8672.
3	2709.	2279.	11989.	0.	1070.	10919.	800.	4553.	6365.	4782.	13455.
4	1882.	3328.	14147.	0.	1070.	13076.	800.	5524.	7552.	5158.	18613.
5	982.	4564.	16693.	0.	1070.	15623.	800.	6670.	8953.	5559.	24172.
6	-0.	6024.	19698.	0.	1070.	18628.	800.	8022.	10605.	5986.	30158.
7	0.	7746.	23243.	0.	0.	23243.	0.	10459.	12784.	6560.	36718.
8	0.	9779.	27427.	0.	0.	27427.	0.	12342.	15085.	7037.	43756.
9	0.	12177.	32364.	0.	0.	32364.	0.	14564.	17800.	7549.	51304.
10	0.	15007.	38189.	0.	0.	38189.	0.	17185.	21004.	8098.	59402.
11	0.	18346.	45063.	0.	0.	45063.	0.	20278.	24785.	8687.	68089.
12	0.	22287.	53175.	0.	0.	53175.	0.	23929.	29246.	9319.	77406.
13	0.	26936.	62746.	0.	0.	62746.	0.	28236.	34510.	9996.	87405.
14	0.	32423.	74040.	0.	0.	74040.	0.	33318.	40722.	10723.	98128.
15	0.	38897.	87368.	0.	0.	87368.	0.	39315.	48052.	11503.	109631.
16	0.	46536.	103094.	0.	0.	103094.	0.	46392.	56702.	12340.	121971.
17	0.	55551.	121651.	0.	0.	121651.	0.	54743.	66908.	13237.	135209.
18	0.	66188.	143548.	0.	0.	143548.	0.	64597.	78951.	14200.	149409.
19	0.	78740.	169387.	0.	0.	169387.	0.	76224.	93163.	15233.	164642.
20	0.	93551.	199876.	0.	0.	199876.	0.	89944.	109932.	16341.	180982.

RETURN ON INVESTMENT = 19.90 %

SIMPLE PAYBACK = 1.4 YEARS.

DISCOUNTED PAYBACK = 1.1 YEARS.

SENSITIVITY ANALYSIS

		SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	19.9 %	1.4 YEARS	1.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	19.9 %	1.4 YEARS	1.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	19.9 %	1.4 YEARS	1.2 YEARS

.453 CP SECONDS EXECUTION TIME.

Job Food

ECO No. 3

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 2

1. Building Envelope
2. Insulation
3. Lighting
4. Hot water
5. Food services
6. Air conditioning
7. Ventilation
8. Process heating
9. Production equipment
10. Heat recovery
11. Solar
12. Operations and maintenance
13. Motors
14. Power factor
99. Miscellaneous

1. Existing conditions:

Steam header line is not insulated.

2. Recommendation:

Install high temperature insulation, such as calcium silicate, to the steam header.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction		545		
Cost Reduction		$1540		

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 1700 (J)

B. Foreign exchange component of A. above $ 3000 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 160 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 15 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$1700}{\$1540/yr} = 1.1$ years

THE PRICE OF THE PLANT = 1700.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 1700.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 1540.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 15 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	1700.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	1474.	226.	1540.	0.	379.	1161.	404.	340.	821.	746.	746.
2	1228.	493.	1817.	0.	379.	1438.	289.	517.	921.	761.	1507.
3	959.	807.	2144.	0.	379.	1765.	284.	667.	1099.	825.	2333.
4	667.	1178.	2530.	0.	379.	2151.	284.	840.	1311.	895.	3228.
5	348.	1617.	2986.	0.	379.	2607.	284.	1045.	1561.	969.	4197.
6	-0.	2134.	3523.	0.	379.	3144.	284.	1287.	1857.	1048.	5246.
7	0.	2744.	4157.	0.	0.	4157.	0.	1871.	2287.	1173.	6419.
8	0.	3463.	4906.	0.	0.	4906.	0.	2208.	2698.	1259.	7678.
9	0.	4313.	5789.	0.	0.	5789.	0.	2605.	3184.	1350.	9028.
10	0.	5315.	6831.	0.	0.	6831.	0.	3074.	3757.	1448.	10476.
11	0.	6498.	8060.	0.	0.	8060.	0.	3627.	4433.	1554.	12030.
12	0.	7893.	9511.	0.	0.	9511.	0.	4280.	5231.	1667.	13697.
13	0.	9540.	11223.	0.	0.	11223.	0.	5050.	6173.	1788.	15485.
14	0.	11483.	13243.	0.	0.	13243.	0.	5959.	7284.	1918.	17403.
15	0.	13776.	15627.	0.	0.	15627.	0.	7032.	8595.	2058.	19460.

RETURN ON INVESTMENT = 17.63 %

SIMPLE PAYBACK = 2.0 YEARS.

DISCOUNTED PAYBACK = 2.2 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	17.6 %	2.0 YEARS	2.2 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	17.6 %	2.0 YEARS	2.3 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	17.6 %	2.4 YEARS	2.3 YEARS

.434 CP SECONDS EXECUTION TIME.

Job Food

ECO No. 4

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 13

1. Building Envelope
2. Insulation
3. Lighting
4. Hot water
5. Food services
6. Air conditioning
7. Ventilation
8. Process heating
9. Production equipment
10. Heat recovery
11. Solar
12. Operations and maintenance
13. Motors
14. Power factor
99. Miscellaneous

1. Existing conditions:

Standard efficiency motors are rewound when they fail.

2. Recommendation:

Replace high duty-factor motors with new premium efficiency types rather than rewinding them.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	19,284			
Cost Reduction	$ 4050			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 7448 (J)

B. Foreign exchange component of A. above $ 5621 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 2951 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 5 years

F. Salvage value (or disposal cost) $ 1000 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$7448}{\$4050} = 1.84$ years

THE PRICE OF THE PLANT = 7448.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 7448.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 5 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 5 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 4050.00
THE SALVAGE VALUE = 1000.00
THE LIFE OF THIS STUDY IS 6 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	7448.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	6458.	990.	4050.	0.	1660.	2390.	1984.	182.	2207.	2007.	2007.
2	5379.	2158.	4779.	0.	1660.	3119.	1322.	809.	2310.	1909.	3916.
3	4203.	3537.	5639.	0.	1660.	3979.	1290.	1210.	2769.	2080.	5996.
4	2921.	5163.	6654.	0.	1660.	4994.	1290.	1667.	3327.	2272.	8269.
5	1523.	7083.	7852.	0.	1660.	6192.	1290.	2206.	3986.	2475.	10743.
6	-0.	9347.	9265.	0.	1660.	7605.	0.	3422.	4183.	2361.	13105.

RETURN ON INVESTMENT = 9.87 %

SIMPLE PAYBACK = 3.4 YEARS.

DISCOUNTED PAYBACK = 3.6 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	9.9 %	3.4 YEARS	3.6 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	9.4 %	3.4 YEARS	3.8 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	8.8 %	3.5 YEARS	3.9 YEARS

.387 CP SECONDS EXECUTION TIME.

Job Food

ECO No. 5

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 10-4

1. Building Envelope
2. Insulation
3. Lighting
4. Hot water
5. Food services
6. Air conditioning
7. Ventilation
8. Process heating
9. Production equipment
10. Heat recovery
11. Solar
12. Operations and maintenance
13. Motors
14. Power factor
99. Miscellaneous

1. Existing conditions:

Hot water for plant clean-up is generated by means of an oil-fired boiler. Heat is rejected from ammonia refrigeration systems in cooling towers.

2. Recommendation:

Recover waste heat from refrigeration systems and use it to preheat clean-up hot water. Install heat exchanger, insulated hot water storage tank, controls, pumps and plumbing.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction			5555	
Cost Reduction			$15,700	

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 64,080 (J)

B. Foreign exchange component of A. above $ 24,000 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 10,680 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 400 (J)

E. Estimated useful life of recommendation 15 years

F. Salvage value (or disposal cost) $ 10,000 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$64,080}{\$15,300} =$ 4.2 years

THE PRICE OF THE PLANT = 64080.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 64080.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 400.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 15700.00
THE SALVAGE VALUE = 10000.00
THE LIFE OF THIS STUDY IS 15 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	64080.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	55563.	8517.	15700.	400.	14285.	1415.	15247.	0.	0.	0.	0.
2	46278.	18568.	18526.	472.	14285.	4241.	10884.	0.	0.	0.	0.
3	36159.	30428.	21861.	557.	14285.	7576.	9014.	0.	0.	0.	0.
4	25128.	44422.	25796.	657.	14285.	11511.	9014.	1124.	10387.	7095.	7095.
5	13105.	60936.	30439.	776.	14285.	16154.	9014.	3213.	12941.	8035.	15130.
6	-0.	80422.	35918.	915.	14285.	21633.	9014.	5679.	15954.	9006.	24136.
7	0.	103415.	42383.	1080.	0.	42383.	0.	19072.	23311.	11962.	36098.
8	0.	130548.	50012.	1274.	0.	50012.	0.	22505.	27507.	12832.	48930.
9	0.	162564.	59014.	1504.	0.	59014.	0.	26556.	32458.	13765.	62695.
10	0.	200343.	69637.	1774.	0.	69637.	0.	31336.	38300.	14766.	77461.
11	0.	244922.	82171.	2094.	0.	82171.	0.	36977.	45194.	15840.	93302.
12	0.	297525.	96962.	2470.	0.	96962.	0.	43633.	53329.	16992.	110294.
13	0.	359597.	114415.	2915.	0.	114415.	0.	51487.	62928.	18228.	128522.
14	0.	432842.	135010.	3440.	0.	135010.	0.	60754.	74255.	19554.	148076.
15	0.	519272.	159312.	4059.	0.	159312.	0.	71690.	87621.	20976.	169052.

RETURN ON INVESTMENT = 6.68 %

SIMPLE PAYBACK = 7.5 YEARS.

DISCOUNTED PAYBACK = 9.1 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	6.5 %	7.5 YEARS	9.2 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	6.4 %	7.6 YEARS	9.3 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	6.1 %	7.8 YEARS	9.8 YEARS

.434 CP SECONDS EXECUTION TIME.

Job Food

ECO No. 6

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 10

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:
   Assuming ECO-5 is enacted, heat energy will still be required to raise water temperatures to generate steam in the boiler. Electrical energy purchased from JPS.

2. Recommendation: Install diesel generator set with heat recovery to raise water temperatures to 220°F before entering the boiler. Heat exchanger on engine cooling water will raise water temperature from 120 to about 205°F and heat exchanger in exhaust stack will raise temperature from 205°F to 220°F. Size unit at 220 hp, 140 kW electric.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	374,400		-8490	
Cost Reduction	$ 78,620		-23,940	

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 226,000 (J)

B. Foreign exchange component of A. above $ 85,000 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 45,000 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 500 (J)

E. Estimated useful life of recommendation 15 years

F. Salvage value (or disposal cost) $ 10,000 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$226,000}{\$\ 54,180} = 4.2$ years

THE PRICE OF THE PLANT = 226000.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 226000.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 500.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 54680.00
THE SALVAGE VALUE = 10000.00
THE LIFE OF THIS STUDY IS 15 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERATIONAL COSTS	AMORTIZATION	CASH FLOW	DEPRECIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	226000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	195960.	30040.	54680.	500.	50380.	4300.	53774.	0.	0.	0.	0.
2	163217.	65487.	64522.	590.	50380.	14143.	38386.	0.	0.	0.	0.
3	127526.	107314.	76136.	696.	50380.	25757.	36000.	0.	0.	0.	0.
4	88624.	156671.	89841.	822.	50380.	39461.	36000.	1557.	37904.	25889.	25889.
5	46220.	214912.	106012.	969.	50380.	55632.	36000.	8834.	46798.	29058.	54947.
6	-0.	283635.	125095.	1144.	50380.	74715.	36000.	17421.	57293.	32341.	87287.
7	0.	364730.	147612.	1350.	0.	147612.	0.	66425.	81186.	41661.	128949.
8	0.	460421.	174182.	1593.	0.	174182.	0.	78382.	95800.	44691.	173640.
9	0.	573337.	205534.	1879.	0.	205534.	0.	92490.	113044.	47942.	221582.
10	0.	706577.	242531.	2218.	0.	242531.	0.	109139.	133392.	51428.	273010.
11	0.	863801.	286186.	2617.	0.	286186.	0.	128784.	157402.	55169.	328179.
12	0.	1049325.	337700.	3088.	0.	337700.	0.	151965.	185735.	59181.	387359.
13	0.	1268243.	398486.	3644.	0.	398486.	0.	179319.	219167.	63485.	450844.
14	0.	1536567.	470213.	4300.	0.	470213.	0.	211596.	258617.	68102.	518946.
15	0.	1831389.	554851.	5074.	0.	554851.	0.	249683.	305168.	73055.	592001.

RETURN ON INVESTMENT = 6.63 %

SIMPLE PAYBACK = 7.5 YEARS.

DISCOUNTED PAYBACK = 9.1 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	6.6 %	7.5 YEARS	9.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	6.2 %	7.7 YEARS	9.7 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	6.2 %	7.8 YEARS	9.8 YEARS

.420 CP SECONDS EXECUTION TIME.

ANNEX "D"

SUGAR FACTORY AND ESTATE

CLARENDON, JAMAICA

EXECUTIVE SUMMARY

Energy consumption at your plant for the twelve month period October 1979 through September 1980 consisted of:

- 5,500,000 kWh of electricity, 100% generated on-site using fuel listed below
- 283,273 imperial gallons of #2 fuel oil (diesel)
- 475,377 imperial gallons of #6 fuel oil (Bunker C)
- 87,571 long tons of bagasse

Total energy costs for the period were $ 912,953. An equivalent amount of fuel purchased at today's prices would cost $ 1,649,755.

The electric energy conservation opportunities (ECO's) contained in this report could save an estimated 162,504 kWh each year, or 3% of your total electric usage. Fuel ECO's could save an estimated 53,900 million Btu's each year, or 40% of your total fuel usage. The annual cost savings for all ECO's would amount to approximately $ 561,519 (J), or 34% of your current annual energy costs. This figure is based on average energy costs for the twelve month period listed above. The estimated total cost of all ECO's is $ 1,905,938 (J), for an average simple payback period of 3.4 years for the projects.

The ECO's in this report could save an estimated 53,900 million Btu's each year in the form of petroleum imported to Jamaica. This would save $ 305,613 (U.S.) per year of foreign exchange. The foreign exchange cost of the ECO's in this report totals $ 635,753 (U.S.), thereby providing a net 48% rate of return on the foreign exchange investment to Jamaica.

The recommendations are:

		Energy Savings	Cost Savings J$
ECO - 1	Replace O_2 Analyzer #6 Boiler	9,500 IG #6	$ 17,100
ECO - 2	Install Economizer on #6 Boiler	38,475 IG #6	$ 68,900
ECO - 3	Install Electric Demand Controller	6,054 IG #2	$ 16,830
ECO - 4	Replace Irrigation Pump Motors with High Efficiency Types	162,504 kWh	$ 18,689
ECO - 5	Install Bagasse Dryer and Storage Facilities	246,000 IG #6	$ 440,000

Job Sugar

ECO No. 1

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 12

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Oxygen analyzer for combustion control of oil-fired number 6 boiler is out of commission.

2. Recommendation:

Repair or replace the oxygen analyzer/controller. A new updated model which also monitors carbon monoxide levels is available for 66% additional cost. The installation of this new system is assumed in the analysis given below.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction				9,500
Cost Reduction				$17,100

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 15,000 (J)

B. Foreign exchange component of A. above $ 5,500 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 2,900 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 10 years

F. Salvage value (or disposal cost) $ 200 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$15,000}{\$17,100} =$ 0.9 years

THE PRICE OF THE PLANT = 15000.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 15000.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 17100.00
THE SALVAGE VALUE = 200.00
THE LIFE OF THIS STUDY IS 10 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	15000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	13006.	1994.	17100.	0.	3344.	13756.	3569.	4584.	9172.	8338.	8338.
2	10833.	4346.	20178.	0.	3344.	16834.	2548.	6429.	10405.	8600.	16938.
3	8464.	7123.	23810.	0.	3344.	20466.	2467.	8100.	12367.	9291.	26229.
4	5882.	10399.	28096.	0.	3344.	24752.	2467.	10028.	14724.	10057.	36285.
5	3068.	14264.	33153.	0.	3344.	29809.	2467.	12304.	17505.	10869.	47155.
6	-0.	18825.	39121.	0.	3344.	35777.	2467.	14989.	20787.	11734.	58889.
7	0.	24208.	46162.	0.	0.	46162.	0.	20773.	25389.	13029.	71918.
8	0.	30559.	54472.	0.	0.	54472.	0.	24512.	29959.	13976.	85894.
9	0.	38053.	64276.	0.	0.	64276.	0.	28924.	35352.	14993.	100887.
10	0.	46897.	75846.	0.	0.	75846.	0.	34131.	41715.	16083.	116970.

RETURN ON INVESTMENT = 22.80 %

SIMPLE PAYBACK = 1.7 YEARS.

DISCOUNTED PAYBACK = 1.8 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	22.8 %	1.7 YEARS	1.8 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	22.7 %	1.7 YEARS	1.8 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	22.6 %	1.8 YEARS	1.8 YEARS

.369 CP SECONDS EXECUTION TIME.

Job Sugar

ECO No. 2

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 10

1. Building Envelope
2. Insulation
3. Lighting
4. Hot water
5. Food services
6. Air conditioning
7. Ventilation
8. Process heating
9. Production equipment
10. Heat recovery
11. Solar
12. Operations and maintenance
13. Motors
14. Power factor
99. Miscellaneous

1. Existing conditions:

Oil-fired number 6 boiler has no heat recovery systems installed.

2. Recommendation:

Install economizer to heat boiler feedwater using waste heat from exhaust stack gases.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction				38,475
Cost Reduction				$68,900

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 140,000 (J)

B. Foreign exchange component of A. above $ 54,000 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 23,500 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 15 year

F. Salvage value (or disposal cost) $ 10,000 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}}$ = $\frac{\$140,000}{\$\ 68,900/yr}$ = 2.0 years

THE PRICE OF THE PLANT = 140000.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT - 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 140000.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 68900.00
THE SALVAGE VALUE = 10000.00
THE LIFE OF THIS STUDY IS 15 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	PRESENT VALUE
0	140000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	121391.	18609.	68900.	0.	31209.	37691.	33311.	1971.	35720.	32473.	32473.
2	101108.	40567.	81302.	0.	31209.	50093.	23779.	11841.	38252.	31613.	64086.
3	78999.	66478.	95936.	0.	31209.	64728.	21667.	19377.	45350.	34072.	98158.
4	54900.	97053.	113205.	0.	31209.	81996.	21667.	27148.	54848.	37462.	135620.
5	28632.	133131.	133582.	0.	31209.	102373.	21667.	36318.	66055.	41015.	176635.
6	-0.	175703.	157627.	0.	31209.	126418.	21667.	47138.	79280.	44751.	221367.
7	0.	225939.	185999.	0.	0.	185999.	0.	83700.	102300.	52496.	273883.
8	0.	285217.	219479.	0.	0.	219479.	0.	98766.	120714.	56314.	330197.
9	0.	355164.	258985.	0.	0.	258985.	0.	116543.	142442.	60409.	390606.
10	0.	437703.	305603.	0.	0.	305603.	0.	137521.	168082.	64803.	455409.
11	0.	535098.	360611.	0.	0.	360611.	0.	162275.	198336.	69516.	524924.
12	0.	650024.	425521.	0.	0.	425521.	0.	191485.	234037.	74571.	599495.
13	0.	785637.	502115.	0.	0.	502115.	0.	225952.	276163.	79995.	679490.
14	0.	945661.	592496.	0.	0.	592496.	0.	266623.	325873.	85812.	765303.
15	0.	1134489.	699145.	0.	0.	699145.	0.	314615.	384530.	92053.	857356.

RETURN ON INVESTMENT = 12.84 %

SIMPLE PAYBACK = 3.6 YEARS.

DISCOUNTED PAYBACK = 4.1 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	12.8 %	3.6 YEARS	4.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	12.8 %	3.6 YEARS	4.2 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	12.5 %	4.5 YEARS	5.1 YEARS

.424 CP SECONDS EXECUTION TIME.

JOB Sugar

ECO No. 3

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 99

1. Building Envelope
2. Insulation
3. Lighting
4. Hot water
5. Food services
6. Air conditioning
7. Ventilation
8. Process heating
9. Production equipment
10. Heat recovery
11. Solar
12. Operations and maintenance
13. Motors
14. Power factor
99. Miscellaneous

1. Existing conditions:

Plant electrical demand is allowed to fluctuate. Diesel generators are run during peak periods to prevent trip-out of steam turbine generators.

2. Recommendation:

Install electrical demand monitoring and load shedding equipment to reduce the need for using the diesel peaking.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction			6054	
Cost Reduction			$16,830	

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 42,221 (J)

B. Foreign exchange component of A. above $ 10,200 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 9,371 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 10 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$42,221}{16,830} = 2.51$ years

THE PRICE OF THE PLANT = 42221.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 42221.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 16830.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 10 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	42221.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	36609.	5612.	16830.	0.	9412.	7418.	10046.	0.	0.	0.	0.
2	30492.	12234.	19859.	0.	9412.	10448.	7171.	1474.	8973.	7416.	7416.
3	23824.	20048.	23434.	0.	9412.	14022.	7037.	3143.	10879.	8174.	15589.
4	16557.	29269.	27652.	0.	9412.	18240.	7037.	5041.	13199.	9015.	24604.
5	8635.	40149.	32630.	0.	9412.	23218.	7037.	7281.	15936.	9895.	34500.
6	-0.	52988.	38503.	0.	9412.	29091.	7037.	9924.	19167.	10819.	45319.
7	0.	68138.	45433.	0.	0.	45433.	0.	20445.	24988.	12823.	58142.
8	0.	86015.	53612.	0.	0.	53612.	0.	24125.	29486.	13756.	71898.
9	0.	107110.	63262.	0.	0.	63262.	0.	28468.	34794.	14756.	86654.
10	0.	132002.	74649.	0.	0.	74649.	0.	33592.	41057.	15829.	102483.

RETURN ON INVESTMENT = 9.27 %

SIMPLE PAYBACK = 4.7 YEARS.

DISCOUNTED PAYBACK = 5.7 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	9.3 %	4.7 YEARS	5.7 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	9.1 %	4.8 YEARS	5.9 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	8.9 %	4.9 YEARS	6.0 YEARS

.385 CP SECONDS EXECUTION TIME.

Job Sugar

ECO No. 4

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 13

1. Building Envelope
2. Insulation
3. Lighting
4. Hot water
5. Food services
6. Air conditioning
7. Ventilation
8. Process heating
9. Production equipment
10. Heat recovery
11. Solar
12. Operations and maintenance
13. Motors
14. Power factor
99. Miscellaneous

1. Existing conditions:

Standard efficiency motors are used to pump water for irrigation.

2. Recommendation:

Purchase new high-efficiency motors rather than rewinding the existing units for the irrigation pumps.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	162,504			
Cost Reduction	$ 18,689			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 48,717 (J)

B. Foreign exchange component of A. above $ 21,053 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 11,242 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 5 years

F. Salvage value (or disposal cost) $ 2,300 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$48,717}{18,689} = 2.61$ years

THE PRICE OF THE PLANT = 48717.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 48717.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 5 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 5 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 18689.00
THE SALVAGE VALUE = 2300.00
THE LIFE OF THIS STUDY IS 6 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	48717.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	42242.	6475.	18689.	0.	10860.	7829.	12978.	0.	0.	0.	0.
2	35183.	14111.	22053.	0.	10860.	11193.	9284.	859.	10334.	8540.	8540.
3	27490.	23133.	26023.	0.	10860.	15163.	9284.	2645.	12517.	9404.	17945.
4	19104.	33772.	30707.	0.	10860.	19847.	9284.	4753.	15093.	10309.	28254.
5	9963.	46327.	36234.	0.	10860.	25374.	9284.	7241.	18133.	11259.	39513.
6	-0.	61141.	42756.	0.	10860.	31896.	0.	14353.	17543.	9902.	49415.

PROJECT HAS YET TO BREAK EVEN.

SIMPLE PAYBACK = 4.7 YEARS.

DISCOUNTED PAYBACK = 5.9 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	.2 %	4.7 YEARS	4.9 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	-.4 %	4.7 YEARS	3.9 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	-4.1 %	4.7 YEARS	2.9 YEARS

.346 CP SECONDS EXECUTION TIME.

Job Sugar

ECO No. 5

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 8

1. Building Envelope
2. Insulation
3. Lighting
4. Hot water
5. Food services
6. Air conditioning
7. Ventilation
8. Process heating
9. Production equipment
10. Heat recovery
11. Solar
12. Operations and maintenance
13. Motors
14. Power factor
99. Miscellaneous

1. Existing conditions:

Bagasse is used as fuel to meet steam and electrical needs during sugar crop season. During off-crop times, oil-fired boiler is operated for steam and electricity.

2. Recommendation: Dry bagasse to improve heat content of fuel, resulting in excess bagasse after crop season. Store bagasse and use as fuel during off-crop season. Requires installation of rotary dryer, conveyors, and storage shed, modification of boilers, and procurement of front-end loader.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction				246,000
Cost Reduction				$440,000

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $1,660,000 (J)

B. Foreign exchange component of A. above $ 545,000 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 240,000 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 20,000 (J)

E. Estimated useful life of recommendation 20 years

F. Salvage value (or disposal cost) $ 100,000 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$1,660,000}{\$\ 420,000} =$ 4.0 years

THE PRICE OF THE PLANT = 1660000.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 1660000.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 20000.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 440000.00
THE SALVAGE VALUE = 100000.00
THE LIFE OF THIS STUDY IS 20 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	1660000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	1439353.	220647.	440000.	20000.	370047.	69953.	394975.	0.	0.	0.	0.
2	1198848.	481010.	519200.	23600.	370047.	149153.	281949.	0.	0.	0.	0.
3	936698.	788239.	612656.	27848.	370047.	242609.	260000.	0.	0.	0.	0.
4	650954.	1150769.	722934.	32861.	370047.	352887.	260000.	41799.	311088.	212477.	212477.
5	339493.	1578554.	853062.	38776.	370047.	483015.	260000.	100357.	382659.	237601.	450078.
6	-0.	2083340.	1006613.	45755.	370047.	636567.	260000.	169455.	467112.	263672.	713751.
7	0.	2678988.	1187804.	53991.	0.	1187804.	0.	534512.	653292.	335242.	1048993.
8	0.	3381853.	1401609.	63709.	0.	1401609.	0.	630724.	770885.	359623.	1408616.
9	0.	4211234.	1653898.	75177.	0.	1653898.	0.	744254.	909644.	385778.	1794394.
10	0.	5189902.	1951600.	88709.	0.	1951600.	0.	878220.	1073380.	413834.	2208228.
11	0.	6344732.	2302888.	104677.	0.	2302888.	0.	1036299.	1266588.	443931.	2652160.
12	0.	7707430.	2717407.	123519.	0.	2717407.	0.	1222833.	1494574.	476217.	3128377.
13	0.	9315415.	3206541.	145752.	0.	3206541.	0.	1442943.	1763597.	510851.	3639229.
14	0.	11212836.	3783718.	171987.	0.	3783718.	0.	1702673.	2081045.	548004.	4187233.
15	0.	13451793.	4464787.	202945.	0.	4464787.	0.	2009154.	2455633.	587859.	4775092.
16	0.	16093763.	5268449.	239475.	0.	5268449.	0.	2370802.	2897647.	630612.	5405704.
17	0.	19211287.	6216770.	282580.	0.	6216770.	0.	2797546.	3419223.	676475.	6082179.
18	0.	22889966.	7335788.	333445.	0.	7335788.	0.	3301105.	4034684.	725673.	6807853.
19	0.	27230806.	8656230.	393465.	0.	8656230.	0.	3895304.	4760927.	778450.	7586302.
20	0.	32352998.	10214352.	464289.	0.	10214352.	0.	4596458.	5617894.	835064.	8421366.

RETURN ON INVESTMENT = 8.46 %

SIMPLE PAYBACK = 6.9 YEARS.

DISCOUNTED PAYBACK = 8.7 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	8.2 %	6.9 YEARS	8.9 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	8.2 %	7.0 YEARS	9.0 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	8.0 %	7.7 YEARS	9.5 YEARS

.441 CP SECONDS EXECUTION TIME.

ANNEX "E"

CHEMICAL MANUFACTURING PLANT

SPANISH TOWN, JAMAICA

EXECUTIVE SUMMARY

Energy consumption at your plant for the twelve month period August 1980 through July 1981 consisted of:

- 1,671,500 KWH of electricity
- -0- gallons of LP gas (butane/propane)
- 144,000 imperial gallons of #2 fuel oil (diesel)
- -0- imperial gallons of #6 fuel oil (Bunker C)

Total energy costs for the period were $750,766.

The electric energy conservation opportunities (ECO's) contained in this report could save an estimated 1,082,700 KWH each year, or 65% of your total electric usage. Fuel ECO's could save an estimated 5878 million BTU's each year, or 24% of your total fuel usage. The annual cost savings for all ECO's would amount to approximately $325,500 (J), or 43% of your annual energy costs. This figure is based on average energy costs for the past twelve month period. The estimated total cost of all ECO's is $323,816 (J), for an average simple payback period of 1.0 year for the projects.

The ECO's in this report could save an estimated 22,118 million BTU's each year in the form of petroleum imported to Jamaica. This would save $125,000 (U.S.) per year of foreign exchange. The foreign exchange cost of the ECO's in this report totals $127,920 (U.S.), thereby providing a net 98% rate of return on the foreign exchange investment to Jamaica.

The recommendations are:

		Energy Savings	Cost Savings J$
ECO - 1	Steam line insulation	7,130 IG	$ 20,120
ECO - 2	Refurbish turbine generator	1,050,000 kWh	220,000

		Energy Savings	Cost Savings J$
ECO - 3	Insulate melter	22,940 IG	64,700
ECO - 4	Replace boiler refractory	3,610 IG	10,171
ECO - 5	Insulate rotary dryer	1,310 IG	3,690
ECO - 6	High efficiency motors	32,700 kWh	6,860

Job Chem

ECO No. 1

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 2

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Most steam lines in good condition, but there are still some uninsulated sections.

2. Recommendation:

Insulate those unlagged sections of steam lines.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction			7130	
Cost Reduction			$20,120	

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 8900 (J)

B. Foreign exchange component of A. above $ 1900 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 1600 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 15 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$8900}{\$20,120} = 0.4$ years

THE PRICE OF THE PLANT = 8900.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 8900.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 20120.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 15 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	8900.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	7717.	1183.	20120.	0.	1984.	18136.	2118.	7208.	10928.	9934.	9934.
2	6428.	2579.	23742.	0.	1984.	21758.	1512.	9111.	12647.	10452.	20386.
3	5022.	4226.	28015.	0.	1984.	26031.	1484.	11046.	14985.	11258.	31645.
4	3490.	6170.	33058.	0.	1984.	31074.	1484.	13316.	17758.	12129.	43774.
5	1820.	8463.	39008.	0.	1984.	37024.	1484.	15993.	21031.	13059.	56832.
6	-0.	11170.	46030.	0.	1984.	44046.	1484.	19153.	24893.	14051.	70884.
7	0.	14363.	54315.	0.	0.	54315.	0.	24442.	29873.	15330.	86213.
8	0.	18132.	64092.	0.	0.	64092.	0.	28841.	35250.	16445.	102658.
9	0.	22578.	75628.	0.	0.	75628.	0.	34033.	41596.	17641.	120299.
10	0.	27825.	89241.	0.	0.	89241.	0.	40159.	49083.	18924.	139222.
11	0.	34017.	105305.	0.	0.	105305.	0.	47387.	57918.	20300.	159522.
12	0.	41323.	124260.	0.	0.	124260.	0.	55917.	68343.	21776.	181298.
13	0.	49944.	146626.	0.	0.	146626.	0.	65982.	80644.	23360.	204658.
14	0.	60117.	173019.	0.	0.	173019.	0.	77859.	95161.	25059.	229717.
15	0.	72121.	204163.	0.	0.	204163.	0.	91873.	112289.	26881.	256598.

RETURN ON INVESTMENT = 25.12 %

SIMPLE PAYBACK = .3 YEARS.

DISCOUNTED PAYBACK = .9 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	25.1 %	.3 YEARS	.9 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	25.1 %	.3 YEARS	1.0 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	25.1 %	.3 YEARS	1.1 YEARS

.431 CP SECONDS EXECUTION TIME.

Job Chem

ECO No. 2

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 12

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Steam turbine generator set has been installed to generate electricity for the plant using steam derived from waste heat. However, the turbine has not operated in 4½ years.

2. Recommendation:

Restore turbine generator to operating condition.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	1,050,000			
Cost Reduction	$220,000			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 178,000 (J)

B. Foreign exchange component of A. above $ 75,000 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 40,000 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 5,000 (J)

E. Estimated useful life of recommendation 15 years

F. Salvage value (or disposal cost) $ 25,000 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$178,000}{215,000} = 0.8$ years

THE PRICE OF THE PLANT = 178000.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 178000.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 5000.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 220000.00
THE SALVAGE VALUE = 25000.00
THE LIFE OF THIS STUDY IS 15 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	178000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	154340.	23660.	220000.	5000.	39680.	180320.	42353.	62085.	118235.	107486.	107486.
2	128551.	51578.	259600.	5900.	39680.	219920.	30233.	85359.	134561.	111208.	218694.
3	100441.	84522.	306328.	6962.	39680.	266648.	25500.	108517.	158132.	118807.	337501.
4	69801.	123396.	361467.	8215.	39680.	321787.	25500.	133329.	188458.	128719.	466220.
5	36403.	169267.	426531.	9694.	39680.	386851.	25500.	162608.	224243.	139238.	605458.
6	-0.	223394.	503307.	11439.	39680.	463627.	25500.	197157.	266470.	150415.	755873.
7	0.	287265.	593902.	13498.	0.	593902.	0.	267256.	326646.	167621.	923494.
8	0.	362632.	700804.	15927.	0.	700804.	0.	315362.	385442.	179812.	1103306.
9	0.	451566.	826949.	18794.	0.	826949.	0.	372127.	454822.	192889.	1296195.
10	0.	556508.	975800.	22177.	0.	975800.	0.	439110.	536690.	206917.	1503112.
11	0.	680339.	1151444.	26169.	0.	1151444.	0.	518150.	633294.	221966.	1725077.
12	0.	826459.	1358704.	30880.	0.	1358704.	0.	611417.	747287.	238109.	1963186.
13	0.	998882.	1603270.	36438.	0.	1603270.	0.	721472.	881799.	255426.	2218612.
14	0.	1202340.	1891859.	42997.	0.	1891859.	0.	851337.	1040522.	274002.	2492614.
15	0.	1442421.	2232394.	50736.	0.	2232394.	0.	1004577.	1227817.	293930.	2786543.

RETURN ON INVESTMENT = 20.13 %

SIMPLE PAYBACK = 1.7 YEARS.

DISCOUNTED PAYBACK = 1.6 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	19.9 %	1.7 YEARS	1.7 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	19.9 %	1.7 YEARS	1.7 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	19.9 %	1.7 YEARS	1.7 YEARS

.420 CP SECONDS EXECUTION TIME.

Job Chem

ECO No. 3

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 2-8

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Raw material melter which uses steam heating coils is uninsulated. Material has a melting point of 112°C. Steam is generated at no cost from a production process, but this process operates only about 30% time. During the remaining time, steam is generated by oil-fired boiler.

2. Recommendation.

Add breeching-type insulation, such as 2 inch calcium silicate with ½" cement cover, to side walls of melter. Top covers should also be insulated if possible.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction			22,940	
Cost Reduction			$64,700	

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $64,920 (J)

B. Foreign exchange component of A. above $11,000 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 5,340 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 15 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$64,920}{\$64,700} = 1.0$ years

THE PRICE OF THE PLANT = 64920.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 64920.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 64700.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 15 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	64920.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	56291.	8629.	64700.	0.	14472.	50228.	15447.	15652.	34577.	31433.	31433.
2	46885.	18812.	76346.	0.	14472.	61874.	11027.	22881.	38993.	32225.	63659.
3	36633.	30827.	90088.	0.	14472.	75616.	10820.	29158.	46458.	34905.	98563.
4	25458.	45005.	106304.	0.	14472.	91832.	10820.	36455.	55377.	37823.	136386.
5	13277.	61735.	125439.	0.	14472.	110967.	10820.	45066.	65901.	40919.	177306.
6	-0.	81476.	148018.	0.	14472.	133546.	10820.	55227.	78319.	44209.	221515.
7	0.	104771.	174661.	0.	0.	174661.	0.	78598.	96064.	49296.	270811.
8	0.	132259.	206100.	0.	0.	206100.	0.	92745.	113355.	52881.	323692.
9	0.	164695.	243198.	0.	0.	243198.	0.	109439.	133759.	56727.	380419.
10	0.	202969.	286974.	0.	0.	286974.	0.	129138.	157836.	60852.	441271.
11	0.	248133.	338629.	0.	0.	338629.	0.	152383.	186246.	65278.	506549.
12	0.	301426.	399582.	0.	0.	399582.	0.	179812.	219770.	70026.	576575.
13	0.	364311.	471507.	0.	0.	471507.	0.	212178.	259329.	75118.	651693.
14	0.	438516.	556379.	0.	0.	556379.	0.	250370.	306008.	80582.	732275.
15	0.	526079.	656527.	0.	0.	656527.	0.	295437.	361090.	86442.	818717.

RETURN ON INVESTMENT = 18.41 %

SIMPLE PAYBACK = 1.9 YEARS.

DISCOUNTED PAYBACK = 2.0 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	18.4 %	1.9 YEARS	2.0 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	18.4 %	1.9 YEARS	2.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	18.3 %	1.9 YEARS	2.1 YEARS

.429 CP SECONDS EXECUTION TIME.

Job Chem

ECO No. 4

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 2 - 8

1. Building Envelope
2. Insulation
3. Lighting
4. Hot water
5. Food services
6. Air conditioning
7. Ventilation
8. Process heating
9. Production equipment
10. Heat recovery
11. Solar
12. Operations and maintenance
13. Motors
14. Power factor
99. Miscellaneous

1. Existing conditions:

Refractory on York Shipley boiler is ragged and missing over about half of the surface area. Boiler is operated only during process downtime, but this amounts to 70% time.

2. Recommendation:

Install refractory, such as 2-inch calcium silicate insulation with ½ inch cement cover to entire boiler

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction			3610	
Cost Reduction			$10,171	

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $ 10,986 (J)

B. Foreign exchange component of A. above $ 2,200 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 1,070 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 15 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$10,986}{\$10,171/yr} = 1.1$ years

THE PRICE OF THE PLANT = 10986.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 10986.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 10171.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 15 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	10986.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	9526.	1460.	10171.	0.	2449.	7722.	2614.	2299.	5423.	4930.	4930.
2	7934.	3183.	12002.	0.	2449.	9553.	1866.	3459.	6094.	5036.	9967.
3	6199.	5217.	14162.	0.	2449.	11713.	1831.	4447.	7266.	5459.	15426.
4	4308.	7616.	16711.	0.	2449.	14262.	1831.	5594.	8668.	5921.	21346.
5	2247.	10447.	19719.	0.	2449.	17270.	1831.	6948.	10323.	6410.	27756.
6	-0.	13788.	23269.	0.	2449.	20820.	1831.	8545.	12275.	6929.	34685.
7	0.	17730.	27457.	0.	0.	27457.	0.	12356.	15101.	7749.	42434.
8	0.	22381.	32399.	0.	0.	32399.	0.	14580.	17820.	8313.	50747.
9	0.	27870.	38231.	0.	0.	38231.	0.	17204.	21027.	8913.	59665.
10	0.	34347.	45113.	0.	0.	45113.	0.	20301.	24812.	9566.	69231.
11	0.	41990.	53233.	0.	0.	53233.	0.	23955.	29278.	10262.	79493.
12	0.	51008.	62815.	0.	0.	62815.	0.	28267.	34548.	11008.	90501.
13	0.	61650.	74122.	0.	0.	74122.	0.	33355.	40767.	11809.	102310.
14	0.	74207.	87464.	0.	0.	87464.	0.	39359.	48105.	12668.	114978.
15	0.	89025.	103208.	0.	0.	103208.	0.	46443.	56764.	13589.	128567.

RETURN ON INVESTMENT = 17.82 %

SIMPLE PAYBACK = 1.9 YEARS.

DISCOUNTED PAYBACK = 2.2 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	17.8 %	1.9 YEARS	2.2 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	17.8 %	2.0 YEARS	2.2 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	17.8 %	2.0 YEARS	2.3 YEARS

.417 CP SECONDS EXECUTION TIME.

Job Chem

ECO No. 5

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 2

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Rotary product dryer is uninsulated, with heat lost through the shell.

2. Recommendation:

Add refractory-type insulation, such as calcium silicate, to the exterior surface of the dryer shell.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction			1310	
Cost Reduction			$3690	

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change $20,780 (J)

B. Foreign exchange component of A. above $ 3,650 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 1,680 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 15 years

F. Salvage value (or disposal cost) $ 0 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$\ 20,780}{\$\ 3690/\text{yr}} = 5.6$ years

THE PRICE OF THE PLANT = 20780.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 20780.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 3690.00
THE SALVAGE VALUE = 0.00
THE LIFE OF THIS STUDY IS 15 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	20780.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	18018.	2762.	3690.	0.	4632.	-942.	4944.	0.	0.	0.	0.
2	15007.	6021.	4354.	0.	4632.	-278.	3530.	0.	0.	0.	0.
3	11726.	9867.	5138.	0.	4632.	506.	3464.	0.	0.	0.	0.
4	8149.	14405.	6063.	0.	4632.	1431.	3464.	0.	0.	0.	0.
5	4250.	19760.	7154.	0.	4632.	2522.	3464.	0.	0.	0.	0.
6	-0.	26079.	8442.	0.	4632.	3810.	3464.	156.	3654.	2063.	2063.
7	0.	33536.	9961.	0.	0.	9961.	0.	4483.	5479.	2811.	4874.
8	0.	42334.	11754.	0.	0.	11754.	0.	5289.	6465.	3016.	7890.
9	0.	52717.	13870.	0.	0.	13870.	0.	6242.	7629.	3235.	11125.
10	0.	64968.	16367.	0.	0.	16367.	0.	7365.	9002.	3471.	14596.
11	0.	79424.	19313.	0.	0.	19313.	0.	8691.	10622.	3723.	18319.
12	0.	96482.	22789.	0.	0.	22789.	0.	10255.	12534.	3994.	22312.
13	0.	116611.	26891.	0.	0.	26891.	0.	12101.	14790.	4284.	26597.
14	0.	140363.	31732.	0.	0.	31732.	0.	14279.	17452.	4596.	31192.
15	0.	168391.	37443.	0.	0.	37443.	0.	16849.	20594.	4930.	36122.

RETURN ON INVESTMENT = 3.75 %

SIMPLE PAYBACK = 8.8 YEARS.

DISCOUNTED PAYBACK = 11.6 YEARS.

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	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	3.8 %	8.8 YEARS	11.6 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	3.3 %	9.5 YEARS	12.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	3.3 %	9.5 YEARS	12.1 YEARS

.404 CP SECONDS EXECUTION TIME.

Job Chem

ECO No. 6

ENERGY CONSERVATION OPPORTUNITY
Jamaican Private Sector

ECO Type 13

1. Building Envelope	6. Air conditioning	11. Solar
2. Insulation	7. Ventilation	12. Operations and maintenance
3. Lighting	8. Process heating	13. Motors
4. Hot water	9. Production equipment	14. Power factor
5. Food services	10. Heat recovery	99. Miscellaneous

1. Existing conditions:

Standard industrial motors in use. Motors are rewound locally upon failure.

2. Recommendation:

Replace motors with energy efficient electric motors instead of rewinding.

3. Projected savings:

	Electric	Fuels		
	kWh	LP Gas IG	Diesel IG	Bunker C IG
Energy Reduction	32,700			
Cost Reduction	$6860			

4. Cost analysis:

A. Estimated cost for design, acquisition, and installation of recommended change (incremental over rewinding) $ 40,360 (J)

B. Foreign exchange component of A. above $ 34,170 (U.S.)

C. Duty (customs, consumption, stamp taxes) on B above $ 18,250 (J)

D. Estimated increase/decrease in maintenance cost resulting from this ECO $ 0 (J)

E. Estimated useful life of recommendation 10 years

F. Salvage value (or disposal cost) $ 5,000 (J)

G. Simple payback period = $\frac{\text{cost of change}}{\text{net reduced annual cost}} = \frac{\$\ 40,360}{\$6860/\text{yr}} = 5.9$ years

THE PRICE OF THE PLANT = 40360.00
THE PRICE OF THE LAND = 0.00
THE AMOUNT OF THE DOWN PAYMENT = 0.00
THE AMOUNT OF THE ORIGINAL LOAN = 40360.00
THE TERMS OF THE ORIGINAL LOAN ARE: 6 YEARS, AT 9.0 PERCENT.
THE ANNUAL INFLATION RATE = 18.0 PERCENT.
THE PRESENT VALUE CALCULATION RATE = 10.0 PERCENT.
THE ANNUAL COSTS = 0.00
1.0 PERCENT OF THE PLANT PRICE IS DEPRECIATED FOR ONLY 6 YEARS.
THE REMAINING PLANT PRICE WAS DEPRECIATED FOR 6 YEARS.
THE TAX CREDIT RATE IS 0.0 PERCENT.
DEPRECIATION WAS CALCULATED USING THE DOUBLE DECLINING BALANCE METHOD.
THE ANNUAL INCOME = 6860.00
THE SALVAGE VALUE = 5000.00
THE LIFE OF THIS STUDY IS 10 YEARS.
THE TAX BRACKET IS 45.00 PERCENT.

END OF YEAR	BALANCE	EQUITY	ANNUAL INCOME	OPERA-TIONAL COSTS	AMORT-IZATION	CASH FLOW	DEPRE-CIATION	TAXES	AFTER TAX CASH FLOW	PRESENT VALUE	NET PRESENT VALUE
0	40360.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	34995.	5365.	6860.	0.	8997.	-2137.	9603.	0.	0.	0.	0.
2	29140.	11695.	8095.	0.	8997.	-902.	6855.	0.	0.	0.	0.
3	22774.	19165.	9552.	0.	8997.	555.	5894.	0.	0.	0.	0.
4	15827.	27979.	11271.	0.	8997.	2274.	5894.	0.	0.	0.	0.
5	8254.	38380.	13300.	0.	8997.	4303.	5894.	0.	0.	0.	0.
6	-0.	50653.	15694.	0.	8997.	6697.	5894.	361.	6335.	3576.	3576.
7	0.	65135.	18519.	0.	0.	18519.	0.	8334.	10185.	5227.	8803.
8	0.	82224.	21852.	0.	0.	21852.	0.	9834.	12019.	5607.	14410.
9	0.	102389.	25786.	0.	0.	25786.	0.	11604.	14182.	6015.	20424.
10	0.	126183.	30427.	0.	0.	30427.	0.	13692.	16735.	6452.	26876.

PROJECT HAS YET TO BREAK EVEN.

SIMPLE PAYBACK = 8.9 YEARS.

DISCOUNTED PAYBACK = 11.1 YEARS.

	RETURN ON INVESTMENT	SIMPLE PAYBACK	DISCOUNTED PAYBACK
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 9.:			
VARIABLE CHANGE NO. 1:	-4.0 %	8.9 YEARS	10.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 12.:			
VARIABLE CHANGE NO. 2:	-5.3 %	8.9 YEARS	9.1 YEARS
AFTER CHANGING THE INTEREST RATE ON THE ORIGINAL LOAN TO 15.:			
VARIABLE CHANGE NO. 3:	-5.3 %	8.9 YEARS	8.1 YEARS

.384 CP SECONDS EXECUTION TIME.

ANNEX "F"

ECONOMIC ANALYSIS

COMPUTER PROGRAM

DEFINITIONS OF TERMS

COMPUTER-BASED ECONOMIC ANALYSIS

Balance = Previous year end balance less principal paid in last year
First Year Balance = Price (Land + Plant) - Down Payment

Equity = (Down Payment + Principal Paid) x $[1 + (\% \text{ inflation} \times .01)]^N$
Note: The principal changes each year.

Yearly Income is given in input data for year one.
= First Year Income x $[1 + (\% \text{ inflation} \times .01)]^N$

Operation Costs = First year costs x $[1 + (\% \text{ inflation} \times .01)]^N$

Amortization = Amortization payments on all loans up to the present year, also known as the equal payment series capital - recovery amount.

$$= \text{Loan} \; \frac{i \times (1 + 1)^N}{(1 + i)^N - 1}$$

Where N = # of years
i = interest rate

Note: The amortization is on an annual basis.

Cash Flow = yearly income - [Operation Costs + Amortization]

Depreciation: The program allows the operator to choose between straight line and double declining balance depreciation. If the operator chooses the latter, the program calculates accordingly until the year when the straight line value is greater than the double declining value, then the program calculates and prints the remaining annual depreciation using the straight line method.

Taxes = Tax Rate x [Cash Flow - Depreciation]

After Tax Cash Flow = Cash Flow - Taxes

$$\text{Present Value} = \frac{(\text{After Tax Cash Flow})}{(1 + i)^N}$$

The present value discounts future dollar values to present dollar values.

N = # of years

i = present value discount rate

$$\text{Net Present Value} = \sum_{i=0}^{N} \text{(Present Value)}$$

$$\text{Return on Investment} = \left[\left(\frac{\text{Net Present Value in at end of final year}}{\text{Sum of the Present Values of the Investments}}\right)^{1/N} - 1\right] \times 100$$

Note that this calculation does not take into account the interest paid on the amortization of each loan, hence only loan value, at the end of the year it begins, is discounted to present value (in year zero) at the rate given in the input.

Simple payback period starts in year zero and ends the year that the sum of the after tax cash flows equals the original investment of plant plus land.

Discounted payback period is calculated similarly to simple payback except that the net present value is used to establish when the break even point occurs.

```
      PROGRAM ECON(INPUT,OUTPUT,TAPE 7,TAPE 5=INPUT,TAPE 6=OUTPUT)
      IMPLICIT REAL (A-Z)
C
C      @@@@@
C      @@@@@ WARNING:  IF YOU ARE RUNNING THIS PROGRAM FROM
C      @@@@@           A DATA FILE, YOU MUST ANSWER EVERY QUESTION,
C      @@@@@           EVEN IF, FOR INSTANCE, YOU HAVE NO INTENTION
C      @@@@@           OF USING A THIRD LOAN.  TO AVOID DIVISION BY
C      @@@@@           ZERO, ENTER A TWO AS YOUR DUMMY VARIABLE.
C      @@@@@                                DAVID WARD, SPRING, 1982.
C      @@@@@
C
C      *****TO RUN THIS PROGRAM, YOU WILL NEED THE
C      **FOLLOWING DATA (IT CAN BE PLACED AS BELOW IN
C      **A DATA FILE):
C           * A 0 (ZERO) OR A 1 IF THE INPUT IS FROM A
C                DATA FILE OR IF IT IS ENTERED MANUALLY.
C           * THE NAME OF THE PLANT OR COMPANY
C           * PLANT PRICE AND LAND PRICE (SEPARATED BY
C                A COMMA).
C           * THE DOWN PAYMENT MADE ON THE PLANT.
C           * THE TAX CREDIT PERCENTAGE RATE.
C           * THE NUMBER OF YEARS AND THE INTERNAL RATE
C                OF RETURN FOR AMORTIZING THE DOWN PAYMENT
C           * A 1 OR A 0 (ZERO) IF IT IS WANTED OR
C                NOT WANTED TO AMORTIZE THE DOWN PAYMENT.
C           * THE AMOUNT, NUMBER OF YEARS, AND INTEREST
C                RATE OF THE ORIGINAL LOAN.
C           * A 1 OR A 0 (ZERO) IF THERE WILL NOT OR THERE
C                WILL BE A SECOND LOAN.
C           * THE START OF THE SECOND LOAN.
C           * THE AMOUNT, PERIOD, AND INTEREST ON THE
C                SECOND LOAN.
C           * DEPRECIATION SCHEDULE OF THE SECOND LOAN
C           * A 1 OR A 0 (ZERO) IF THERE WILL NOT OR
C                THERE WILL BE A THIRD LOAN.
C           * THE START OF THE THIRD LOAN.
C           * THE AMOUNT, PERIOD, AND INTEREST ON THE
C                THIRD LOAN.
C           * DEPRECIATION SCHEDULE OF THE THIRD LOAN
C           * THE ANNUAL INFLATION RATE.
C           * THE ANNUAL INCOME
C           * THE ANNUAL COSTS
C           * THE TAX BRACKET.
C           * THE PRESENT VALUE CALCULATION RATE.
C           * THE PORTION OF THE PLANT PRICE TO BE DEPRECIATED
C                ON A SHORTER TIME, AND THE PERIOD.
C           * THE NUMBER OF YEARS FOR DEPRECIATION.
C           * A 1 OR A 2 IF STRAIGHT LINE OR DOUBLE DECLINING
C                BALANCE DEPRECIATION IS USED.
C           * THE PLANT SALVAGE VALUE.
C           * A CARRIAGE CONTROL NUMBER.
C                     ***THE PROGRAM NOW PRINTS A TABLE OF INFORMATION.
C                     *******IT THEN ASKS IF YOU WANT TO CONTINUE.
C           * A 1 OR A 0 (ZERO) IF YOU WANT TO REPEAT WITH DIFFERENT
C                VALUES OR IF YOU WANT TO STOP.
C           * CHOOSE BETWEEN 14 VARIABLES TO CHANGE.
C           * THE NUMBER OF TIMES YOU WISH TO CHANGE THIS VARIABLE.
C           * THE VALUES OF THE NEW VARIABLE.
C           * A 1 OR  A 0 (ZERO) IF YOU WANT TO SEE THE TABLE
```

```
C          + W CARRIAGE CONTROL NUMBER.
C
C
      DIMENSION INTPD1(100),BALNC1(100),PPOFFI(100),
     +INTPD2(100),BALNC2(100),PPOFF2(100),
     +INTPD3(100),BALNC3(100),PPOFF3(100),DEPREM(100),
     +BALANCE(100),EQUITY(100),INCOMYR(100),BKVAL(100),DEP(100),
     +BALD(100),INTPDD(100),PPOFFD(100),COSTS(100),CSHFLO(100),
     +XDEP(100),PRESVAL(100),NETPVAL(100),TAXES(100),
     +ATXCSHF(100),VARCH(100),MORTSUM(100),
     +AMORT1(100),AMORT2(100),AMORT3(100),
     +XDEP1(100),DEP1(100),XDEP2(100),DEP2(100),
     +YDEP1(100),ZDEP1(100),YDEP2(100),ZDEP2(100),NAME(20),
     +AMRT(100),INTPAD(100)
C
      INTEGER KXX,IN,K,J,I,PERD1,PERD2,STLN2,PERD3,STLN3,MAXPER,DEPYR,
     +PERYR2,PERYR3,DPPRD,SHTPER,MAXP,MXPR1,SHTPR1,DPYR1,SET,
     +PVSET,FLAG,LIST,Z,XSHT2,XSHT3,XDEPER2,DEPER2,
     +XDEPER3,DEPER3,NAME,STLON2,STLON3
      YN3=1
      FLAG=LIST=0
      SHTPR1=SHTPER=XSHT2=XSHT3=PERD1=STLN2=PERD2=DPPRD=0
      STLN3=PERD3=PERYR2=MAXPER=PERD1=MAXPER=DEPYR=PERYR3=0
      MAXP=MXPR1=DPYR1=SET=PVSET=0
C
      PLANT=LAND=DOWN=IRR=MORT1=RATE1=TIM=INTRST1=0.0
      NUMPAY1=MORT2=RATE2=MOY=TM=0.0
      MORT3=RATE3=INCOMY=COSTYR=0.0
C
      DO 1 I=1,100
      INTPD1(I)=BALNC1(I)=PPOFF1(I)=INTPD2(I)=BALNC2(I)=0.0
      PPOFF2(I)=INTPD3(I)=BALNC3(I)=PPOFF3(I)=BALANCE(I)=0.0
      EQUITY(I)=INCOMYR(I)=BKVAL(I)=DEP(I)=0.0
      BALD(I)=COSTS(I)=CSHFLO(I)=DEPREM(I)=0.0
      INTPDD(I)=PPOFFD(I)=XDEP(I)=PRESVAL(I)=NETPVAL(I)=0.0
      AMORT1(I)=AMORT2(I)=AMORT3(I)=0.0
      TAXES(I)=ATXCSHF(I)=VARCH(I)=MORTSUM(I)=0.0
      XDEP1(I)=DEP1(I)=XDEP2(I)=DEP2(I)=0.0
      YDEP1(I)=ZDEP1(I)=YDEP2(I)=ZDEP2(I)=0.0
1     CONTINUE
C
C
5     FORMAT(/,'INPUT A 0 IF INPUT IS FROM A DATA FILE, ',
     +'A 1 IF IT IS FROM THE TERMINAL',/////)
      WRITE(6,5)
      READ(5,*)IN
      KXX=6
      IF(IN.EQ.0)KXX=7
C
4     FORMAT(/,'ENTER THE COMPANY NAME')
      WRITE(KXX,4)
      READ(5,3)NAME
3     FORMAT(20A4)
C
10    FORMAT(/,'ENTER THE PRICE OF THE PLANT AND THE PRICE OF THE LAND')
      WRITE(KXX,10)
      READ(5,*)PLANT,LAND
C
15    FORMAT(/,'ENTER THE DOWN PAYMENT TO BE MADE ON THE PLANT')
      WRITE(KXX,15)
      READ(5,*)DOWN
C
19    FORMAT(/,'ENTER THE TAX CREDIT PERCENTAGE RATE')
      WRITE(KXX,19)
      READ(5,*)XTXCDRT
```

```
20    FORMAT(/,'ENTER THE PERIOD (# OF YEARS) AND INTERNAL ',
     +'RATE OF RETURN FOR THE DOWN PAYMENT, (IN PERCENT)')
      WRITE(KXX,20)
      READ(5,*)DPPRD,XIRR
C
23    FORMAT(/,'TYPE A 1 IF YOU WOULD LIKE TO AMORTIZE THE',
     +' DOWN PAYMENT, AND A 0 IF YOU DO NOT WISH TO')
24    WRITE(KXX,23)
      READ(5,*)AMTZ
      IF(AMTZ.NE.1.AND.AMTZ.NE.0)GOTO 24
C
25    FORMAT(/,'ENTER AMOUNT OF ORIGINAL LOAN, THE PERIOD (# OF YEARS)',
     +/,' AND THE INTEREST RATE (IN PERCENT), IN THAT ORDER')
      WRITE(KXX,25)
      READ(5,*)MORT1,PERD1,XRATE1
C
C
40    FORMAT(/,'INPUT A 1 IF THERE WILL NOT BE A SECOND LOAN, '
     +'A 0 IF THERE WILL BE A SECOND LOAN')
      WRITE(KXX,40)
      READ(5,*)YN2
      IF(YN2.EQ.1.AND.KXX.EQ.6)GOTO 96
C
45    FORMAT(/,'WHAT YEAR WILL THE SECOND LOAN START IN')
      WRITE(KXX,45)
      READ(5,*)STLN2
C
50    FORMAT(/,'ENTER THE AMOUNT OF THE SECOND LOAN, THE PERIOD ',
     +/,'(# OF YEARS), AND THE INTEREST RATE (IN PERCENT), ',
     +'IN THAT ORDER')
      WRITE(KXX,50)
      READ(5,*)MORT2,PERD2,XRATE2
C
57    FORMAT(/,'FOR HOW MANY YEARS WILL THE PURCHASES ',
     +'FROM THE SECOND LOAN BE DEPRECIATED')
      WRITE(KXX,57)
      READ(5,*)XDEPER2
C
65    FORMAT(/,'INPUT A 1 IF THERE WILL NOT BE A THIRD LOAN, '
     +'A 0 IF THERE WILL BE A THIRD LOAN')
      WRITE(KXX,65)
      READ(5,*)YN3
      IF(YN3.EQ.1.AND.KXX.EQ.6)GOTO 96
C
70    FORMAT(/,'WHAT YEAR WILL THE THIRD LOAN START IN')
      WRITE(KXX,70)
      READ(5,*)STLN3
C
75    FORMAT(/,'ENTER THE AMOUNT OF THE THIRD LOAN, THE PERIOD ',
     +/,'(# OF YEARS), AND THE INTEREST RATE (IN PERCENT), ',
     +'IN THAT ORDER')
      WRITE(KXX,75)
      READ(5,*)MORT3,PERD3,XRATE3
C
82    FORMAT(/,'FOR HOW MANY YEARS WILL THE PURCHASES ',
     +'FROM THE THIRD LOAN BE DEPRECIATED')
      WRITE(KXX,82)
      READ(5,*)XDEPER3
C
C
95    FORMAT(/,'WHAT PERCENT IS EXPECTED FOR THE ANNUAL INFLATION')
96    WRITE(KXX,95)
      READ(5,*)XINF
```

```
      READ(5,*)INCOMY
C
110   FORMAT(/,'WHAT IS THE EXPECTED ANNUAL COSTS')
      WRITE(KXX,110)
      READ(5,*)COSTYR
C
145   FORMAT(/,'ENTER THE EXPECTED TAX BRACKET (IN PERCENT)')
      WRITE(KXX,145)
      READ(5,*)XTAXRAT
C
147   FORMAT(/,'ENTER THE RATE FOR THE PRESENT VALUE ',
     +'CALCULATION (IN PERCENT)')
      WRITE(KXX,147)
      READ(5,*)XPVRATE
C
119   FORMAT(/,'SOME COMPONENTS OF THE PLANT COST MAY HAVE',
     +' A SHORTER DEPRECIATION PERIOD THAN THE PLANT ',
     +'ITSELF,',/,' SUCH AS MACHINERY OR VEHICLES.  WHAT ',
     +'PORTION OF THE PLANT PRICE WILL BE DEPRECIATED ',
     +'ON A SHORTER TIME (IN PERCENT),',/,' AND WHAT WILL ',
     +'THIS SHORTER PERIOD BE.')
      WRITE(KXX,119)
      READ(5,*)XPORTN,SHTPER
C
140   FORMAT(/,'ENTER THE NUMBER OF YEARS FOR DEPRECIATION ',
     +'OF THE PLANT')
      WRITE(KXX,140)
      READ(5,*)DEPYR
C
120   FORMAT(/,'ENTER 1 IF YOU WANT TO USE STRAIGHT-LINE ',
     +'DEPRECIATION,',/,'OR 2 IF YOU WANT TO USE DOUBLE-DECLINING ',
     +'BALANCE DEPRECIATION')
121   WRITE(KXX,120)
      READ(5,*)ORT
C
      IF(ORT.NE.1.AND.ORT.NE.2.)GOTO 121
C
135   FORMAT(/,'ENTER THE AMOUNT OF EXPECTED SALVAGE VALUE OF ',
     +'THE PLANT')
      WRITE(KXX,135)
      READ(5,*)SALVG
C
136   FORMAT(/,'ADVANCE TO THE BOTTOM OF THE PAGE, TYPE ',
     +'ANY NUMBER, AND HIT THE RETURN.  THEN STAND BACK!')
      WRITE(KXX,136)
      READ(5,*)XX
C
200   TXCDRT=XTXCDRT/100.
      TXCRED=TXCDRT*(PLANT+LAND)
      IRR=XIRR/100.
C
      AMORTD=DOWN*((IRR*(1+IRR)**DPPRD))/
     +((1+IRR)**DPPRD-1)
      BALD(1)=AMORTD
      DO 22 I=1,DPPRD
      INTPDD(I)=BALD(I)*IRR
      PPOFFD(I)=(AMORTD*IRR)-INTPDD(I)
      BALD(I+1)=BALD(I)-PPOFFD(I)
22    CONTINUE
C
      IF(AMTZ.EQ.0)AMORTD=0
      RATE1=XRATE1/100.
C
      INTRST1=RATE1
```

```
      DO 35 K=1,PERD1
      AMORT1(K)=MORT1*((INTRST1*(1+INTRST1)**NUMPAY1))/
     +(((1+INTRST1)**NUMPAY1)-1)
      INTPD1(K)=BALNC1(K)*RATE1
      PPOFF1(K)=AMORT1(K)-INTPD1(K)
      BALNC1(K+1)=BALNC1(K)-PPOFF1(K)
35    CONTINUE
C
      IF(YN2.EQ.1)GOTO 90
      RATE2=XRATE2/100.
C
      INTRST2=RATE2
      NUMPAY2=PERD2
C
      STLN2=STLN2+1
      PERYR2=STLN2+PERD2
      BALNC2(STLN2)=MORT2
      DO 60 J=STLN2,PERYR2
      AMORT2(J)=MORT2*((INTRST2*(1+INTRST2)**NUMPAY2))/
     +(((1+INTRST2)**NUMPAY2)-1)
      INTPD2(J)=BALNC2(J)*RATE2
      PPOFF2(J)=AMORT2(J)-INTPD2(J)
      BALNC2(J+1)=BALNC2(J)-PPOFF2(J)
60    CONTINUE
      STLN2=STLN2-1
C
      IF(YN3.EQ.1)GOTO 90
      RATE3=XRATE3/100.
C
      INTRST3=RATE3
      NUMPAY3=PERD3
C
      STLN3=STLN3+1
      PERYR3=STLN3+PERD3
      BALNC3(STLN3)=MORT3
      DO 85 J=STLN3,PERYR3
      AMORT3(J)=MORT3*((INTRST3*(1+INTRST3)**NUMPAY3))/
     +(((1+INTRST3)**NUMPAY3)-1)
      INTPD3(J)=BALNC3(J)*RATE3
      PPOFF3(J)=AMORT3(J)-INTPD3(J)
      BALNC3(J+1)=BALNC3(J)-PPOFF3(J)
85    CONTINUE
      STLN3=STLN3-1
C
90    MAXPER=MAX0(PERD1,PERD2,PERD3)
      MXPR1=MAXPER+1
      INF=XINF/100.
C
      DO 86 K=1,MXPR1
      AMRT(K)=AMORT1+AMORT2+AMORT3
      INTPAD(K)=INTPD1+INTPD2+INTPD3
86    CONTINUE
C
      BALANCE(1)=PLANT+LAND-DOWN
      EQUITY(1)=DOWN
      DO 100 K=2,MXPR1
      BALANCE(K)=BALNC1(K)+BALNC2(K)+BALNC3(K)
      EQUITY(K)=EQUITY(K-1)*(1+INF)+(AMRT(K-1)-INTPAD(K-1))
100   CONTINUE
C
      INCOMYR(2)=INCOMY
      DO 115 J=3,MXPR1
      INCOMYR(J)=INCOMYR(J-1)*(1+INF)
```

```
      DEPER2=XDEPER2+1
      DEPER3=XDEPER3+1
      PORTN=XPORTN/100
      DPYR1=DEPYR+1
      SHTPR1=SHTPER+1
C
      DO 122 J=2,SHTPR1
      XDEP1(J)=(PLANT*PORTN)/SHTPER
122   CONTINUE
C
C        STRAIGHT LINE DEPRECIATION ON THE SECOND LOAN
C
      STLON2=STLN2+1
      XSHT2=SHTPR1+STLN2
      DO 126 J=STLON2,XSHT2
      YDEP1(J)=MORT2/DEPER2
126   CONTINUE
C
C        STRAIGHT LINE DEPRECIATION ON THE THIRD LOAN
C
      IF(YN3.EQ.1)GOTO 523
      STLON3=STLN3+1
      XSHT3=SHTPR1+STLN3
      DO 127 J=STLON3,XSHT3
      ZDEP1(J)=MORT3/DEPER3
127   CONTINUE
C
523   DO 123 J=2,DPYR1
      DEP1(J)=(((PLANT*(1.-PORTN))-SALVG)/DEPYR)+XDEP1(J)+
     +YDEP1(J)+ZDEP1(J)
123   CONTINUE
C
125   DO 124 J=2,SHTPR1
      XDEP2(J)=(2./SHTPER)*((1.-(2./SHTPER))**(J-1))*(PLANT*PORTN)
124   CONTINUE
C
C        DOUBLE-DECLINING-BALANCE DEPRECIATION ON THE SECOND LOAN
C
      XSHT2=SHTPR1+STLN2
      DO 128 J=STLON2,XSHT2
      YDEP2(J)=(2./DEPER2)*((1.-(2./DEPER2))**(J-1))*MORT2
128   CONTINUE
C
C        DOUBLE-DECLINING-BALANCE DEPRECIATION ON THE THIRD LOAN
C
      IF(YN3.EQ.1)GOTO 530
      XSHT3=SHTPR1+STLN3
      DO 129 J=STLON3,XSHT3
      ZDEP2(J)=(2./DEPER3)*((1.-(2./DEPER3))**(J-1))*MORT3
129   CONTINUE
C
530   DO 130 J=2,DPYR1
      DEP2(J)=((2./DEPYR)*((1.-(2./DPYR1))**(J-1))*(PLANT*
     &(1.-PORTN)))+XDEP2(J)+YDEP2(J)+ZDEP2(J)
130   CONTINUE
C
      DO 329 J=2,DPYR1
      IF(ORT.EQ.1)DEP(J)=DEP1(J)
      IF(ORT.EQ.2)DEP(J)=DEP2(J)
      IF(ORT.EQ.2.AND.DEP1(J).GT.DEP2(J))DEP(J)=DEP1(J)
329   CONTINUE
146   TAXRAT=XTAXRAT/100.
      PVRATE=XPVRATE/100.
C
      IF(LIST.NE.0)GOTO 149
C
```

```
      IF      .NE.     THEN
C
      WRITE(6,159)NAME
159   FORMAT(40X,'CASH FLOW ANALYSIS FOR:  ',20A4,//)
      WRITE(6,160)PLANT
160   FORMAT('THE PRICE OF THE PLANT = ',F10.2)
      WRITE(6,161)LAND
161   FORMAT('THE PRICE OF THE LAND =  ',F10.2)
      WRITE(6,162)DOWN
162   FORMAT('THE AMOUNT OF THE DOWN PAYMENT =  ',F10.2)
      WRITE(6,163)MORT1
163   FORMAT('THE AMOUNT OF THE ORIGINAL LOAN = ',F10.2)
      XRATE1=RATE1*100
      WRITE(6,164)PERD1,XRATE1
164   FORMAT('THE TERMS OF THE ORIGINAL LOAN ARE: ',I3,1X,
     +'YEARS, AT ',F4.1,' PERCENT.')
      IF(YN2.EQ.0)WRITE(6,181)MORT2
181   FORMAT('THE AMOUNT OF THE SECOND LOAN = ',F10.2)
      IF(YN2.EQ.0)WRITE(6,182)PERD2,XRATE2,STLN2
182   FORMAT('THE TERMS OF THE SECOND LOAN ARE: ',I3,1X,
     +'YEARS, AT ',F4.1,' PERCENT, STARTING AT END OF YEAR ',I2)
      IF(YN3.EQ.0)WRITE(6,183)MORT3
183   FORMAT('THE AMOUNT OF THE THIRD LOAN = ',F10.2)
      IF(YN3.EQ.0)WRITE(6,184)PERD3,XRATE3,STLN3
184   FORMAT('THE TERMS OF THE THIRD LOAN ARE: ',I3,1X,
     +'YEARS, AT ',F4.1,' PERCENT, STARTING AT END OF YEAR ',I2)
      WRITE(6,165)XINF
165   FORMAT('THE ANNUAL INFLATION RATE = ',F4.1,' PERCENT.')
      WRITE(6,265)XPVRATE
265   FORMAT('THE PRESENT VALUE CALCULATION RATE = ',F4.1,
     +' PERCENT.')
      WRITE(6,173)COSTYR
173   FORMAT('THE ANNUAL COSTS = ',F12.2)
      WRITE(6,174)XPORTN,SHTPER
174   FORMAT(F4.1,' PERCENT OF THE PLANT PRICE IS ',
     +'DEPRECIATED FOR ONLY ',I2,' YEARS.')
      WRITE(6,277)DEPYR
277   FORMAT('THE REMAINING PLANT PRICE WAS DEPRECIATED ',
     +'FOR ',I2,' YEARS.')
      WRITE(6,175)XTXCDRT
175   FORMAT('THE TAX CREDIT RATE IS ',F4.1,' PERCENT.')
      IF(ORT.EQ.1.)WRITE(6,176)
176   FORMAT('DEPRECIATION WAS CALCULATED USING THE ',
     +'STRAIGHT LINE METHOD.')
      IF(ORT.EQ.2.)WRITE(6,177)
177   FORMAT('DEPRECIATION WAS CALCULATED USING THE ',
     +'DOUBLE DECLINING BALANCE METHOD.')
      IF(YN2.EQ.0)WRITE(6,178)XDEPER2
178   FORMAT('THE SECOND LOAN WAS DEPRECIATED FOR ',
     +I2,' YEARS.')
      IF(YN3.EQ.0)WRITE(6,278)XDEPER3
278   FORMAT('THE THIRD LOAN WAS DEPRECIATED FOR ',
     +I2,' YEARS.')
      WRITE(6,180)INCOMY
180   FORMAT('THE ANNUAL INCOME = ',F12.2)
      WRITE(6,501)SALVG
501   FORMAT('THE SALVAGE VALUE = ',F11.2)
      WRITE(6,502)MAXPER
502   FORMAT('THE LIFE OF THIS STUDY IS ',I2,' YEARS.')
      WRITE(6,172)XTAXRAT
172   FORMAT('THE TAX BRACKET IS ',F5.2,' PERCENT.',/////)
C
      WRITE(6,131)
131   FORMAT(40X,'OPERA-',74X,'NET')
      WRITE(6,132)
132   FORMAT('END OF',2X,'[illegible]',5X,'[illegible]',2X,'[illegible]',6X,'CASH',6X,
```

```
133   FORMAT(1X,'YEAR',2X,'BALANCE',5X,'EQUITY',4X,
     +'INCOME',5X,'COSTS',4X,'IZATION',6X,'FLOW',5X,'CIATION',
     +5X,'TAXES',6X,'CASH FLOW',5X,'VALUE',6X,'VALUE')
      WRITE(6,134)
134   FORMAT(1X,'----',2X,'-------',5X,'------',4X,
     +'------',5X,'-----',4X,'-------',6X,'----',5X,'-------',
     +5X,'-----',6X,'---------',5X,'-----',6X,'-----')
C
      TAXES(1)=-(TXCRED)
      ATXCSHF(1)=NETPVAL(1)=PRESVAL(1)=TXCRED
149   CFLOSUM=PVALSUM=TXCRED
      MORTSUM(1)=0.0
      SET=1
150   DO 155 I=2,MXPR1
      K=I+1
      MORTSUM(K)=AMORT1(I)+AMORTD+AMORT2(I)+AMORT3(I)
      IF(K.EQ.3)MORTSUM(2)=MORTSUM(3)
      CSHFLO(I)=INCOMYR(I)-(COSTS(I)+MORTSUM(I))
      TAXES(I)=(CSHFLO(I)-DEP(I))*TAXRAT
      ATXCSHF(I)=CSHFLO(I)-TAXES(I)
      IF(DEP(I).GT.CSHFLO(I))TAXES(I)=ATXCSHF(I)=0.0
      PRESVAL(I)=ATXCSHF(I)*(1./(1.+PVRATE)**(I-1))
      NETPVAL(I)=NETPVAL(I-1)+PRESVAL(I)
      PVALSUM=PVALSUM+PRESVAL(I)
      IF(PVALSUM.GT.(PLANT+LAND).AND.PVSET.EQ.0)PVSET=1
      IF(PVALSUM.LT.(PLANT+LAND))PVSET=I
      IF(PVALSUM.LT.(PLANT+LAND))SUMPVS=PVALSUM
      CFLOSUM=CFLOSUM+ATXCSHF(I)
      IF(I.EQ.2)SUMSET=ATXCSHF(I)
      IF(CFLOSUM.LT.(PLANT+LAND))SET=I
      IF(CFLOSUM.LT.(PLANT+LAND))SUMSET=CFLOSUM
155   CONTINUE
C
      COSTS(2)=COSTYR
      DO 359 I=3,MXPR1
      COSTS(I)=COSTS(I-1)*(1+INF)
359   CONTINUE
C
      IF(CSHFLO(MXPR1).LT.0.0)DIX=1
C
      PV2=MORT2/(1+PVRATE)**STLN2
      PV3=MORT3/(1+PVRATE)**STLN3
C
      SET=SET+1
      SUMSET=SUMSET+ATXCSHF(SET)
      IF(PVSET.LT.MXPR1)PVSET=PVSET+1
      SUMPVS=SUMPVS+PRESVAL(PVSET)
      CAPINV=PLANT+LAND+PV2+PV3
      CFTMP=CSHFLO(SET)
      PVTMP=PRESVAL(PVSET)
C
      IF(DIX.EQ.1)GOTO 449
      CALL INTERP(CFTMP,SET,SUMSET,CAPINV,SPABAK)
      SPABAK=SPABAK-1
      CALL INTERP(PVTMP,PVSET,SUMPVS,CAPINV,DPABAK)
449   DPABAK=DPABAK-1
C
C
      IF(LIST.NE.0)GOTO 258
C
      DO 156 I=1,MXPR1
      K=I-1
      WRITE(6,151)K,BALANCE(I),EQUITY(I),INCOMYR(I),COSTS(I),
     +MORTSUM(I),
     +CSHFLO(I),DEP(I),TAXES(I),ATXCSHF(I),PRESVAL(I),NETPVAL(I)
151   FORMAT(2X,I2,2X,F8.0,[illegible]
```

```
525          F6.0,2X,F10.0,2X,F6.0,2X,F10.0,3X,F10.0,2X,F9.0,2X,F10.0)
526   156    CONTINUE
527          PLERB=PLANT+LAND+MORT2+MORT3
528          IF(PLERB.GT.NETPVAL(MAXPER))DIX=1
529          IF(DIX.EQ.1)GOTO 169
530   C
531   C
532          ROI=((NETPVAL(MAXPER+1)/(PLANT+LAND+PV2+PV3))
533         +**(1./MAXPER)-1.)*100
534   C
535          IF(DIX.NE.1)WRITE(6,170)ROI
536   170    FORMAT(///,10X,'RETURN ON INVESTMENT =',F6.2,' %')
537   169    IF(DIX.EQ.1)WRITE(6,171)
538   171    FORMAT(///,10X,'PROJECT HAS YET TO BREAK EVEN.')
539          WRITE(6,179)SPABAK
540   179    FORMAT(/,10X,'SIMPLE PAYBACK = ',F4.1,' YEARS.')
541          WRITE(6,185)DPABAK
542   185    FORMAT(/,10X,'DISCOUNTED PAYBACK = ',F4.1,' YEARS.')
543   C
544          WRITE(6,157)
545   157    FORMAT(//////////////)
546   C
547          WRITE(KXX,230)
548   230    FORMAT('ENTER A 1 IF YOU WOULD LIKE TO REPEAT THIS ',
549         +'ANALYSIS BY SUBSTITUTING A DIFFERENT VALUE FOR ',/,
550         +'    ONE OF THE VARIABLES, OR ENTER A ZERO IF YOU ',
551         +'WOULD JUST LIKE TO STOP')
552          READ(5,*)QUERY
553          IF(QUERY.EQ.0)STOP
554          WRITE(KXX,235)
555   235    FORMAT('CHOOSE THE NUMBER CORRESPONDING TO THE ',
556         +'VARIABLE YOU WISH TO CHANGE ',/,
557         +'    FROM THE FOLLOWING LIST:',/,
558         +'       1.....THE PRICE OF THE PLANT',/,
559         +'       2.....THE PRICE OF THE LAND',/,
560         +'       3.....THE DOWN PAYMENT MADE ON THE PLANT',/,
561         +'       4.....THE TAX CREDIT PERCENTAGE RATE (IN PERCENT)',/,
562         +'       5.....THE AMOUNT OF THE ORIGINAL LOAN',/,
563         +'       6.....THE INTEREST RATE OF THE ORIGINAL LOAN',/,
564         +'       7.....THE PERIOD OF THE ORIGINAL LOAN',/,
565         +'       8.....THE AMOUNT OF THE SECOND LOAN',/,
566         +'       9.....THE YEAR THE SECOND LOAN STARTS',/,
567         +'       10....THE AMOUNT OF THE THIRD LOAN',/,
568         +'       11....THE YEAR THE THIRD LOAN STARTS',/,
569         +'       12....THE ANNUAL INFLATION RATE',/,
570         +'       13....THE EXPECTED ANNUAL INCOME',/,
571         +'       14....THE EXPECTED TAX BRACKET',/,
572         +'       15....THE RATE FOR THE PRESENT VALUE CALCULATION',/,
573         +'       16....THE NUMBER OF YEARS FOR THE DEPRECIATION',/,
574         +'       17....THE AMOUNT OF THE SALVAGE VALUE OF THE PLANT',//)
575          READ(5,*)LIST
576          WRITE(KXX,240)
577   240    FORMAT('HOW MANY TIMES WOULD YOU LIKE TO CHANGE THIS',
578         +' VARIABLE',/)
579          READ(5,*)FLAG
580          DO 250 I=1,FLAG
581          WRITE(KXX,255)I
582   255    FORMAT('ENTER THE VALUE OF VARIABLE CHANGE NUMBER ',I2,/)
583          READ(5,*)VARCH(I)
584   250    CONTINUE
585   C
586          WRITE(KXX,251)
587   251    FORMAT('TYPE A 1 IF YOU WOULD LIKE TO SEE THE ABOVE ',
588         +'TABLE PRINTED AGAIN FOR EACH OF THE VARIABLE CHANGES.',/,
```

```
     +'DISCOUNTED PAYBACK ARE DIFFERENT FOR EACH OF THE ',
     +'VARIABLE CHANGES.')
      READ(5,*)SMOKE
C
 336  FORMAT(/,'ADVANCE TO THE BOTTOM OF THE PAGE, TYPE ',
     +'ANY NUMBER, AND HIT THE RETURN.')
      WRITE(KXX,336)
      READ(5,*)XX
      Z=0
 220  IF(FLAG.EQ.0)STOP
      FLAG=FLAG-1
      Z=Z+1
      IF(LIST.EQ.1)PLANT=VARCH(Z)
      IF(LIST.EQ.2)LAND=VARCH(Z)
      IF(LIST.EQ.3)DOWN=VARCH(Z)
      IF(LIST.EQ.4)XTXCDRT=VARCH(Z)
      IF(LIST.EQ.5)MORT1=VARCH(Z)
      IF(LIST.EQ.6)XRATE1=VARCH(Z)
      IF(LIST.EQ.7)PERD1=VARCH(Z)
      IF(LIST.EQ.8)MORT2=VARCH(Z)
      IF(LIST.EQ.9)STLN2=VARCH(Z)
      IF(LIST.EQ.10)MORT3=VARCH(Z)
      IF(LIST.EQ.11)STLN3=VARCH(Z)
      IF(LIST.EQ.12)XINF=VARCH(Z)
      IF(LIST.EQ.13)INCOMY=VARCH(Z)
      IF(LIST.EQ.14)XTAXRAT=VARCH(Z)
      IF(LIST.EQ.15)XPVRATE=VARCH(Z)
      IF(LIST.EQ.16)DEPYR=VARCH(Z)
      IF(LIST.EQ.17)SALVG=VARCH(Z)
      GOTO 200
C
 258  ROI=((NETPVAL(MAXPER+1)/(PLANT+LAND+PV2+PV3))
     +**(1./MAXPER)-1.)*100
      IF(Z.EQ.1)WRITE(6,221)
 221  FORMAT(////,43X,'SENSITIVITY ANALYSIS')
      IF(Z.EQ.1)WRITE(6,222)
 222  FORMAT(//,30X,'RETURN ON',10X,'SIMPLE',10X,'DISCOUNTED')
      IF(Z.EQ.1)WRITE(6,223)
 223  FORMAT(30X,'INVESTMENT',9X,'PAYBACK',11X,'PAYBACK')
      GOTO 259
 260  WRITE(6,224)Z,ROI,SPABAK,DPABAK
 224  FORMAT(/,'VARIABLE CHANGE NO. ',I2,':',9X,F4.1,' %',9X,
     +F4.1,' YEARS',8X,F4.1,' YEARS')
      IF(FLAG.EQ.0)WRITE(6,219)
 219  FORMAT(//////)
      IF(LIST.NE.0)GOTO 220
C
 259  IF(LIST.EQ.1)WRITE(6,290)VARCH(Z)
      IF(LIST.EQ.2)WRITE(6,295)VARCH(Z)
      IF(LIST.EQ.3)WRITE(6,300)VARCH(Z)
      IF(LIST.EQ.4)WRITE(6,305)VARCH(Z)
      IF(LIST.EQ.5)WRITE(6,310)VARCH(Z)
      IF(LIST.EQ.6)WRITE(6,315)VARCH(Z)
      IF(LIST.EQ.7)WRITE(6,320)VARCH(Z)
      IF(LIST.EQ.8)WRITE(6,321)VARCH(Z)
      IF(LIST.EQ.9)WRITE(6,322)VARCH(Z)
      IF(LIST.EQ.10)WRITE(6,323)VARCH(Z)
      IF(LIST.EQ.11)WRITE(6,324)VARCH(Z)
      IF(LIST.EQ.12)WRITE(6,325)VARCH(Z)
      IF(LIST.EQ.13)WRITE(6,330)VARCH(Z)
      IF(LIST.EQ.14)WRITE(6,335)VARCH(Z)
      IF(LIST.EQ.15)WRITE(6,340)VARCH(Z)
      IF(LIST.EQ.16)WRITE(6,345)VARCH(Z)
      IF(LIST.EQ.17)WRITE(6,350)VARCH(Z)
 290  FORMAT(//,'AFTER CHANGING THE PLANT PRICE TO',F8.0,':')
 295  FORMAT(//,'AFTER CHANGING THE LAND COST TO',F8.0,':')
```

```
657  300   FORMAT(//,'AFTER CHANGING THE DOWN PAYMENT TO',F3.0,':',
658  305   FORMAT(//,'AFTER CHANGING THE TAX CREDIT PERCENTAGE ',
659       +'RATE TO',F4.0,':')
660  310   FORMAT(//,'AFTER CHANGING THE ORIGINAL LOAN TO',F8.0,':')
661  315   FORMAT(//,'AFTER CHANGING THE INTEREST RATE ON ',
662       +'THE ORIGINAL LOAN TO',F8.0,':')
663  320   FORMAT(//,'AFTER CHANGING THE PERIOD OF THE ',
664       +'ORIGINAL LOAN TO',F4.0,':')
665  321   FORMAT(//,'AFTER CHANGING THE SECOND LOAN TO',F8.0,':')
666  322   FORMAT(//,'AFTER CHANGING THE YEAR THE SECOND ',
667       +'LOAN STARTS TO',F4.0,':')
668  323   FORMAT(//,'AFTER CHANGING THE THIRD LOAN TO',F8.0,':')
669  324   FORMAT(//,'AFTER CHANGING THE YEAR THE THIRD ',
670       +'LOAN STARTS TO',F4.0,':')
671  325   FORMAT(//,'AFTER CHANGING THE INFLATION RATE TO',F4.0,':')
672  330   FORMAT(//,'AFTER CHANGING THE ANNUAL INCOME TO',
673       +F8.0,':')
674  335   FORMAT(//,'AFTER CHANGING THE TAX BRACKET TO',F4.0,':')
675  340   FORMAT(//,'AFTER CHANGING THE RATE FOR THE PRESENT ',
676       +'VALUE CALCULATION TO',F4.0,':')
677  345   FORMAT(//,'AFTER CHANGING THE NUMBER OF DEPRECIATION ',
678       +'YEARS TO',F4.0,':')
679  350   FORMAT(//,'AFTER CHANGING THE SALVAGE VALUE OF ',
680       +'THE PLANT TO',F8.0,':')
681  C
682        IF(SMOKE.EQ.0)GOTO 260
683  C
684        WRITE(6,331)
685  331   FORMAT(120X,'NET')
686        WRITE(6,332)
687  332   FORMAT(29X,'ANNUAL',15X,'AMORT-',6X,'CASH',6X,'DEPRE-',
688       +16X,'AFTER TAX',4X,'PRESENT',4X,'PRESENT')
689        WRITE(6,333)
690  333   FORMAT(1X,'YEAR',2X,'BALANCE',5X,'EQUITY',4X,
691       +'INCOME',5X,'COSTS',4X,'IZATION',6X,'FLOW',5X,'CIATION',
692       +5X,'TAXES',6X,'CASH FLOW',5X,'VALUE',6X,'VALUE')
693        WRITE(6,334)
694  334   FORMAT(1X,'----',2X,'-------',5X,'------',4X,
695       +'------',5X,'-----',4X,'-------',6X,'----',5X,'-------',
696       +5X,'-----',6X,'---------',5X,'-----',6X,'-----')
697  C
698        DO 356 I=1,MXPR1
699        K=I-1
700        WRITE(6,351)K,BALANCE(I),EQUITY(I),INCOMYR(I),COSTS(I),
701       +MORTSUM(I),
702       +CSHFLO(I),DEP(I),TAXES(I),ATXCSHF(I),PRESVAL(I),NETPVAL(I)
703  351   FORMAT(2X,I2,2X,F8.0,2X,F10.0,2X,F8.0,2X,F8.0,2X,
704       +F8.0,2X,F10.0,2X,F8.0,2X,F10.0,3X,F10.0,3X,F8.0,2X,F10.0)
705  356   CONTINUE
706  C
707        WRITE(6,270)ROI
708  270   FORMAT(///,10X,'RETURN ON INVESTMENT =',F6.2,' %')
709        WRITE(6,279)SPABAK
710  279   FORMAT(/,10X,'SIMPLE PAYBACK = ',F4.1,' YEARS.')
711        WRITE(6,285)DPABAK
712  285   FORMAT(/,10X,'DISCOUNTED PAYBACK = ',F4.1,' YEARS.',/)
713  C
714        IF(LIST.NE.0)GOTO 220
715        END
716  C
717  C
718  C       THIS SUBROUTINE INTERPOLATES TO FIND THE TWO PAYBACKS
719  C
720  C
```

```
     723          REAL INCREM,SUM,CAPINV,ANSW
     724          ANSW=((CAPINV-(SUM-INCREM))/INCREM)+(SET-1)
     725          RETURN
     726          END
SCAN  726 EOR      726
0 ?
```


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JAMAICA

PRIVATE SECTOR CREDIT FUND PROJECT

FINANCIAL SYSTEM REVIEW

VOLUME THREE

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I. INTRODUCTION

First Washington Associates prepared this survey of the financial sector in Jamaica as an integral part of its contract with the U.S. Agency for International Development related to a private sector credit program to encourage alternative energy conservation investment. The purpose of the survey was to determine what alternative sources of credit already existed in Jamaica which might facilitate the desired energy investments, the capabilities and limitations of existing credit institutions, and the ways in which a new government loan program might interface with private banks to assure a reliable, effective and sound distribution of financial resources to the productive sectors of the economy.

The information in this report came mainly from personal interviews with the central bank, commercial banks, merchant banks, JECIC, EDF, RF, JDB, PIC, NDB and others in the financial system. The World Bank, Inter-American Development Bank, and International Monetary Fund provided statistical and other data. The Ministry of Finance and Ministry of Mining and Energy were also helpful in providing guidance and information which went into the report.

FWA has done a number of previous studies of the financial system in Jamaica, which were used in presentations to the World Bank and Inter-American Development Bank. The firm also notes that it has worked on a variety of assignments for the Bank of Jamaica, JECIC, EDF, RF, the Ministry of Finance and U.S. AID in Jamaica. FWA has fully respected the

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confidentiality of previous work done for those organizations, but notes with gratitude the great degree of cooperation received from former clients in making a contribution to this survey.

II. SUMMARY

Jamaica possesses a well-established financial infrastructure which closely resembles the British financial system in its fundamentals. The scene is dominated by the Bank of Jamaica (BOJ) - the central bank - which oversees the activities of all financial intermediaries, with the largest share of lending activities being transacted by the commercial banking subsector. In addition, there are trust companies, merchant banks, building societies, credit unions, the National Housing Trust, insurance companies, and peoples cooperative banks. Altogether, the eight types of financial institutions had over J$2.2 billion in outstanding loans to the private sector at the end of 1981, as shown below:

Loans Outstanding to Private Sector by Source
at 31 December 1981

	(J$000)	Percent
Commercial Banks	1,200,291	54
Trust Companies	103,528	5
Merchant Banks	38,074	2
Building Societies	271,946	12
Credit Unions	176,800	8
National Housing Trust	270,000	12
Insurance Companies	141,000	6
Peoples Cooperative Banks	16,000	1
Total	2,217,639	100

In addition to the above, there are a number of government lending programs that operate mainly through the commercial banks to provide foreign exchange credit to the private sector. The major government institutions are the Jamaica Export Credit Insurance Corporation (through its lines of credit), the Export Development Fund, and the Rehabilitation Fund. Others are JDB and PIC (now doing little but administering old loans), and NDB (which is just starting up as the officially-designated medium and long-term lending bank for development financing).

III. THE BANK OF JAMAICA

In addition to its regulatory role as the country's central bank, the Bank of Jamaica, which came into existence two years before independence, has been involved in a variety of other activities, complementing operations of the other financial institutions. BOJ's wholly-owned subsidiaries have been very successful in making foreign exchange available to the manufacturing and construction sectors, developing new non-traditional export industries, and serving other development needs of the country.

The Jamaica Export Credit Insurance Corporation (JECIC) provides export insurance and export financing and operates three dozen lines of credit from foreign suppliers.

Export Development Fund (EDF) makes hard currency loans to Jamaican non-traditional exporters to cover their needs in imported raw materials, intermediate goods, and spare parts for their products and for a limited amount of capital equipment.

Premier Investment Corporation (PIC) provides term loans to small scale enterprises through local branches of Jamaican commercial banks using the proceeds of a World Bank loan. Together with the Small Industries Finance Company (SIFCO) and the Small Enterprise Development Company (SEDCO), PIC has been successful in providing term financing to medium-sized and small companies.

Rehabilitation Fund (RF), which was established in January 1982 and became operational in June, will serve as a foreign exchange

operation for the domestic industrial and construction sectors, making foreign exchange loans repayable in local currency. RF's activities are financed by the proceeds of an Inter-American Development Bank loan with a counterpart contribution by the Government of Jamaica.

IV. COMMERCIAL BANKS

There are eight commercial banks with approximately 150 branches doing business in Jamaica. They are: the Bank of Nova Scotia Jamaica Ltd., National Commercial Bank Jamaica Ltd., Citibank, N.A., Bank of Commerce Jamaica Ltd., Workers Savings & Loan Bank, Jamaica Citizens Bank Ltd., First National Bank of Chicago Jamaica Ltd., and Royal Bank Jamaica Ltd. A new license has recently been issued for the Bank of Credit and Commerce (Middle East backing) but this bank has not begun commercial operations as yet. Summary financial statements of the commercial banks as of December 31, 1981 are shown in Annex "A".

The major banks in Jamaica are of Canadian and British origin and were established prior to 1930. During the 1960's, the American banks also started operations and the older banks started forming trust companies. In the 1970's, two foreign-owned banks were nationalized. However, the present Government is again welcoming foreign investment in the banking sector.

By the end of the first quarter of 1982, total assets of Jamaican commercial banks exceeded two and a third billion dollars (Jamaican), with the largest share held by the Bank of Nova Scotia. The National Commercial Bank (NCB), which was acquired by the government in late 1977, is the second largest commercial bank in the country.

As shown in the table on the next page, between the end of 1974 and 31 March 1982, total assets of Jamaican commercial banks grew from J$694.7 million to the present level of J$2,354.8 million, an increase of 239 percent. Total deposits held by these banks increased from J$618.8 million to

COMMERCIAL BANKS - SUMMARY ACCOUNTS

J$mn.

End of Period	Foreign Assets (net)	Cash and Deposits with BoJ	DOMESTIC CREDIT					Assets/ Liabs.	DEPOSITS			Cr. From BoJ	Other Items (net)
			Claims on Govt.	Govt. Dept.	Total	Cr. to Private Sector	Total		Private Demand (adj.)	Time	Sav-ings		
			(1)	(2)	(1-2)								
1974	-21.5	70.1	76.8	9.8	67.0	579.1	646.1	694.7	154.4	196.0	268.4	1.0	74.9
1975	-23.7	70.1	105.7	9.5	96.2	679.0	775.2	821.6	185.8	214.9	331.3	6.6	83.0
1976	-28.2	94.5	133.3	12.9	120.4	673.1	793.5	859.8	189.3	252.7	349.6	7.8	60.4
1977	-26.3	93.0	287.9	13.2	274.7	627.3	902.0	968.7	286.5	163.8	451.4	0.2	66.8
1978	-15.0	197.9	355.0	17.2	337.8	740.2	1,078.0	1,260.9	373.6	259.0	519.0	2.9	106.4
1979	-10.6	155.8	384.3	31.6	352.7	884.6	1,237.3	1,382.5	335.3	251 8	595.2	18.0	182.2
1980	12.4	391.8	377.6	34.5	343.1	1,082.1	1,425.2	1,829.4	430.5	443.7	736.0	64.1	155.1
1981	3.0	301.8	553.0	44.5	508.5	1,486.3	1,994.8	2,299.6	484.8	723.7	873.2	2.0	215.9
1982													
Jan.	1.5	313.7	559.2	51.4	507.8	1,507.6	2,015.4	2,330.6	498.8	698.1	887.1	2.0	244.6
Feb.	12.6	309.1	573.0	51.4	521.6	1,525.5	2,047.1	2,368.8	464.8	737.3	897.8	2.0	266.9
Mar.	37.5	264.6	585.6	58.9	526.7	1,526.0	2,052.7	2,354.8	536.3	692.6	921.1	2.0	202.8

J$2,150 million over the same period of time - an increase of 247 percent. In nominal terms, this represents an annual average growth of almost 27 percent. However, when these figures are compared to the 250 percent increase in the Consumer Price Index in the same period, it becomes apparent that both the total assets and total deposits held by commercial banks have virtually stagnated or decreased in the past nine years.

In terms of the deposits' distribution by type - this remained remarkably constant. Savings accounted for 39 percent of total deposits in 1974 and 1982. Both time deposits and demand deposits gained one point from 28 and 22 percent to 29 and 23 percent, respectively. Under the current monetary policy exercised by the Bank of Jamaica, commercial banks are required to maintain liquid reserves at least equal to 40 percent of deposits. Of this reserve, 5 percent of deposits must remain in non-interest-bearing accounts at the Bank of Jamaica. The remainder can be maintained in cash, cash equivalents, or ninety-day Treasury bills.

Actual liquidity of the commercial banks vs. required minimum liquidity is demonstrated in the table on the following page. This shows clearly that the commercial banks are quite liquid at present and that statutory reserve requirements in themselves should not pose a problem to increased medium-term lending.

Credit to the private sector increased 164 percent in nominal terms from December 31, 1974 to March 31, 1982 - an actual decline in real terms. In relative terms, the ratio of credit to private sector to total assets decreased from 83 percent at the end of 1974 to 65 percent at March 31, 1982, while the ratio of private credit to total domestic credit declined from 90 percent to 74 percent over the same period.

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COMMERCIAL BANKS - STATUTORY LIQUIDITY

J$000

Period	Average Deposit Liabilities	Required Minimum Liquidity	Average Liquidity	Average Deposits	Excess Liquidity	Loans from Central Bank	Net Liquidity
1975	729,827	171,509	178,671	24.5	7,162	9,865	- 2,703
1976	760,864	186,412	219,759	28.9	33,347	14,978	18,369
1977	871,873	257,202	355,536	40.8	98,334	8,153	90,181
1978	1,013,517	298,988	425,315	42.0	126,327	19,165	107,162
1979	1,175,259	346,701	495,652	42.2	151,886	43,003	108,883
1980	1,452,786	418,571	588,773	40.5	173,115	44,843	128,272
1981	1,892,700	558,347	792,843	41.9	234,496	24,973	209,523
1982							
Jan.	1,979,780	584,035	836,466	42.3	252,431	18,649	233,782
Feb.	2,004,766	591,406	874,000	43.6	282,594	21,419	261,175
Mar.	2,061,427	608,121	906,159	44.0	298,038	20,459	277,579

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The decline in the private sector's share of total domestic credit is the mirror image of the more than two-fold increase in the government's share of outstanding loans - from 10 percent at the end of 1974 to 26 percent in March 1982. This fact reflects the continued inability of the government to finance its increasing budget deficits.

An analysis of outstanding loans to the private sector by category in the last year and a quarter is shown in the table on the next page. This shows that the breakdown between the sub-sectors remained largely the same. Manufacturing is still the leading private borrower in the country (20.6 percent in 1982) with agriculture displacing personal loans in the second place with 12.5 percent at the end of March 1982. The continuously high ratio of manufacturing credit is partially a result of the sector's successful export activity and the availability of foreign exchange provided to non-traditional exporters by the Export Development Fund. A decrease in personal loans coupled with an increase in credit for professional services lends further credibility to the government's claim of moderating inflation and consumer spending and stimulating business activity.

The prime rate in Jamaica was raised from 11 to 13 percent in January 1980, and remained at that level since then. The discount saving rate was increased from 7 to 9 percent at the same time, and has not changed in the last two and one-half years.

The actual interest rate paid by borrowers is considerably higher, reflecting the current cost of deposits to financial intermediaries.

Commercial Banks Loans and Advances to the Private Sector

	Dec. 1980 J$000	% of Total	Dec. 1981 J$000	% of Total	March 1982 J$000	March 1982 % of Total
1. Agriculture	117,793	10.8	192,923	12.9	192,147	12.5
(i) *Production*	*110,232*		*163,675*		*161,614*	
(ii) *Marketing*	*1,516*		*24,815*		*26,132*	
(iii) *Land Acquisition*	*6,046*		*4,433*		*4,401*	
2. Mining	6,252	0.6	7,838	0.5	8,429	0.6
3. Manufacturing	212,881	19.6	317,343	21.2	314,354	20.6
(i) *Sugar, Rum & Molasses*	*45,339*		*74,075*		*69,620*	
(ii) *Food, Drink & Tobacco*	*36,637*		*59,937*		*63,899*	
(iii) *Paper, Printing & Publishing*	*7,639*		*12,008*		*9,931*	
(iv) *Textiles, Leather & Footwear*	*40,188*		*53,117*		*53,452*	
(v) *Furniture, Fixt. & Wood Products*	*8,990*		*13,614*		*14,338*	
(vi) *Metal Products*	*8,566*		*22,295*		*20,647*	
(vii) *Cement & Clay Products*	*13,083*		*9,832*		*10,228*	
(viii) *Chemicals & Chemicals Products*	*17,373*		*18,549*		*18,549*	
(ix) *Other*	*36,066*		*53,916*		*53,690*	
4. Construction & Land Development	127,310	11.7	181,324	12.1	199,459	13.0
(i) *Construction*	*37,325*		*71,226*		*75,821*	
(ii) *Land Development*	*64,676*		*65,164*		*71,933*	
(iii) *Land Acquisition*	*25,309*		*44,934*		*51,705*	
5. Financial Institutions	23,049	2.2	34,455	2.3	31,876	2.1
6. Transport, Storage & Communication	108,661	10.0	145,822	9.8	154,466	10.1
7. Electricity, Gas & Water	40,945	3.8	59,058	4.0	53,607	3.5
8. Government Services	23,480	2.2	24,124	1.6	20,476	1.3
(i) *Central Government*	*15,843*		*21,078*		*18,931*	
(ii) *Local Government*	*7,637*		*3,046*		*1,545*	
9. Distribution	89,583	8.2	122,136	8.2	120,462	7.9
10. Tourism	60,341	5.5	76,161	5.1	98,208	6.4
11. Entertainment	12,065	1.1	12,384	0.8	13,104	0.9
12. Professional & Other Services	76,689	7.0	128,593	8.6	137,518	9.0
13. Personal	188,034	17.3	192,606	12.9	185,508	12.1
(i) *Land Residents*	*185,918*		*189,820*		*183,348*	
(ii) *Overseas Residents*	*2,116*		*2,786*		*2,160*	
TOTAL	1,088,083	100.0	1,188,224	100.0	1,529,614	100.0

After added charges, fees, and other considerations, such as interest payments in advance and compensatory balances, prime commercial borrowers can acquire working and investment capital at interest rates around 16 percent, as shown in the table on the next page.

Although interest rates in Jamaica may seem comparable to those prevailing in the United States, this is not so because of the much higher domestic price inflation occurring in Jamaica. When the level of inflation is taken into account, the interest rate paid by borrowers in Jamaica has been negative, even in the highest rate category of installment credit as can be seen from the table on the page after next which summarizes consumer price inflation in Jamaica from 1974 through March 1982.

Banks and other financial intermediaries in Jamaica have been able to attract funds at interest rates below the inflation level in the past years mainly due to the official exchange controls preventing investors from turning to foreign institutions offering positive effective interest rates. Consequently, Jamaica borrowers have been able to obtain financing from local banks at negative interest rates in real terms. This situation, however, is slowly changing with the successful implementation of the new government's National Recovery Program and measures agreed with the International Monetary Fund.

Although interest rates have been low in real terms, they have been regarded by many borrowers as a hindrance to more ambitious capital investment plans. Another, much more important, barrier to the fulfillment of plans has been the commercial banks' insistence on very conservative loan collateral requirements. Banks require that title to real assets serve as collateral for virtually all their loans, frequently equal to

COMMERCIAL BANK LENDING INTEREST RATES FOR MAJOR CATEGORIES OF LOANS

Period	Installment	Mortgage	Personal	Commercial	Local Government	Central Government	Weighted Average Rate
1980							
Jan	18.96	10.63	16.26	14.90	14.90	12.74	15.30
Feb	18.89	9.43	16.18	15.06	14.81	12.74	15.35
Mar	19.00	9.37	16.15	15.05	14.96	12.68	15.34
Apr	19.31	9.26	16.37	15.12	14.97	12.61	15.55
May	19.71	9.58	16.26	15.14	15.05	12.47	15.63
Jun	19.70	9.21	16.02	15.22	15.22	12.76	15.60
Jul							
Aug							
Sep	18.82	9.68	20.53	15.25	14.77	12.79	15.85
Oct	20.37	9.50	16.47	15.29	14.87	12.82	15.80
Nov	20.29	10.04	16.44	15.15	14.90	12.35	15.77
Dec	20.57	9.87	16.51	16.64	14.86	13.40	16.68
1981							
Jan	20.70	9.65	16.61	15.38	14.94	13.39	15.98
Feb	20.79	10.27	16.96	15.44	15.06	14.21	16.09
Mar	22.95	9.55	16.55	15.43	15.08	14.43	16.33
Apr	20.94	9.17	16.55	15.45	14.43	14.37	15.95
May	21.03	13.99	16.54	15.41	14.93	14.33	16.10
Jun	21.13	12.78	16.56	15.44	14.93	14.44	16.19
Jul	21.18	12.77	16.38	15.44	14.88	14.94	16.17
Aug	21.15	13.47	16.32	15.45	14.89	14.41	16.20
Sep	17.43	12.97	16.41	15.39	14.87	14.29	15.65
Oct	20.51	13.11	16.43	15.50	14.95	14.12	15.61
Nov	21.52	13.11	16.75	15.72	14.96	14.21	16.32
Dec	21.64	13.12	16.59	15.61	14.83	14.73	16.25

Source: Bank of Jamaica

CONSUMER PRICE INDICES
(January 1975 = 100)

JAMAICA

End of Period	Food and Drink 53.23	Fuel Other Household Supplies 5.13	Housing 8.87	Household Furnishings and Furniture 3.18	Personal Clothing and Accessories 8.15	Personal Expenses 8.43	Transportation 4.86	Miscellaneous Expenses 8.10	All Items 100.0
1974	87.9	96.9	96.9	88.7	95.7	91.1	99.4	95.6	96.6
1975	113.1	107.9	116.6	106.5	108.7	108.2	99.5	117.1	111.8
1976	121.9	114.0	125.4	124.6	119.8	116.2	111.3	125.6	120.9
1977	136.9	128.4	129.5	156.5	136.8	129.8	125.2	170.0	137.9
1978	210.8	205.9	151.6	259.4	208.5	198.2	232.0	203.5	206.0
1979	262.4	270.5	178.4	292.2	241.0	217.4	249.3	219.5	246.7
1980	350.7	367.9	200.2	361.0	302.4	288.0	279.9	255.0	317.5
1981	353.0	400.6	230.2	417.3	327.1	327.2	287.8	274.8	332.7
1982									
Jan.	356.3	399.3	233.2	422.0	327.7	326.5	288.5	272.5	334.7
Feb.	358.4	401.8	235.1	422.1	329.3	328.4	292.1	272.3	336.4
Mar.	359.5	404.6	237.1	424.4	330.1	328.7	293.0	273.7	337.8

150 percent or more of the value of the loan. This may be accomplished by placing a charge on all corporate fixed and floating assets or by acquiring a first mortgage lien over real estate. Only in very exceptional circumstances are loans secured with only personal or corporate guarantees, backed up with life insurance policies. The commercial banks' rigid insistence on heavy collateral on real assets, or on the deposit of cash with them equal to the amount being loaned, has made it extremely difficult or impossible for marginally creditworthy firms to make capital investments which might pay for themselves over the medium term. The following table presents a breakdown of the commercial banks' outstanding loans by category compiled by the Bank of Jamaica.

PERCENT OF COMMERCIAL BANK LOANS
OUTSTANDING BY TYPE OF LOAN

	1980				1981			
	Mar	Jun	Sep	Dec	Mar	Jun	Sep	Dec
Installments	13.46	14.46	14.63	14.70	13.31	14.42	14.22	12.36
Mortgage	5.06	5.05	4.76	4.24	1.67	.90	.46	.43
Personal	8.23	8.43	8.45	8.31	7.81	7.23	6.88	6.89
Commercial	54.72	52.49	52.22	53.51	55.70	55.61	57.15	60.79
Local Government	15.47	17.01	17.79	17.43	19.87	20.50	19.75	18.23
Central Government	3.06	2.56	2.15	1.81	1.64	1.34	1.54	1.30
TOTAL	100	100	100	100	100	100	100	100

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As evidenced by the above data, the commercial loans have been steadily increasing their share of total credit since the last election, rising from 53.51 percent at the end of 1980 to 60.79 percent a year later. The most volatile change, however, has occurred in mortgage loans, whose share fell from 4.24 percent in December 1980 to almost one-tenth of that a year later, representing the only credit category with a less than 1 percent share. The nearly constant share of installment loans by commercial banks may be the consequence of the fact that these are the only loans made at fixed interest rates and even monthly repayment. This may also explain the relatively low share of installment credit.

In the critical area of installment credit, involving mainly loans for the purchase of equipment with a useful life of three to five years or more, the commercial banks have been extremely conservative, both for reasons of funding (i.e., they wish to match the terms of loans with the terms of borrowed money) and for reasons of risk (i.e., the longer the loan the greater the perceived risk of non-payment). About half of installment credit is for motor vehicles, furniture and household equipment. Less than 20 percent historically has been for capital equipment of all kinds, including equipment for business and farming. The amounts of installment credit approved and outstanding from 1975 to 1982 are shown below. The average repayment term for installment credit in Jamaica is currently only about twelve months.

INSTALLMENT CREDIT

(In millions of J$)

	Approvals		Outstanding at End of Period				
	Total	Est. 20% for capital equip.	Commercial Banks	Finance Houses	Dealers	Total	Est. 20% for capital equip.
1975	$ 145.8	$ 29.2	92.2	18.9	22.4	133.5	26.7
1976	106.7	21.3	80.5	16.7	21.3	118.5	23.7
1977	103.8	20.8	69.9	14.3	20.5	104.7	20.9
1978	44.6	8.9	80.5	13.6	29.3	123.3	24.7
1979	61.2	12.2	112.8	14.4	19.7	146.9	29.4
1980	190.0	38.0	139.2	16.0	20.6	175.8	35.2
1981	224.5	44.9	174.1	19.7	22.9	216.7	43.3
Jan 1982	18.2	3.6	174.6	20.2	23.6	218.4	43.7

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In order to increase the amounts, and improve the terms, of installment credit in Jamaica for capital equipment purchases, the Government should consider measures to: (a) make foreign exchange available to meet J$ financing, (b) provide funding of longer term loans at compatible interest rates, and (c) provide supplementary assurances of repayment in the form of partial guarantees of creditworthiness.

V. MERCHANT BANKS

There are seven merchant banks in Jamaica: BNS Merchant Bank, West India Company of Merchant Bankers Ltd., Caribbean Merchant Bank, Eagle Merchant Bank, Jamaican American Merchant Bank, Jamincorp International Merchant Bank, and First National Bank of Chicago Merchant Bank.

Merchant banks are not regulated under the Bank Act but are subject to the 1966 Protection of Depositors Act. They are not required to maintain reserves at BOJ nor are there any lending limits regarding capital. These banks are restrained from taking local deposits in excess of twenty times capital (issued and statutory reserves). Ten percent of deposits and of annual profits must be placed in statutory reserves.

Some merchant banks do leasing, but for the most part they handle three to five-year lending. Merchant banks are not permitted to deal in foreign currency. A summary of the assets and liabilities of Jamaica's merchant banks is shown on the next page.

As can be seen, Jamaica's merchant banks reduced both real and nominal levels of activity substantially from 1975 through 1982. As recently as February 1982, outstanding loans were less than half as large in nominal terms as they had been in December 1975 and were less than a quarter as large in real terms. In March 1982, merchant bank loan activity began to pick up a bit, but it is still very low by any index. Merchant banks have been quite conservative in the past, and it is believed that their contribution to future economic development will continue to be small in relation to that of the commercial banks.

MERCHANT BANKS
SUMMARY OF ASSETS AND LIABILITIES

J$000

End of Period	LIABILITIES					Total	ASSETS				
	Capital and Reserves	Foreign Liabilities	Time Deposits	Balances due to Banks & Insts. in Ja.	Other Liabilities		Cash and Deposits with banks and Insts. in Jamaica	Foreign Assets	Loans and Advances	Jamaica Gov't Secs.	Other Assets
1975	5,944	57,488	48,916	30,546	1,411	144,305	45,000	655	86,842	-	11,808
1976	5,691	44,946	47,164	27,368	2,076	127,245	37,652	777	75,831	-	12,985
1977	5,350	35,341	34,552	31,639	3,555	110,437	32,975	2,182	60,499	2,056	12,725
1978	5,186	53,096	32,553	35,264	4,993	131,092	37,012	1,207	70,574	1,785	20,514
1979	6,383	55,515	29,675	26,800	5,219	123,591	30,070	3,228	74,371	4,478	11,444
1980	6,031	14,190	28,305	28,839	6,871	84,236	34.576	473	28,969	1,999	18,219
1981	6,626	22,805	35,324	21,439	6,529	92,723	36,480	714	38,074	800	16,655
1982											
Jan.	5,407	22,977	42,738	29,139	6,042	106,303	57,264	718	37,380	800	10,141
Feb.	5,498	22,070	50,535	28,315	5,854	112,272	64,391	919	36,377	302	10,283
Mar.	5,701	21,581	37,848	26,270	5,176	96,576	31,137	1,360	53,571	382	10,126

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VI. JECIC

Established in 1971, JECIC administers an export credit insurance program, three relatively small local currency pre- and post-shipment financing funds, the EDF and RF,and thirty-one supplier lines of credit from seven countries. As of September 30, 1981, JECIC had total assets of US$95.6 million and was managing resources totalling almost US$300 million in various currencies.

With regard to the lines of credit, a large number of governments, foreign banks, and export organizations have established these facilities with JECIC, usually to finance their nation's exports to Jamaica. These lines of credit have provided important sources of foreign exchange to finance imports, primarily to improve the export capabilities of Jamaican manufacturers but also to provide needed goods for domestic use.

Most of these lines are short-term, calling for payment in a year or less, and are subject to fairly stringent conditions and rules. Interest rates on most lines are tied to the international cost of money (e.g., LIBOR) but some are on concessional terms extended by governments as development assistance. JECIC receives a 1 percent administrative fee on all transactions out of the interest charge, except as noted otherwise.

JECIC sets the terms and conditions of each sub-loan credit between itself and the ultimate beneficiary. An important requirement is that of a bank guarantee or cash payment for a minimum of 55 percent of the CIF value of the goods to be financed. A promissory note for the unsecured balance must be given by the importer and a 2 percent guarantee fee on this portion of the credit (i.e., 45 percent) is charged by JECIC.

A summary of the provisions of each of the major lines of credit administered by JECIC is given on the pages which follow. A more detailed explanation of each line is given in Annex "B".

LINES OF CREDIT ADMINISTERED BY JECIC

Name of Line of Credit	Avail. for Procurement in most countries	Repayment Term more than 1 year	Interest Rate not tied to prime or LIBOR	Avail. for most types of business	Sub-loans not indexed to US$
Venezuela	No	No	Yes	Yes	No
Japanese OECD	Yes	No	Yes	Yes	No
Korea	No	No	Yes	Yes	No
Mexico	No	Yes	Yes	Yes	No
Thos Bell (UK)	No	No	No	Yes	No
Thos Bell (Int'l)	Yes	No	No	Yes	No
Thos Bell (US)	No	No	No	Yes	No
Gillespie Bros	Yes	No	No	Yes	No
Burlington	No	No	No	No	No
BLADEX short-term	Yes	No	No	No	No
BLADEX med.-term	Yes	Yes	No	No	No
IADB rediscntng	Yes	No	Yes	No	No
KFW III	No	No	Yes	Yes	No
Waswani	No	No	No	No	No
SE 1st Nat'l of Miami	Yes	No	No	Yes	No
Security Pacific	No	No	No	Yes	No
Grindlay's Bank (3)	Yes	No	No	Yes	No
Cuba	No	No	Yes	No	No
Australia	No	No	Yes	Yes	No
Israel	No	No	Yes	Yes	No

LINES OF CREDIT ADMINISTERED BY JECIC

-cont-

Name of Line of Credit	Avail. for Procurement in most countries	Repayment Term more than 1 year	Interest Rate not tied to prime or LIBOR	Avail. for most types of business	Sub-loans not indexed to US$
Austin Blades	Yes	No	Yes	Yes	No
Eximbank	No	No	½ Yes	No	No
New Zealand I	No	No	Yes	No	No
New Zealand II	No	No	Yes	No	No
Norway	No	Yes	Yes	Yes	No
Brazil	No	Yes	Yes	Yes	No
Japan I	Yes	No	Yes	Yes	No
ABN Bank	Yes	No	No	Yes	No
KFW II	Yes	No	Yes	Yes	No
Colombia	No	No	Yes	Yes	No
1st Nat'l Bank of Greater Miami	Yes	No	No	Yes	No

"Yes" answers on the above table indicate terms and conditions that are favorable to utilization of the credit for development financing purposes similar to those contemplated for the proposed energy fund. As can be seen, only seven of the lines have more than two out of five "yes" answers. Thus, most of them are not conducive to this type of operation, either because of tied procurement, because repayment cannot exceed one year, because the interest rate is tied to prime or LIBOR (and thus considerably exceeds 16 percent), because the use is restricted to a limited number of firms, or because sub-loans impose full exchange risk on the borrower.

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A compilation of the total utilization of each line through February 28, 1982, the available balance, and the amount of import licenses issued against that balance is shown in the tables on the next two pages. The total credit limit for all lines is US$176.15 million, of which US$88.3 million has been used to date, and US$87.3 million is still available. In addition, of course, many of the lines are revolving and additional amounts become available as repayments are made. Most lines of credit appear to work fairly smoothly. However, a major problem is the differing mechanics of operating each line, and the delays being experienced in starting up disbursements under some of these lines.

Jamaica Export Credit Insurance Corporation - Lines of Credit Schedule

Commercial Lines from Financial Institution mainly

for Private Sector Use

Month Ending February 28, 1982

Category A.

Lines of Credit	Credit Limit US$	Total Utilization US$	Balance US$	Import Licences Held US$
Austin Blades	15.0m	11,257,652.95	3,742,347.05	2,339,406.91
Bladex - Short Term	3.0m	2,085,151.00	914,849.00	447,063.83
Bladex - Medium Term	3.5m	584,956.00	2,915,044.00	175,704.00
Burlington	10.0m	1,241,905.84	8,758,094.16	49,261.17
Gillespie	2.5m	1,684,311.22	815,688.78	125,000.21
S. E. National Bank of Miami	2.0m	2,000,000.00	Nil	467,916.00
Thomas Bell U.K.	10.0m	8,241,168.70	1,758,831.30	2,233,276.70
Thomas Bell U.S.	5.0m	5,457,116.50	(457,116.50)	1,333,554.48
WASWANI	2.0m	1,677,449.94	322,550.06	-
Security Pacific	2.0m	1,954,111.71	45,888.29	-
Grindlays Bank/Thomas Bell	4.40m	-	4,400,000.00	
Grindlays Bank/Gillespie	4.40m	1,353,571.51	3,046,428.49	3,013,965.02
Grindlays Bank/Tower Hill	2.20m	569,572.29	1,630,427.71	
A.B.N.	3.0m	-	3,000,000.00	139,811.25
Thomas Bell - Int'l	2.0	2,016,790.90	(16,790.90)	-
First National Bank of Greater Miami	2.0	-	2,000,000.00	-

Jamaica Export Credit Insurance Corporation - Lines of Credit Schedule

Govt. to Govt. Lines of Credit

For Public & Private Sector Use

Category B

Line of Credit	Credit Limit	Total Utilization	Balance	Import Licences Held
Cuba	US$ 4.20m	522,264.29	3,677,735.71	-
Germany II	US$ 2.9m	1,692,721.46	1,207,278.54	41,474.17
Germany III	US$ 4.3m	-	US$4.3m	
Norway(N.K. 100)	US$19.87m	19.87m	Nil	-
Mexico	US$10m	3,143,384.73	6,856,615.27	572,700.73
Venezuela	US$ 8.3m	6,957,098.96	1,342,901.04	480,204.00
Israel	US$ 1.00m	80,000.00	920,000.00	-
Japanese OECD	US$10m	57,391.30	9,942,608.70	3,254,638.28
Korea	US$ 5m	635,780.00	4,364,220.00	773,700.00
New Zealand I	US$ 2.0m	2,000,000.00	Nil	-
Australia	US$ 0.83m	-	830,000.00	-
Brazilian	US$ 3.0m	-	3,000,000.00	-
Japanese I	US$10.0m	10,000,000.00	Nil	-
Colombia	US$5.0m	-	5,000,000.00	-
New Zealand II	US$2.0m		2,000,000.00	1,580,805.46

Jamaica Export Credit Insurance Corporation - Lines of Credit Schedule

Commercial Lines from Financial Institution mainly

for Private Sector Use

Month Ending February 28, 1982

Category A.

Lines of Credit	Credit Limit US$	Total Utilization US$	Balance US$	Import Licences Held US$
IADB Rediscounting	US$ 4.20m	2.0m	2.0	-
Eximbank	US$12.75m	-	12.75	-
Totals of A & B	US$178.15	US$87,082,399.3	US$91,067,600.7	US$17,028,482.21

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A special word may be in order about the Eximbank line. Approved in 1981, it is expected to become operative shortly. The Eximbank line may be used by the agricultural or industrial sector. Commercial and tourism enterprises are not eligible sub-borrowers. The interest rate to ultimate beneficiaries will exceed 18 percent and exchange risk must be assumed by the sub-borrower, which are deterrents to the line's use. Maximum repayment on sub-loans will be five years. Although the line will definitely fill some of the needs of larger firms, it is not tailored to encourage small developmental investments in energy conservation.

VII. EXPORT DEVELOPMENT FUND

The EDF was established on May 9, 1979 and began operations during September. Its main purpose is to make available foreign exchange for the import content of non-traditional exports (i.e., for raw materials, components, spare parts and packaging). In the case of exporters who are net earners of foreign exchange the EDF will also make available the foreign exchange required for manufactures for the local market. The foreign exchange is made available to exporters through commercial banks which provide import financing through US$ denominated loans which are then, at time of payment overseas by the commercial banks' correspondents, discounted with the EDF. The cycle is closed and the obligations to the EDF repaid, through the commercial banks, after exporters receive payment from their overseas clients.

The resources of the EDF include US$30 million out of a World Bank loan, and US$7.5 million from an IADB loan, which have been fully disbursed, and US$35 million from a second World Bank loan, of which about half had been disbursed at May 31, 1982. The EDF was also able to negotiate with Royal Bank of Canada a US$5 million overdraft facility at that bank's New York office, which has been used mainly for bridge financing between EDF disbursement and World Bank reimbursement. All but US$10 million of EDF's resources is earmarked for short term loans (maximum 365 days). A summary of EDF activity from inception through February 28, 1982, is shown on the next page.

EXPORT DEVELOPMENT FUND

Actual Short-Term Operations, 1979-1982
(US$ Millions)

	Final Commitments		Outstanding Undisbursed Commitments	Disbursements		Cumulative Repayments		Disbursed Loans Outstanding
	Month	Cum. Year		Month	Cum. Year	Total	Principal	
1979								
Through December		5.5	5.3		0.2	-	-	0.2
1980								
January	0.3	0.3	5.1	0.5	0.5	-	-	0.7
February	3.1	3.4	7.9	0.3	0.8	-	-	1.0
March	1.5	4.9	8.3	1.1	1.9	0.1	0.1	2.0
April	1.9	6.8	8.8	1.4	3.3	0.2	0.2	3.3
May	3.4	10.2	11.5	0.7	4.0	0.5	0.5	3.7
June	7.0	17.2	14.7	3.8	7.8	1.4	1.3	6.7
July	3.2	20.4	15.3	2.6	10.4	3.0	2.8	7.8
August	7.5	27.9	20.7	2.1	12.5	4.1	3.9	8.8
September	3.5	31.4	20.7	3.5	16.0	4.9	4.6	11.6
October	4.1	35.5	22.4	2.4	18.4	6.5	6.1	12.5
November	2.7	38.2	21.8	3.3	21.7	8.5	8.0	13.9
December	2.0	40.2	18.8	3.0	24.7	10.9	10.2	14.7
1981								
January	4.0	4.0	17.0	5.8	5.8	2.3	2.2	18.3
February	4.8	8.8	17.2	4.6	10.4	5.6	5.3	19.8
March	5.6	14.4	20.7	2.1	12.5	8.4	7.8	19.4
April	7.9	22.3	25.7	2.9	15.4	10.4	9.7	20.4
May	1.8	24.1	24.6	2.9	18.3	12.9	12.0	21.0
June	3.8	27.9	24.9	3.5	21.8	13.9	12.9	23.6
July	4.9	32.8	27.4	2.4	24.2	17.8	16.4	22.5
August	2.7	35.5	25.5	4.6	28.8	21.9	20.2	23.3
September	6.0	41.5	27.5	4.0	32.8	25.5	23.4	24.1
October	4.1	45.6	26.4	5.2	38.0	29.9	27.6	25.1
November	3.5	49.1	26.9	3.0	41.0	34.2	31.5	24.2
December	4.9	54.0	27.5	4.3	45.3	37.5	34.4	25.6
1982								
January	3.5	3.5	27.1	3.9	3.9	4.3	3.9	25.6
February	12.0	15.5	34.8	4.3	8.2	8.0	7.2	26.6

The EDF is a wholly-owned subsidiary of the Bank of Jamaica. It has a nine-member Board of Directors, including representatives of the BOJ, the Ministries of Finance, of Industry, and of Foreign Affairs and Trade, and of the private manufacturing and commercial banking sectors. Having no staff of its own, the EDF is administered by the Jamaica Export Credit Insurance Corporation.

Through 1981, all of EDF's activity had been for short-term financing of raw materials, components, spare parts and packaging. Of the US$10 million currently allocated for medium-term financing of capital equipment, a minor portion has already been earmarked for particular projects. The remaining money is subject to stringent terms and conditions for use, including the requirement that it be used only for manufacturers in the export sector, that it be repaid out of the ultimate beneficiary's foreign exchange earnings, that the maximum term of repayment be four years, that all the exchange risk be taken by the ultimate beneficiary, and that it finance only investments designed to bring the firm back up to its original rated production capacity. The EDF's current charges are 16 percent interest, ½ percent commitment fee, and up to 2 percent for a guarantee fee, if required.

VIII. REHABILITATION FUND

The RF is a wholly-owned subsidiary of the Bank of Jamaica, managed by JECIC under the terms of a management assistance contract and directed by a Board of Directors with representatives from JECIC, BOJ, the Ministries of Industry, Construction and Finance, the Trade Administrator, and the private banking and business sectors. Its basic objective is to restore production and employment in the private industrial and construction sectors to historical levels within a period of three to four years.

The RF was established in early 1982 and began accepting sub-loan applications in June 1982. It will finance the acquisition of goods of external origin such as industrial and construction equipment and machinery, spare parts, raw materials, intermediate goods, packaging materials and construction inputs, utilized in the process of production in the industrial sector primarily for the domestic market, and the construction sector. Sub-loans are made available to eligible firms through commercial banks which provide import financing through J$ denominated loans which are then, at the time of payment overseas by the commercial banks' correspondents, discounted by the RF. Obligations to RF are repaid, through the commercial banks, in regular installments of principal, plus accrued interest, based on projects' cash flow characteristics and borrowers' repayment capacity.

The resources of the RF include US$35 million from the IADB and US$15 million from the Government of Jamaica. As of May 31, 1982, RF ahd received "pre-applications' indicating an intention to apply for US$70 million of import financing, divided roughly half for equipment

and half for materials. The details of these "pre-applications" are shown in Annex "C". If only half are approved, RF will be completely utilized in a relatively short period of time.

Access to the RF is subject to stringent terms and conditions. Any sub-loan borrower must first exhaust its possible recourse to the EDF before obtaining RF financing. The facility is not available to commercial firms or tourist enterprises. Almost one-third of the funds can be used only by construction firms and the remainder only by manufacturing industries. The repayment term of sub-loans may be up to ten years, including up to two years grace. Sub-loans are denominated in J$, with no exchange risk being taken by the ultimate beneficiary. Interest rates will initially be established at 16 percent, with 1 percent going to the Government of Jamaica as an exchange risk fee. A one-time commitment fee of ½ percent is also charged. If guarantees are issued by JECIC, the cost will be 2 percent per annum on outstanding guaranteed balances.

IX. JAMAICA DEVELOPMENT BANK

This institution was established under the Jamaica Development Act of 1969, replacing the Development Finance Corporation which was established in 1959.

JDB was organized to fulfill the following broad national needs:

A. To fill various gaps in the country's existing financial system by increasing the availability of medium and long-term financing in certain sectors.

B. To supplement scarce domestic funds with loans from overseas sources.

C. To assist the establishment and expansion of development enterprises by participating in share capital granting loans and other forms of financial assistance.

JDB had total assets at 1979 year-end of J$120.1 million and a loan portfolio of J$95.5 million after provision for losses. The institution's accumulated operating deficit at the 1979 year-end was J$45.2 million. However, it made a small profit in 1980, on the order of J$0.7 million. During 1980, JDB approved thirty-three loans totalling J$37.4 million, giving some indication of the size of the loans handled. It should be mentioned, however, that demand for loans had slackened during 1980 on the part of smaller companies, thereby distorting the normal historical loan size.

Historically, JDB suffered a negative reputation, both domestically and internationally, as a result of alleged questionable operating practices and alleged poor loan administration. These problems resulted in a scathing

report from the Auditor General in 1978, and a purging of bad debts culminating in a provision for losses in 1978 of J$50.3 million against loans of J$136.2 million. For 1979, the loss provision had dropped to J$41.9 million on loans of J$137.4 million. While some consideration must be given to the fact that a part of the JDB's poor lending record was attributable to actions taken on loans in the national interest, nevertheless, JDB was told in 1981 that it would be provided with no further funds for lending by either IDB or IBRD unless the bank "straightened out" its operations and balance sheet. JDB was not able to achieve this and its operations as a lender to the industrial sector are now being phased out. JDB will be replaced by the National Development Bank as the major source of development lending for non-agricultural activities in Jamaica.

X. PREMIER INVESTMENT CORPORATION

In 1975, BOJ established a scheme known as The Small Businessmen's Financing Scheme, and empowered its subsidiary, Premier Investment Corporation to administer it. Under this program, commercial banks were encouraged to make intermediate-term loans to small business enterprises. The scheme was replaced in 1978 by a modification known as the Modern Small-Scale Enterprise Development Project, which was funded in part by World Bank, and is currently operative.

The concept is imaginative and innovative in its approach to help small businessmen in Jamaica. Its loans are made to small-scale enterprises having not more than US$100,000 of net fixed assets, excluding land and building, and are made on terms of up to ten years for equipment and up to five years for working capital, with a grace period of up to two years before the first payment is due.

Its loans may be made for the following purposes:

- the purchase, installation, renovation, improvement, or modernization of equipment of a kind usually affixed to real or immovable property;
- the renovation, improvement, or modernization of premises or the purchase, construction, alteration, or extension of premises;
- working capital.

A study of this program made by First Washington Associates in 1978 for the Bank of Jamaica concluded that:

> "The Program is generous in its overall repayment term and interest rate, and it attempts to coordinate the efforts of numerous Jamaican agencies with a role to play in small

> business development. However, loan mechanics are detailed and cumbersome, paperwork requirements are heavy, too many approvals are required for certain actions, and much of the documentation and analysis, although suitable for a large project, seems ill-adapted to the capabilities and needs of small businesses."

Since 1978, many changes have been made in the procedures of the program which have streamlined its operations and increased its effectiveness.

PIC's staff, while quite small in number (seven persons), is mostly adequate for its present operations. Its new loan activity will diminish in the latter part of 1982, when its present loan funding will have been completely utilized. Its office is housed within the BOJ building, convenient to BOJ, JECIC, and its affiliates.

XI. NATIONAL DEVELOPMENT BANK

Along with the Agricultural Credit Bank, the National Development Bank is the successor to the Jamaica Development Bank. NDB is envisaged as a wholesale lender, with commercial banks and other financial intermediaries acting as retailers of credit on its behalf. The intent is that, by using commercial intermediaries, performance on the lending portfolio (which was alleged to have suffered in the predecessor organizations due to poor management and to the fact that money was perceived to be coming from the government and therefore not requiring payback) would be improved. Technical assistance and supervision would be provided to ensure the viability of borrowers' projects.

The NDB's offices are at 15 Oxford Road, Kingston 5. It has a small start-up staff of six professionals, is only partially financed (US$250,000 from the Government of Jamaica), and is not yet operational. NDB has developed a preliminary 10-page statement of objectives, policies, organization and management, and operations, a copy of which is shown in Annex "D". It acknowledges the need for revision and extension of this document and the preparation of detailed policies and procedures, operations manuals, management information and accounting systems, organizational development plans, and a full range of other management tools required to permit NDB to fulfill its important role in the Jamaica economy.

In early May 1982, Prime Minister Seaga announced that NDB would become the only institution officially sanctioned by the government to provide medium and long-term loans to the non-agricultural sectors of

the economy. He also stated that JDB and SIFCO would eventually be brought under the control of the NDB by the appointment of a common Board of Directors for all three insitutions. The Prime Minister further noted that the medium and long-term lending activities of JECIC and PIC would eventually be phased out as their current pools of loanable funds become exhausted and that new sources of loanable funds for non-agricultural development purposes would be channeled through NDB. A copy of the Prime Minister's letter to that effect is included in Annex "E".

QUARTERLY LIABILITIES AND ASSETS OF COMMERCIAL BANKS AS AT 31ST DECEMBER 1981

PUBLISHED UNDER SECTION 13 (4) OF THE BANKING ACT

Annex "A"

J$'000

	Bank of Commerce Jamaica Limited	Bank of Nova Scotia Jamaica Limited	Citibank, N.A.	First Jamaica National Bank Ltd.	Jamaica Citizens Bank Ltd.	National Commercial Bank Jamaica Limited	Royal Bank Jamaica Limited	Workers Savings & Loan Bank	TOTAL
LIABILITIES									
1. Deposits	131,449	656,699	72,213	89	87,528	644,103	265,353	148,386	2,005,820
1A. Special Deposits	14,043	21,072	11,283	-	3,338	16,894	32,675	926	100,231
2. Due to Bank of Jamaica	-	-	2,000	-	-	-	-	-	2,000
3. Due to other banks and Loans from Financial Institutions	1,401	42,385	31,439	1,209	7,506	14,530	12,762	6,650	117,882
4. Cheques and other instruments in the course of payment	6,614	35,524	1,532	2	1,414	21,371	6,370	3,785	76,612
5. Acceptances, Guarantees and Letters of Credit as per Contra	22,819	69,684	3,356	-	13,233	116,928	65,636	12,719	304,375
5. Other Liabilities	6,948	28,057	9,291	1,909	3,164	63,115	11,894	6,478	130,856
7. Capital Paid-up or Assigned	3,500	6,600	2,881	2,000	4,000	10,000	4,337	4,050	37,368
7A. Capital Loans	-	-	-	-	-	-	171	-	171
7B. Special Debentures	800	3,000	-	1,500	-	5,500	2,000	2,025	14,825
8. Reserve	954	20,400	205	68	1,000	12,100	6,589	3,366	44,682
9. Unappropriated Profit/(Losses)	70	90	(16,525)	(3,471)	829	2,505	1,351	(8,283)	(23,434)
10. TOTAL LIABILITIES	188,598	883,511	117,675	3,306	122,012	907,046	409,138	180,102	2,811,388
ASSETS									
11. Cash	015	14,726	563	-	2,225	13,233	6,612	3,570	44,944
12. Due from Bank of Jamaica	27,953	54,726	15,353	60	6,385	82,419	63,769	8,834	259,499
13. Due from other banks and Deposits with Financial Institutions	6,832	19,563	4,916	30	6,071	24,690	12,202	10,614	84,918
14. Cheques and Other Items in Course of Collection	-	9,308	870	-	1,653	15,582	8,277	6,146	41,836
15. Treasury Bills	20,952	78,535	21,767	800	6,000	80,000	71,689	7,815	287,558
16. Investments	17,738	101,854	4,218	-	19,716	64,438	21,335	22,569	251,868
17. Loans, less Provision for Losses	77,473	500,334	57,127	374	64,658	472,883	132,018	97,398	1,402,265
18. Customer's Liabilities for Acceptances, Guarantees and Letters of Credit	22,819	69,684	3,356	-	13,233	116,928	65,636	12,719	304,375
19. Premises, Furniture and Fixtures	4,348	12,043	773	467	1,455	13,703	5,732	8,549	47,070
20. Other Assets	6,468	22,738	8,732	1,575	616	23,170	21,868	1,888	87,055
21. TOTAL ASSETS	188,598	883,511	117,675	3,306	122,012	907,046	409,138	180,102	2,811,388

Source: BANK OF JAMAICA

SUMMARY OF INDIVIDUAL LINES OF CREDIT

1. Venezuela

- Value: 35 m Bolivars (US$8.3m)
- Renewable annually
- Purpose: importation of consumer goods, raw materials, and capital goods from Venezuela.
- Terms: 5.5 percent per annum for capital goods and raw materials and 6.5 percent for consumer goods for 180-260 days; finance limited to 30 percent national content.

2. Japanese (Overseas Economic Cooperation Fund)

- Value: 2 billion yen
- Not renewable
- Purpose: importation of a wide range of eligible commodities from:
  (a) OECD countries.
  (b) Developing countries, as set out in the Memorandum of Understanding on Unifying of Bilateral Development Loans in favor of Procurement in Developing Countries, agreed by eight members of the Development Assistance Committee (DAC) on June 7, 1974.
- Terms: Beneficiaries are required to pay at the time of opening a Letter of Credit the full yen amount converted into Jamaican dollars, plus a JECIC service charge of 2 percent.
- Other: International competitive bidding is required when the import contract exceeds 50 million yen.

3. Korea

- Value: $5 million
- Current line is the second for the same amount as the original, effective September 1981 until September 1982, not renewable.
- Purpose: import from Korea of wide range of goods, including raw materials and capital goods.
- Terms: 9 percent per annum, sub-loans 10.5 to 12.0 percent, on six-month basis.

4. Mexico

- Value: US$10 million (increased from original $5 m)
- Revolving
- Purpose: import from Mexico of raw materials and capital goods.
- Terms: 180 days for raw materials, 360 days to 3 years for capital goods; interest 8 percent per annum (6 percent to Mexico and 2 percent to JECIC); downpayment of 15 percent on purchase of capital goods; finance limited to 60 percent national content.

5. Thomas Bell (U.K.)

- Value: £5 million
- Revolving
- Purpose: import from U.K. of raw materials and capital goods.
- Terms: 180 days, interest 2 percent above LIBOR plus commission charges.

6. Thomas Bell (International)

- Value: £1 million
- Not renewable, effective November 1981 until funds fully utilized.
- Purpose: no restriction on country of origin.

7. Thomas Bell (U.S.)

- Value: US$7.5 million
- Effective May 1981, revolving
- Purpose: import of raw materials and capital goods from U.S. only.
- Terms: 2 percent above LIBOR plus 1 percent JECIC fee.

8. Gillespie Brothers

- Value: US$2.5 million (originally £5 m, reduced when ECGD withdrew cover January 1981)
- Revolving
- Purpose: import of raw materials worldwide (originally only U.K.).
- Terms: 180 days, interest 2 percent above LIBOR plus 1 percent JECIC fee.

9. Burlington

- Value: US$10 million
- Renewable annually
- Purpose: purchase of textiles from Burlington Mills, New York.
- Terms: 180 days, interest equivalent to six-month Bankers Acceptance rate in New York (included in invoice value) plus 1 percent JECIC fee.

10. BLADEX (short term)

- Value: US$3 million
- Revolving
- Purpose: for import of raw materials and capital goods for processing into exports.
- Terms: 180 days, 1.5 percent above LIBOR plus 1 percent JECIC fee.

11. BLADEX (medium term)

- Value: US$3.5 million
- Expires when funds utilized.
- Purpose: for import of machinery, spare parts and raw materials by exporters.
- Terms: maximum of three years, 1.5 percent over LIBOR plus 1 percent JECIC fee.

12. IADB Rediscounting

- Value: US$4.0 million
- Revolving
- Purpose: for short-term financing of exports of capital goods and services, manufactures, semi-manufactures, and other non-traditional exports; $0.5 million for intra-regional exports and $3.5 million for the rest of the world.
- Terms: 7 percent per annum, and a commitment fee of 1.5 percent per annum payable semi-annually.
- Other: IADB will finance 85 percent of the export credit but may increase financing to 100 percent if the exporting country assumes the political risks of the export credits.

13. KfW III (Kreditanstalt fuer Wiederaufbau, a German Government agency)

- Value: DM10 million
- Renewable
- Purpose: import from West Germany of raw materials, spare parts, industrial and agricultural machinery.
- Terms: 4.5 percent per annum (maturity na), plus commitment charge of ½ percent per annum on undisbursed amounts.

14. WASWANI (German)

- Value: US$2 million
- Revolving
- Purpose: for import of goods from West Germany.
- Terms: 180 days, 2 percent above German bank rate, plus 4.5 percent commission.

15. Southeast First National Bank of Miami

- Value: US$2.0 million
- Revolving
- Purpose: importation of raw materials.
- Terms: 180 days, interest is 1½ percent over Southeast's Prime Fixed Rate.

16. Security Pacific

- Value: US$2 million
- Revolving
- Purpose: for import of capital goods and raw materials from U.S. and Canada.
- Terms: 1.25 percent above U.S. Prime Rate plus 1 percent JECIC fee.

17. Grindlay's Bank/Thomas Bell (US$4.4m)
Grindlay's Bank/Gillespie (US$4.4m)
Grindlay's Bank/Tower Hill (US$2.2m)

- Value (combined): US$11.0 million
- Purpose: importation of raw materials and capital goods.
- Terms: 3/8 percent above LIBOR for 180 days plus 1 percent JECIC fee plus handling charges and commissions.

18. Cuban

- Value: Canadian $5 million
- Renewable annually.
- Purpose: import of stated commodities from specified Cuban companies.
- Terms: 17 percent for 180 days credit, 18 percent for credits up to 360 days.

19. Australian

- Value: US$0.83 million
- Not revolving
- Purpose: importation of Australian goods only.
- Terms: 18.5 percent per annum for 180 days.

20. Israeli

- Value: US$1 million (signed October 1981)
- Revolving
- Purpose: imports from Israel only--all types of goods.
- Terms: 11 percent per annum for 180 days plus 1 percent JECIC fee.

21. Austin Blades

- Value: US$15 million
- Revolving
- Purpose: import of raw materials and capital goods worldwide.
- Terms: 1 percent above LIBOR for 180 days plus 1 percent JECIC fee.

22. Export-Import Bank of the United States

- Value: US$12.75 million
- Not renewable
- Purpose: import of equipment from the U.S. for the agricultural and industrial sectors.
- Terms: 181 days to 5 years, interest at 10.75 percent per annum on half the credit, and at ½ percent above LIBOR on the other half.

23. New Zealand I

- Value: US$2 million
- Not renewable
- Purpose: import of dairy products from New Zealand.
- Terms: 360 days, interest at 14 percent per annum.

24. New Zealand II

- Value: US$2 million
- Not renewable
- Purpose: import of mutton from New Zealand.
- Terms: 360 days, interest at 14 percent per annum.

25. Norway

- Value: NK100 million
- Not renewable
- Purpose: import of capital goods from Norway.
- Terms: up to ten years, interest at 14 percent per annum.

26. Brazil

- Value: US$3 million

27. Japan I

- Value: US$10 million
- Not renewable
- Purpose: import of raw materials, capital equipment, accessories, spares, and essential consumer goods from OECD and DAC countries.
- Terms: interest at 6-7 percent including JECIC fee.

28. ABN Bank

- Value: US$3.0 million
- Purpose: importation of raw materials and capital goods.
- Terms: 1.5 percent above Bankers Acceptance Rate plus 1 percent JECIC fee.

29. KfW II

- Value: US$2.9 million
- Not revolving
- Purpose: importation of raw materials and spare parts.
- Terms: 2 percent per annum plus 1 percent JECIC fee.

30. Colombia

- Value: US$5.0 million

31. First National Bank of Greater Miami

- Value: US$2.0 million

Annex "C"

REHABILITATION FUND

PRE-APPLICATIONS AT MAY 20, 1982

Construction

Product	Financing Desired (US$000) Constr mat'l	Equip	Total
Commercial Bldg	141	68	209
Elect & A/C Contr	150	-	150
Elect & Mech Engr Contr	50	50	100
Roofing & Comm Bldg	200	300	500
Windows, Doors	62	29	91
Maint & Sales-Diesel Equip	250	-	250
Housing Construction	60	15	75
Commerc'l & Housing Constr	200	500	700
Factory Built Housing	200	1800	2000
Housing Construction	1250	150	1400
Concrete Blocks	-	400	400
Distrib, Constr. Hardware	125	-	125
Metal Building Fabric Constr Equip Distribution	-	950	950
Redimix Concrete	-	550	550
Housing Construction	1250	1250	2500
Building Supplies Dealer	1250	-	1250
Window Mfg, Steel Supplier & Erector	1000	-	1000
	6188	6062	12250

PRE-APPLICATIONS AT MAY 20, 1982

Industrial

Product	Financing Desired (US$000) Equip	Raw Mat'ls	Total
Industrial Chemicals	100	500	600
Calcium Carbonate	350	-	350
Cigarettes, Printing, Crackers	1840	2000	3840
Furniture	120	-	120
Furniture	54	11	65
Furniture	11	20	31
Tape & Record Production	100	-	100
Urethane Retreading Tires	537	1500	2037
Tire Retreading	85	100	185
Retail Counters	125	125	250
Milk, Milk Products, Citrus Drinks	1600	2000	3600
Leather	-	2000	2000
Horticulture	500	-	500
Stockings	-	500	500
Concrete Roof Tiles	500	500	1000
Industrial Batteries	200	25	225
Powdered Fruits & Vegetables	425	-	425
Soft Drinks	-	67	67
Switch Gear	1200	2000	3200
Beer, Soft Drinks	2000	2000	4000
Printer	450	50	500
Consumer Products Shelf Stanley Home Products	100	300	400
Medicines & Cosmetics	60	-	60
Diversified	2000	2000	4000

PRE-APPLICATIONS AT MAY 20, 1982

Industrial

-cont-

Product	Financing Desired (US$000) Equip	Raw Mat'ls	Total
Zippers, Travel Goods, Abrasives & Tapes	250	-	250
Plastics	2500	-	2500
Toys, Plastic Products	75	75	150
Steel Pipe	600	2000	2600
Electrical Panels	2000	2000	4000
Linotype Plates	131	-	131
Electrical Appliances	1000	1000	2000
Bakery	500	500	1000
Spices, Mosquito Coils	270	850	1020
Nails, Hardware staples	500	500	1000
Sweetrolls, Donuts & Bakery Goods	110	-	110
Bakery, Macaroni, Packaging	164	775	939
Garments	-	25	25
TV, Radio	-	2000	2000
Mattresses, Bedding	380	-	380
Potato Processing	2000	2000	4000
Business Forms	650	650	1300
Agriculture Insecticides & Chemicals	10	90	100
Consumer Shampoos, Remedies	130	200	330
Paints	100	2000	2100
Plastic, Packaging	4000	-	4000

Annex "D"

NATIONAL DEVELOPMENT BANK OF JAMAICA LIMITED

ESTABLISHMENT :

The National Development Bank of Jamaica Limited (NDB) is a Government owned limited liability company incorporated under the Companies Act with offices at 15 Oxford Road; Kingston 5. Its duties and powers are defined by its Articles and Memorandum of Association.

The Share Capital of the Bank is J$1 million divided into one million shares of one dollar each. It is the intention of the Government to purchase the entire share capital of the Bank.

OBJECTIVE :

The overall objective of the NDB is to foster economic development by assisting in the establishment and growth of productive enterprises in Jamaica. Emphasis will be placed, however, on enterprises in the manufacturing, agro-industrial, tourism and mining sectors of the economy.

To achieve its objective, the Bank will endeavour to attract funds from overseas sources which, supplemented with funds raised locally, will be passed to commercial banks and other approved financial institutions for on-lending to ultimate borrowers. This means that the Bank will not lend directly to business enterprises, but will lend instead to approved financial intermediaries for on-lending to business enterprises on terms that fall within predetermined guidelines.

The Bank will seek to make a profit, will be private sector orientated, and will only support enterprises that are viable and capable of making a positive contribution to the economy.

The Bank's policy guidelines are set out in more detail below:

POLICIES :

Financing Policies

1) The NDB will primarily devote its resources to the establishment of new productive enterprises and to the expansion and modernization of existing ones.

2) The financing extended by the Bank will be provided for :

   i) the purchase and installation of machinery and equipment;
   ii) the purchase, construction, reconstruction or expansion of buildings and productive facilities, including the installation of services.

3) The financing extended by the Bank will be provided in the form of medium to long-term credit.

4) The Board of Directors of the Bank will establish and regulate the financing approval limits of its management officials. Such limits will be reviewed from time to time, whenever there is good reason for doing so in the light of the Bank's performance and portfolio characteristics.

5) In all its financing operations, the Bank will adopt sound economic financial and technical criteria so as to ensure the integrity of its assets, maintain a prudent ratio of assets to liabilities, and establish satisfactory risk characteristics within its portfolio.

6) In line with the above, the Bank will only finance projects which are technically, economically and financially feasible.

7) To further effectively protect its assets the Bank will require acceptable guarantees from the financial institutions to which credit is being granted.

8) In appraising projects to which the Bank may give its assistance, special consideration will be given to the effect these projects will have on the country's balance of payments, on employment generation and on the absorption of domestic inputs.

9) As part of its appraisal process, the Bank will ensure that each project receiving its assistance is fully and satisfactorily financed, including the provision of adequate working capital.

10) The grant of credit to the directors of the Bank, its managers, officials or employees, or to enterprises controlled by them or by individuals related to them shall require the unanimous approval of the Directors present at the relevant meeting. In such cases, the individual involved shall take no part either in the discussion or the voting nor shall he be included in the quorum.

11) To control its portfolio and ensure concerted action to minimize portfolio losses, the Bank will as part of its overall portfolio management :

i) establish internal procedures leading to efficient loan collection and immediate actions on defaulting clients;

ii) maintain an information system which will give due importance to the management's needs for updated portfolio data and performance.

iii) establish adequate provisions to cover possible portfolio losses. To that end, it shall set aside annually a proportion of its net profits to create specific provisions for doubtful operations. The amount of these accumulated provisions shall be reviewed periodically in light of updated estimates of the risk of actual losses in its investment portfolio.

12) The Bank will ensure that adequate provisions are made for the assumption of devaluation risks, by explicitly passing these on to the ultimate borrowers, or by asking the Government to assume them or by some other means.

Financing Policies

1. In order to ensure that sufficient resources are available to meet its operational requirements, the Bank will complement its own resources by :

   - obtaining foreign credit lines and acting as intermediary in credits obtained in domestic or foreign currency.

2. The Bank will strive to make its funds application schedules consistent with its funds availability schedules so as to ensure the financial liquidity needed for its operations. To that end the maturities of the assets of the Bank shall correspond with those of its liabilities or shall be shorter than those of the latter.

3. The Bank will establish its on-lending terms and conditions and control its operational expenditures so as to ensure a profitability which will at least allow it to maintain the value of its equity in real terms.

4. In line with the preceding, operational expenditures shall be kept to the minimum necessary in light of the scale of the Bank's activities and the volume of its operations.

Operating and Administrative Policies:

1) The Bank will evaluate periodically its institutional arrangements and will introduce changes in its organization, internal systems and procedures as necessary to maintain high operational efficiency and to ensure implementation of its on-going developmental activities.

2) The need to become a responsive and competent institution implies improving continually the institution's staff capacity and capability. To that end the Bank will :

   i) maintain a qualified staff composed of the number and specializations of personnel required by the institution's needs;

   ii) establish and maintain an effective system of staff selection and development; and

   iii) provide effective motivation for its staff by setting an adequate level of remuneration, granting scholarships for professional specializations, establishing internal training programmes; and generally carrying out sound personnel management policies.

3) Accounts will be kept in accordance with sound accounting and control principles and practices so as to reflect economic and financial condition of the Bank, facilitate analysis of its development both overall and by sector served, control and analyze the portfolio, control administrative and operational expenditures, and enable financial economic and operational tables and projections to be periodically prepared.

4) On the basis of accounting, operational information, sectoral analysis and surveys, a management information system will be established to permit effective planning, management and control of the Bank's operations.

5) For purpose of establishing efficient information system the Bank shall determine and periodically review the information requirements of each management level and operational sector and provide to each level the information it needs in the best form to permit it to plan, implement, manage and control its operations.

6) The Bank will establish adequate internal checks and internal auditing procedures.

7) The Bank shall constantly verify that its administrative, financial operational and accounting procedures meet the requirements for an adequate level of internal control.

8) The Bank shall hire the services of independent external auditors to carry out annually a full audit of year end financial statements and an assessment of portfolio quality and adequacy of provisions for doubtful loans.

Special Activities :

1) The Bank shall not confine its assistance to projects submitted to it but shall also follow an active policy of identifying new investment opportunities of significant value to the economy.

2) As part of its investment activities the Bank will, as appropriate, make arrangements for the carrying out of surveys, pre-investment studies and feasibility studies.

3) The Bank will undertake other development activities complementary to financial assistance with a view to fostering or accelerating the development of the sectors it is serving. Such activities shall be subject to the availability of funds and to the priorities accorded to the Bank's programmes.

ORGANIZATION AND MANAGEMENT :

The basic authority of the Bank is vested in the Board of Directors. The Board is responsible for the general supervision of the affairs of the Bank, including the adoption of policy guidelines.

The members of the Board of Directors are :

Dr. Marshall Hall	Managing Director, Jamaica Banana Producers' Association.
Mr. Afeef Lazarus	Attorney-at-Law, Livingston Alexander & Levy.
Mr. Philmore Ogle	Chartered Accountant, Touche Ross Ogle & Co.
Mr. Adolph Brown	President, Small Business Association.
Mr. C.T. Brown	Deputy Governor, Bank of Jamaica.
Hon. Horace Barber	Financial Secretary, Ministry of Finance & Planning.
Mr. W. Woodham	Permanent Secretary, Ministry of Industry & Commerce
Dr. Noel Lyon	Managing Director, National Development Bank

The day to day management of the Bank rests with the Bank's Managing Director and principal officers who at present are :

Dr. Noel Lyon	Managing Director
Mr. Harry Abrikian	Treasurer
Mr. Errol Maloney	Corporate Bank Secretary (Part-time)
Miss Kathleen Grant	Senior Operations Officer

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OPERATIONS :

NDB will offer a programme of medium and long term financing to enterprises in the manufacturing, agro-industrial, tourism and mining sectors of the economy.

The programme will be operated through approved financial institutions, including commercial banks. In effect, these institutions will refinance with NDB loans meeting criteria laid down by NDB. These criteria will give priority to projects making a positive contribution to the economy by inter alia :

(i) being labour intensive;
(ii) using Jamaican raw materials;
(iii) spawning other industrial enterprises;
(iv) being a foreign exchange earner or saver by either import substitution or generating exports or creating facilities such as in the tourist industry for attracting foreign exchange.

Approved financial institutions will be allowed an appropriate interest rate spread out of the interest paid on the loans by sub-borrowers.

The role of an approved financial institution includes the following:

1. Receiving applications for loans. Applications will be made on a prescribed form developed for the purpose. This document will be prepared by -

a) the applicant in conjunction with the approved financial institution, or
b) public sector institutions that offer this service as, for example, JIDC and JNIP, or
c) consultants.

2. Analysing applications and determining the willingness of the institution to extend the credit requested.

3. Requesting refinancing from NDB.

4. Repaying loans advanced by NDB and interest thereon. NDB will only disburse funds after the financial institution has signed and endorsed a promissory note for the full amount of the loan involved.

5. Participating in the financing of each project for which refinancing is sought by providing at least the working capital component of the financial package.

6. Keeping the NDB informed on a regular basis on the status of loans advanced by NDB.

Annex "E"

JAMAICA HOUSE
KINGSTON, JAMAICA

4th May, 1982

In June, 1981, I announced the formation of the National Development Bank of Jamaica Limited to promote the growth of non-agricultural sectors of the economy.

At the time of the announcement, the Government was aware of the existence of other Government-supported lending institutions, and of the fact that initially there would be an overlap of functions between some of these institutions and the new Bank.

It is our intention, however, to rationalize this overlap of functions and by so doing the National Development Bank will become the only Institution officially sanctioned by the Government to provide medium and long term loans to the non-agricultural sectors of the economy.

In the short run, Jamaica Development Bank and Small Industries Finance Co. Ltd will continue to exist as collecting agencies for their existing portfolios and as such will eventually be brought under the control of the National Development Bank by the appointment of a common Board of Directors for all three Institutions.

Eventually also, the medium and long term lending activities of Jamaica Export Credit Insurance Co. and Premier Investment Corporation will be phased out as their current pools of loanable funds become exhausted.

All new sources of loanable funds for non-agricultural development purposes will naturally be channelled through the National Development Bank.

EDWARD SEAGA
Prime Minister and
Minister of Finance and Planning

Dr. Marshall Hall,
Chairman,
National Development Bank of Jamaica Lt
C/o Jamaica Banana Producers' Associati
Oxford House, 6 Oxford Road,
Kingston 5.

c.c. Chairman - JDB
Chairman - SIFCO
Chairman - JECIC

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JAMAICA

PRIVATE SECTOR ENERGY CREDIT FUND PROJECT

MARKET SURVEY RESULTS

VOLUME FOUR

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I. INTRODUCTION

First Washington Associates prepared this analysis of the demand in Jamaica for energy conservation and alternative energy equipment and services--and associated credit demand--as an integral part of its contract with the U.S. Agency for International Development related to a private sector credit program in this area. The information in this report came largely from personal interviews conducted with forty-nine business firms in Jamaica, located mainly in the Kingston-Spanish Town metropolitan area.

The firms in this survey were chosen from a list of the 100 heaviest users of electric power, obtained from billing records of the Jamaica Public Service Company. They were asked questions about their plans for energy conservation and the financing they would require to realize these plans. The firms were also apprised of the results of energy audits carried out by Georgia Tech under subcontract to FWA, and survey respondents were asked about their interest in implementing similar energy audits and making investments to capitalize on potential power savings. Each of the firms filled out a detailed questionnaire form, a copy of which is included as Annex "A".

Other major sources of information for this report included FWA's prior "Analysis of a Preliminary Census of Manufacturing Industry in Jamaica - 1981" which covered 211 Jamaican firms, and various studies done by the World Bank and the Inter-American Development Bank.

FWA carried out this energy sector survey over a three-month period commencing in March 1982, using the subcontracting services of Touche, Ross, Ogle & Company of Kingston, Jamaica for interviewing and survey design.

II. SUMMARY

The survey contained herein consisted of data received from firms in the manufacturing, tourism, commercial, and public service subsectors of the economy, believed to constitute a representative sample of the private sector. All monetary figures shown are in Jamaican dollars. Conversion into U.S. dollars may be accomplished at the official rate of exchange as of June 30, 1982, which was J$1.78 = US$1.00. Percentages quoted do not always add up to 100 percent. In some cases, responses add to less than 100 percent because a few firms preferred not to answer some questions, while percentages indicated were based on a total of forty-nine firms. In other cases, responses add to more than 100 percent because some firms answered more than once on a given topic and answers were not mutually exclusive.

The forty-nine firms chosen for this census accounted for a substantial portion of Jamaican economic activity. In 1981, it is estimated that the respondents accounted for about 20 percent of JPS electric energy consumption, over 10 percent of Gross Domestic Product, and more than 33 percent of manufactured goods exports.

Of the companies interviewed, 65 percent were interested in having a professional energy audit done to establish ways for them to conserve electricity, and were willing to pay their own money for such an audit. Forty-nine percent had already taken concrete steps to conserve electric power, and 51 percent indicated plans to do so in the next two years.

The survey indicated that just the forty-nine firms interviewed planned to make energy conservation investments of almost J$6,000,000 in the next two years. Extrapolated to the economy as a whole, this conservatively implies a potential maximum investment demand by the private business sector of J$17,800,000 in 1982-84 in energy-saving equipment and services.

Financing, however, will be a crucial element in whether or not the private sector undertakes this investment. Three quarters of the respondents

indicated that they would need, or want to use, medium-term (over one-year repayment) financing to cover their energy-saving investments. Most respondents are apparently willing to pay 15 percent per annum interest on loans to finance energy investments. A small minority (12 percent) indicated they might borrow at rates as high as 17-18 percent.

Eighty-one percent of the respondents indicated that energy-saving investments would have to pay for themselves within five years and, by extension, it may be assumed that this would be the maximum repayment term required on associated financing. However, 20 percent of the firms polled indicated that they would like to use a loan facility (the RF) that offered repayment in a maximum term of ten years.

It was obvious from this survey that Jamaican firms are very interested in making investments which can save on their already very high energy bills. Availability of foreign exchange financing on reasonable terms will be an essential element in permitting this to take place. Also, however, many respondents indicated that other Jamaican Government incentives would be very important to stimulate the necessary investments.

The incentive most favored by survey respondents would be reduced import duties on equipment needed to reduce energy consumption. Another popular suggestion was that the government reduce income taxes for firms depending on the extent to which they effected energy savings. Other favored incentives included reducing electricity rates for firms which make energy conservation investments, streamlining licensing procedures, and granting foreign exchange allocation priority for firms wishing to import energy-saving equipment.

III. THE SURVEY RESPONDENTS

Survey respondents consisted of forty-nine firms in Jamaica active in manufacturing, commerce, tourism, and public service. A list of these firms is given below. Details of their responses, which should be regarded as confidential, are included in Annex "C".

OBS	NAME	LINE
1	antilles chemical co ltd	manuf
2	appliance traders	manuf
3	ariguanabo textile	manuf
4	berec caribbean ltd	manuf
5	black block factory	manuf
6	british american insurance co	comm
7	british american life ins co	comm
8	broadway group of companies	comm
9	butterkist ltd	manuf
10	caribbean broilers (ja) ltd	manuf
11	caribbean casting & engin	manuf
12	caribbean products	manuf
13	cigarette co of ja ltd	manuf
14	cmp metal products ltd	manuf
15	colgate palmolive	manuf
16	cremo ltd	manuf
17	desnoes and geddes limited	manuf
18	durable products co	manuf
19	federated pharmaceutical co	manuf
20	gleaner company	manuf
21	guinness ltd	manuf
22	industrial chemical co	manuf
23	industrial commercial develop	comm
24	industrial gases co ltd	manuf
25	j wray and nephew co ltd	manuf
26	j.l.a. hatchery ltd	manuf
27	jamaica biscuit co	manuf
28	jamaica frozen food ltd	manuf
29	jamaica oxygen and atyl ltd	manuf
30	jamaica package ind ltd	manuf
31	jamintel	other
32	johnson and johnson co	manuf
33	kiskimo ltd	manuf
34	metal box jamaica ltd	manuf
35	national continental corp	comm
36	new yarmouth ltd	manuf
37	servwell stove ja ltd	manuf
38	shaw park beach hotel	hotel
39	the alkali group of companies	manuf
40	thermo plastic co ltd	manuf
41	tropical battery co ltd	manuf
42	united dairy farmers	manuf
43	universal stores ltd	comm
44	urban development corp ltd	other
45	van leer jamaica ltd	manuf
46	west indies glass company ltd	manuf
47	west indies home contractors	manuf
48	west indies pulp, paper group	manuf
49	zero processing & storage ltd	manuf

The firms interviewed came from a wide range of subsectors, which can be separated into at least fifteen different categories. The sub-sectoral breakdown of the respondents was as follows:

	Number	Percent
Construction & building products	2	4.1
Chemicals	5	10.2
Electrical apparatus & appliances	4	8.2
Food processing	8	16.4
Garments	1	2.0
Paper products & packaging	5	10.2
Pharmaceuticals & cosmetics	3	6.1
Plastic products	1	2.0
Rum & liqueur	3	6.1
Tobacco, cigarettes & cigars	1	2.0
Wholesale & retail sales	4	8.2
Insurance	2	4.1
Public Service	2	4.1
Hotel	1	2.0
Miscellaneous Manufacturing	7	14.3
Total	49	100.0

Twenty-two of the survey respondents, or 45 percent, were completely Jamaican owned firms. Seven, or 14 percent, were completely foreign-owned; and fifteen, or 31 percent, were of mixed ownership. The pattern of ownership by broad sector groupings is shown in the table below:

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TABLE OF LINE BY OWNER

LINE / FREQUENCY / PERCENT / ROW PCT / COL PCT	OWNER: domestic	foreign	mixed	not aval	TOTAL
comm	2 4.08 33.33 9.09	0 0.00 0.00 0.00	3 6.12 50.00 20.00	1 2.04 16.67 20.00	6 12.24
hotel	0 0.00 0.00 0.00	1 2.04 100.00 14.29	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 2.04
manuf	19 38.78 47.50 86.36	6 12.24 15.00 85.71	11 22.45 27.50 73.33	4 8.16 10.00 80.00	40 81.63
other	1 2.04 50.00 4.55	0 0.00 0.00 0.00	1 2.04 50.00 6.67	0 0.00 0.00 0.00	2 4.08
TOTAL	22 44.90	7 14.29	15 30.61	5 10.20	49 100.00

Survey responses did not appear to be significantly influenced by the pattern of ownership.

The forty-nine firms involved consumed a total of J$50.1 million of electric energy in 1980 and in addition purchased J$10.2 million of fuel for power during the year. They were among the 100 largest private consumers of power in the country and together purchased about 20 percent of all the power sold by JPS in 1981. They were also major employers of Jamaican labor, using the services of 12,970 men and women last year. These facts are shown in the table below, disaggregated by economic activity groups, and shown on a monthly basis.

OBS	Line	Total Employment	Total Electric Power Consumption/Month	Total Fuel Purchase/Month	Total Energy Consumption/Month
1	Comm	1,900	J$169,000	J$136,000	J$305,000
2	Hotel	150	25,000	12,000	37,000
3	Manuf	10,369	2,698,500	689,000	3,387,500
4	Other	551	1,285,000	12,000	1,297,000
	Total	12,970	J$4,177,500	J$849,000	J$5,026,500

The relationship of the survey group to total power generation and consumption may be made clearer by reference to the following table:

	1980	1979	1978
Number of Customers (Average):			
Residential	199,468	189,858	177,745
Commercial & Industrial-Small	23,765	23,861	23,651
Commercial & Industrial-Large	23	24	24
Other	2,229	2,223	2,168
TOTAL	225,485	215,966	203,588
Survey Group	49		
Net Generation Purchase & Sales (Thousand Kilowatthours)			
Net Generation:			
Steam	1,062,884	998,521	1,119,797
Hydro	133,572	108,319	114,715
Diesel	77,925	187,704	108,852
Purchases	103	139	11
TOTAL	1,274,484	1,294,683	1,343,375
Losses and Unaccounted for	245,769	228,064	199,991
Company Use	6,160	6,637	7,144
Electricity Sold	1,022,555	1,059,982	1,136,240
Total Sales: (J$ Million)	242.2	172.2	133.2
Survey Group	50.1		

Nineteen companies, or 39 percent of the respondents, participated in FWA's 1981 census of manufacturing industry in Jamaica. Their individual responses to that census are given in Annex "D". These nineteen firms had the following sales record for 1979-80 and plans for 1981-83:

Sales
(in J$MN)

	Actual		Projected		
	1979	1980	1981	1982	1983
Domestic Sales	218.474	248.493	298.857	351.739	409.000
Caricom Exports	11.278	10.748	18.354	24.822	28.910
Other Exports	2.906	4.743	6.050	8.980	11.430
Total Sales	232.657	263.984	323.261	385.541	449.340

In all respects the nineteen census participant firms have been, and expect to continue to be, dynamic contributors to the Jamaican economy. Their total sales rose from J$232.7 million in 1979 to J$264.0 million in 1980, and they anticipate further growth to J$449.3 million in 1983. The nineteen firms have significant exports (J$14.2 million and J$15.5 million in 1979 and 1980, respectively). They expect the export component of their sales to rise to J$40.3 million by 1983 (a 160 percent increase over 1980), one of the many factors which will necessitate their keeping costs of goods sold, including power costs, as low as possible (in order to remain competitive internationally). Domestic sales are expected to grow somewhat more slowly, rising from J$218.5 million and J$248.5 million in 1979 and 1980 to J$409.0 million by 1983 (a 65 percent increase). The purchases of these firms are equally important to the national economy and are summarized in the table below.

Purchases
(in J$MN)

	Actual		Projected		
	1979	1980	1981	1982	1983
Foreign Raw Materials	108.147	114.940	144.967	164.955	175.901
Local Raw Materials	34.695	43.097	54.192	65.550	76.055
Spare Parts	5.063	5.712	7.386	8.261	9.648
Total Purchases	147.905	163.750	206.545	238.766	261.604

The nineteen census participant firms are heavy purchasers of domestic and foreign raw materials and spare parts. Total purchases by the group are expected to grow from J$147.9 million and J$163.8 million in 1979 and 1980, respectively, to J$261.6 million in 1983. The imported component is very large. Foreign raw materials purchases (exclusive of the imported petroleum content of energy consumption) were J$108.1 million in 1979, J$114.9 million in 1980, and are expected to be J$175.9 million in 1983. Spare parts imports are expected to rise from J$5.1 million and J$5.7 million in 1979 and 1980, respectively, to J$9.6 million in 1983. Domestic purchases, which will support many other local enterprises, were J$34.7 million in 1979 and J$43.1 million in 1980. Depending on their ability to contain costs, and thus continue to be profitable and viable, domestic purchases by the nineteen firms are expected to grow to J$76.1 million in 1983.

In addition to their energy-related investments, the nineteen firms have major general investment plans for the 1981-83 period. Statistics on actual and planned investment are shown in the table below.

Investment
(in J$MN)

	Actual		Projected		
	1979	1980	1981	1982	1983
Equipment	4.232	5.017	22.215	9.733	4.800
Installation	0.373	0.279	0.656	0.480	0.620
Land	0.000	0.096	0.039	0.000	0.000
Building	2.220	1.862	2.939	1.800	0.000
Total Investment	6.825	7.254	25.848	12.013	5.420

In 1979 and 1980 the nineteen firms invested a total of only J$6.8 million and J$7.3 million, respectively. In the 1981-83 period they expected to invest a total of J$43.3 million, consisting of J$36.7 million for imported euqipment, J$1.8 million for installation, and J$4.7 million for building. Based on interviews in the second quarter of 1982, and contrary to the table above, it appears that most of this investment will take place in 1982-83 or later, instead of in 1981-82 as indicated previously. The major purpose of these investments is to expand productive capacity and thus help to realize the sales targets projected by the firms. This does not include the energy-related investment plans noted later in this report.

If one assumes a close correlation between energy consumption and productive activity, it is possible to estimate the total sales and purchases of all forty-nine companies participating in the energy survey. The nineteen firms noted above used roughly 25 percent of all the energy consumed by the group of forty-nine. On this basis, it may be estimated that the larger group had sales of about J$1.2 billion in 1981 and purchases of about J$800 million in the same year.

A profile of some of the salient facts developed on the typical firm responding to FWA's energy survey is given in the table below.

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energy conservation credit demand

	total	commercial	hotel	manufacturing	other
number of companies	49	6	1	40	[illegible]
average shifts, 1980	2	1	3	2	[illegible]
average employment, 1980	295	380	150	288	27[illegible]
average monthly electric bill ($j)	85,255	28,167	25,000	67,463	642,50[illegible]
average monthly energy bill ($j)	102,582	50,833	37,000	84,688	648,50[illegible]
average monthly fuel bill ($j)	26,531	34,000	12,000	26,500	12,00[illegible]

The typical firm in FWA's energy survey runs an average of two shifts a day, and employs just under 300 people. Its average monthly electric bill is J$85,000 and its average monthly fuel bill is J$27,000. Most of the firms are engaged in manufacturing, using domestic and foreign raw materials. The typical firm is concerned about its energy use, interested in ways to cut down on its electric and fuel bills, and willing to pay for a professional audit to identify areas where savings can be made, and where investments will reduce power costs. It is also conscious of the need to reduce the country's imported fuel bill because of the extreme difficulties the company has had in obtaining the foreign exchange necessary to pay for its own purchases of imported raw materials, parts, etc.

The typical firm has competent management, and an attitude that if an investment will pay for itself in a reasonable period of time, it should be undertaken. The company has made extensive use of its commercial banking resources, almost all based on overdraft facilities with short terms of payment. It has used governmental credit in the past on short to medium terms of payment. The firm is reasonably well aware of prevailing conditions in international money and capital markets, realistic about

the possibilities and limitations of credit programs, and sensitive to the relationship between loan terms and conditions and its own ability and willingness to make capital investments.

IV. ENERGY AUDITS

Some of the most important conclusions regarding energy audits, which were developed by the survey, are shown in the table below.

	Total	Commercial	Hotel	Manufacturing	Other
Number of companies	49	6	1	40	2
Willing to pay audit fee	32	4	1	26	1
percent of total	65	67	100	65	50
Average acceptable audit fee	2,611	2,500	-	2,643	-
Willing to pay audit fee if financed	10	3	1	6	0
percent of total	20	50	100	15	0

Of the forty-nine companies surveyed, thirty-two or 65 percent indicated an interest in, and willingness to pay for, an energy audit. This was based on interviewers' informing the companies that audits and associated retrofits have been shown to save a minimum of 10 percent and as much as 40 percent of energy cost for companies. Samples of the types of things likely to be disclosed by an audit for the company involved were discussed with the firms. They were then asked whether they would be willing to pay a one-time fee equal to 5 percent of their monthly electricity bill to cover a complete professional engineering audit of their plant They were also informed that this would produce a series of concrete recommendations which could save them 10-20 percent of their monthly power bill on a regular, ongoing basis. The positive response to this question was remarkably uniform between the commercial and manufacturing groups.

The average amount of audit fee which firms indicated a willingness to pay readily was J$2,611. The maximum amount of fee which a firm indicated it

would pay with its own cash was J$10,000. In addition to the thirty-two firms which were willing and able to pay cash for an energy audit, ten firms or 20 percent of the sample indicated an interest in undertaking the audit if it were financed for them over a twelve-month period. Thus, 85 percent of the firms interviewed were interested in professional energy audits costing not more than 5 percent of their monthly electricity bill and could either pay cash or were interested in obtaining financing to pay for such audits.

V. PREVIOUS ENERGY INVESTMENTS

As mentioned before, many of the firms surveyed had already taken steps in the last two years to reduce their energy consumption. Twenty-four out of the forty-nine firms had made such investments, of which twenty were in manufacturing, three in commercial ventures, and one in tourism.

The investments made in energy conservation included such things as upgrading productive machinery to consume less power by a chemical plant; installing window film, timers, and fluorescent lighting by an insurance company; putting in new insulation for refrigeration equipment by a commercial firm; cleaning burners and electrical devices by a food processor; installing compressor control systems by a packaging firm; purchasing heat recovery systems by a hotel; improving air conditioning controls by a consumer goods manufacturer; installing a better insulated roof by an electrical apparatus producer; refurbishing a furnace by a glass products company; modifying a boiler by a paper manufacturer; and improving heat recovery techniques by a food processor.

With regard to previous energy-related investments, most of these paid for themselves in a relatively short period of time. The maximum payback period expected from these investments was apparently five years, and the normal payback period was four years or less. In some cases, the payback was within twelve months of the related investment.

VI. PLANNED ENERGY INVESTMENTS

Half of the forty-nine respondents to this survey indicated existing plans to take steps, including new capital investments, to reduce energy consumption over the next two years. Of those indicating such plans, twenty were in manufacturing, three were in commercial ventures, and one was in public service. It should be stressed that the plans of all but five of these firms were made without reference to a professional energy audit. It may be anticipated that audits would develop significant additional energy-related investment possibilities. The energy investments which companies would like to make at this preliminary stage are summarized in the table below.

Planned Energy Investments

	Total	Commercial	Hotel	Manufacturing	Other
Number of companies	49	6	1	40	2
Total investment (J$)	5,919,000	50,000	200,000	5,669,000	0
Of which:					
Energy generating equipment (J$)	875,000	0	0	875,000	0
Equipment to increase output with present electricity use	4,050,000	0	0	4,050,000	0
Equipment to maintain existing output with less energy use	994,000	50,000	200,000	744,000	0

The subsectoral breakdown of the above investments reveals wide variations in the capital spending plans of survey respondents. The largest amount of investment, accounting for 74 percent of the total, is planned by the food processing industry, mainly related to additional

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production of saleable goods with less energy consumption per unit. Other major subsectors are chemicals, with 12 percent of planned investment, pharmaceuticals and cosmetics with 6 percent, and a hotel with 3 percent. Details of planned subsectoral investments in energy conservation, on a pre-energy audit basis, are shown in the table on the following page.

Planned Equipment Purchases by Subsector

Subsector	Total	Energy Generating Equipment	Reduce Energy Consumption at Existing Production Level	Produce More with less Energy Consumption
Hotel	$200,000	$0	$200,000	$0
Public Service	0	0	0	0
Wholesale and Retail Sales	0	0	0	0
Construction	0	0	0	0
Insurance	50,000	0	50,000	0
Garments	0	0	0	0
Tobacco	0	0	0	0
Rum, Liquors	0	0	0	0
Food	4,429,000	225,000	204,000	4,000,000
Chemicals	700,000	200,000	500,000	0
Pharmaceuticals & Cosmetics	350,000	350,000	0	0
Electric Apparatus & Appliances	0	0	0	0
Plastic Products	50,000	0	0	50,000
Paper Products	0	0	0	0
Misc. Manuf.	140,000	100,000	40,000	0
Total	$5,919,000	$875,000	$994,000	$4,050,000

VII. POSTPONED ENERGY INVESTMENTS

Eleven out of the forty-nine survey respondents, or 22 percent, indicated that they had postponed energy investments because the interest cost of associated financing was too high. Most of these firms would have had to borrow from local commercial banks and pay a real interest rate of 18 percent or more. Ten firms, or 20 percent of the survey respondents, said that the repayment terms available from the banks (which usually do not exceed twelve months) were too short and thus inhibited them from making desirable energy investments.

A detail of the type of energy investments which firms were postponing is shown in the table below.

Postponed Energy Investments

	Total	Commercial	Hotel	Manufacturing	Other
Number of investments in equipment to generate electrical energy	4	1	0	2	1
Number of investments in equipment to maintain existing level of output with less energy consumption	3	0	0	3	0
Number of investments in equipment to increase output with same energy consumption	6	2	0	4	0

The firms which had postponed energy investments indicated that, on average, they expected any investment they made to pay for itself within a period of four years. They also indicated that the maximum interest rate most of them would pay for financing this type of investment would be 15 percent per annum.

VIII. THE ROLE OF FINANCING

The availability, terms, and conditions of financing will obviously play a critical role in whether or not the survey firms proceed with their energy investment plans. The financing must provide both foreign exchange and local currency, an acceptable interest rate, and a reasonable repayment period. A few firms indicated they could make the energy investments without financing; however, the vast majority indicated they would have to use credit to make the necessary purchases. The possible sources of funds indicated by the survey firms for their proposed investments are shown below.

Possible Sources of Funds for Energy Investments

	Number	Percent of Total
Cash from firm's earnings	10	20
Short-term loan (up to 1 year)	12	24
Medium-term loan (up to 4 years)	11	22
Long-term loan (up to 10 years)	10	20
Other financing (unspecified term)	15	31

As shown, 20 percent of the firms thought they could pay cash for certain investments. Some of these firms also indicated they would need financing for their investments. Thus, 97 percent of the forty-nine firms indicated a desire for financing energy investments. Many firms indicated that the terms available from EDF (up to four years -- 16 percent interest) or RF (up to ten years -- 16 percent interest) would be satisfactory. Even firms willing to pay cash, however, stated their concern that foreign exchange would not be available to permit their cash to buy imported equipment. Also, many of the firms indicating a wish to use EDF or RF will not

be eligible to use those facilities because of program restrictions and limited amounts of funds available.

Although 20 percent of the respondents indicated their desire to use a facility like the RF which provides for payment in a term as long as ten years, a much shorter payback period was expected for almost all energy-related investments. Forty-three percent of the forty-nine survey firms expected their investments to pay for themselves in a maximum of five years, 14 percent in four years, 16 percent in three years, and 8 percent in two years or less. These facts are shown in the table on the next page.

With regard to interest rates, most firms indicated that the maximum rate they were financially able to pay was 15 percent per annum. However, 59 percent indicated that they might pay a higher rate if really necessary, with the overwhelming majority indicating that the absolute limit would be in the range of 17 percent per annum (2 percent above the maximum preferred range). Obviously, there is some trade-off between acceptable repayment term and interest rate, and if the term is longer, the rate might be slightly higher.

proposed financing of energy saving equipment

	total	commercial	hotel	manufacturing	other
number of companies	49	6	1	40	2
--- companies planning equipment purchases ---					
energy generating equipment	11	2	0	9	0
maintain existing level	13	1	1	11	0
increase output	12	1	0	11	0
--- expected payback period for capital investments ---					
5 years	21	0	1	20	0
percent of total	43	0	100	50	0
4 years	7	2	0	5	0
percent of total	14	33	0	13	0
3 years	8	2	0	6	0
percent of total	16	33	0	15	0
2 years	3	0	0	3	0
percent of total	6	0	0	7	0
1 year or less	1	0	0	1	0
percent of total	2	0	0	2	0
--- source of funds for proposed purchases ---					
cash from firms earnings	10	2	0	7	1
percent of total	20	33	0	17	50
edf loan up to 4 yrs	11	1	0	10	0
percent of total	22	17	0	25	0
short term bank loan	12	1	1	9	1
percent of total	24	17	100	22	50
rehab loan up to 10 yrs	10	1	0	9	0
percent of total	20	17	0	22	0
other	15	2	1	11	1
percent of total	31	33	100	27	50

IX. OTHER INVESTMENT INCENTIVES

The respondents to the FWA survey were overwhelmingly in favor of additional government incentives to encourage private sector energy conservation investments. The most popular measures desired were reduction or abolition of import duties on energy-saving equipment. Twenty-six out of the forty-nine firms, or 53 percent, indicated that lower import duties would encourage them to make energy-saving investment.

Nineteen out of the forty-nine firms, or 39 percent, favored other tax incentives to encourage energy investments, of whom more than half suggested that the tax relief be based upon the firm's reduced energy consumption. A significant number of firms--seven, or 14 percent of the survey--suggested that JPS reduce its electricity rates and that the government subsidize the cost of fuel for companies making effective energy-saving investments.

Other suggestions made (with the number suggesting in parentheses) were: streamline import licensing for energy-saving equipment (3), grant foreign exchange priority for imports of energy-saving equipment (2), liberalize depreciation allowances for energy conservation or alternative energy investments (1), and provide the private sector with more officially-developed information on alternative energy technologies (1).

The question of what government incentives would be appropriate to encourage private sector investment in energy conservation is considerably broader than just the energy field, encompassing in fact what the government must do to encourage investment in all fields. The present government is, indeed, committed to promoting private investment, both domestic and foreign, through the simplification of existing regulations and procedures and has announced its specific support for energy-saving and alternative energy investments.

Jamaica National Investment Promotion, Ltd. (JNIP) has established a special unit to encourage and assist energy-related investments by performing the following specific functions:

(1) act as Secretariat for the joint U.S./Jamaica Commission and other related committees, sub-committees, and task forces;

(2) act as Secretariat for any subsequent commissions and related groups which are established with other countries;

(3) co-ordinate the processing of all private sector proposals on projects being considered by government ministries and agencies;

(4) liaise with government ministries and agencies as well as private sector groups and organizations with respect to new investments;

(5) collect and compile basic statistical and other data of significance to prospective investors;

(6) make recommendations to government with respect to applications from prospective investors for concessions of all types;

(7) evaluate project proposals;

(8) identify and promote potential areas of investment;

(9) prepare feasibility studies;

(10) expedite the processing of all project proposals;

(11) initiate or participate in overseas investment promotional missions and trade exhibitions;

(12) co-operate with foreign governments and private sector groups (local and foreign) in the establishment of facilities consistent with the attainment of the objectives of the program.

The individual assigned these responsibilities for energy investments is intelligent, pleasant, and resourceful. However, she could benefit from additional personnel backup and specialized training. A real

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demonstration effect could be obtained if the JNIP unit were able to publicize the beneficial effects of specific energy-saving investments, and if it had the time available to do a thoroughgoing identification and promotion of potential areas of energy investment--things which it is not possible to do at present with its limited staff and budget.

Other incentives to private sector investment include the officially-sponsored campaign by the Ministry of Mining and Energy to acquaint the public with possible energy-saving investments, and to train people and firms to do proper energy audits. Further publicity would encourage public awareness of the need for, and benefits of, investments in this area and additional training courses in energy audits would serve to improve the professional capabilities of local firms to do this work.

The government's decision some time ago to eliminate all subsidies on petroleum products and electrical energy has served as a strong stimulus to private sector energy-saving investments. The government intends to maintain this policy in the future, and make price adjustments to reflect cost increases. This is an essential part of the ongoing official program to induce energy-saving investments.

X. DOMESTIC ENERGY EQUIPMENT & SERVICES

Based on interviews conducted with about a dozen actual and prospective energy industry investors in Jamaica, it is clear that there is indeed a demand for credit for investments in the energy conservation and solar equipment industries. In fact, Jamaican National Investment Promotion (JNIP), already has two proposals for projects in these areas which total over $2 million (U.S.) in requested loans. These projects are for the manufacture and installation of solar crop dryers and computerized energy management systems.

The industry leader in Jamaica is Appliance Traders Ltd., which assembles and markets solar water heating panels and systems. They have been in this market for over four years, and presently install about 100 residential hot water systems annually. They have also installed systems for hotels, hospitals, and institutional kitchens. As the primary industry in Jamaica already established, Applicance Traders seems hesitant to state that a loan fund for industrial development (which could go to their competitors) is needed. Instead, Appliance Traders would prefer that low-interest loans be available to permit the masses to afford solar water heating.

The other companies interviewed were much more positive in their belief that the fund could benefit them. These companies were established much more recently and see the loan funds as a badly needed source of foreign exchange for raw materials and parts. Certain of these companies are operating as distributors of U.S.-made products in addition to their own lines, and the availability of foreign exchange would enhance these arrangements.

Tropical Energy (est. 1981) - manufactures solar collectors, heat exchangers for air conditioners, and fluorescent light fixtures. Distributors for solar control window film, photovoltaic (solar cell) panels, and control systems.

KIW Hardware (est. 1907, in solar for three years) - have installed about 100 residential solar hot water systems over last three years, 10 have been in other Caribbean countries. They have established joint ventures with Sun Ray of Ontario, Canada to distribute solar collectors and with E-Systems of Texas U.S. to manufacture their collectors in Jamaica.

MAC SIM Ltd. (est. 1970) - have manufactured solar collectors since 1981, and installed five solar hot water systems in 1981.

Econergy Engineering Services (est. 1980) - provide energy conservation consulting services and manufactur solar hot water heating panels and air-conditioning heat exchangers to produce hot water.

Dunn's Equipment Engineering (est. 1975) - provide energy conservation consulting services, equipment maintenance, mechanical equipment design and manufacturing, piping, and insulation.

In addition to these companies already in the marketplace, the following potential projects have been identified from JNIP or from interviews with their proponents:

1. Manufacture of solar crop dryers - Energy Management, Ltd. of Clark and Clark Ltd., in a joint venture with International Solar Technologies, Inc., Plainfield, Indiana.
2. Installation and maintenance services for computerized energy management systems, with eventual manufacturing of sub-assemblies - Southern Energy Management, Inc., Pompano Beach, Florida.

3. Establishment of maintenance service to vacuum and steam clean air conditioner registers, ducts, air handling fans, and coils - Texas Industrial Vacuum Services, Houston, Texas (Mr. Larry Foster).
4. Manufacture of gaskets to repair steam leaks, water leaks, inefficient engines and filters to prevent maintenance problems and inefficiencies in engines, air conditioners and industrial systems - Teape-Johnston, Ltd. (Dr. Franklin Johnston).
5. Distribute U.S.-made industrial insulation and manufacture calcium silicate pipe insulation using locally available raw materials (gypsum) - El-Mech Engineers, Ltd. (Mr. Trevor Bernard).
6. Manufacture, or assemble from kits, switches and timers to reduce electrical energy consumption in air-conditioning and lighting systems - Wonards Radio Engineering Ltd. (Mr. Edward C. Wong).
7. Manufacture efficient wood stoves for cooking to replace use of gas and electric and to extend wood supplies of the poor - Dunn's Equipment Engineering (Mr. Trevor Dunn).
8. Manufacture industrial heat exchangers for waste heat recovery from boilers and other heat sources - Controls Engineering and Chemicals Ltd. (Mr. Trevor Sutherland).
9. Establishment of systematic boiler tune-up service using digital oxygen and combustibles stack gas analyzers to improve boiler efficiency - El-Mech (Mr. Bernard) and Dunn's Equipment (Mr. Dunn).

Interviews showed that these prospective business venturers were unanimous in their agreement that the loan funds were needed in order that they be able to acquire the necessary raw materials, parts, initial inventory, or specialized test equipment necessary to set up operations. There was

concern expressed that the funds might go only to established companies and that their lack of a long track record in the field might preclude them from receiving loans.

From these studies, it appears that a demand for credit is evident, based on the following facts:

1) There is one well-established company in the field, demonstrating that there is a sustaining market;
2) There are at least five more embryonic companies in the field, some in competition iwth the leader and some with energy conservation products;
3) There are two loan applications at JNIP totalling over $2 million (U.S.) for related ventures;
4) There are at least seven other good ideas for potential businesses with proponents searching for funding sources.

In addition, however, JNIP has other alternative energy project proposals which also have large funding requirements, for example:

1) About six projects for ethanol (alcohol from sugar cane or other biomass, for use as fuel) production-ranging from $2 million - 10 million (U.S.) each.
2) One waste conversion (municipal solid waste to electric power) project - requesting $340,000 (U.S.) for the feasibility study only.
3) Two wind energy projects - one for $2 million, the other recently received and not yet evaluated.

If these sorts of projects are truly indicative of what is required to set up manufacturing of alternative energy or energy conservation operations in Jamiaca, the conclusion could quickly be drawn that substantial amounts of funding would immediately be required in this area. However, each of the projects proposed to the JNIP needs to be carefully examined in terms of appropriate technology. Important questions to be raised are:

1) Why is a capital-intensive project being proposed when Jamaica is starving for capital?
2) What are the labor-stimulating effects of these projects in Jamaica, which has a high rate of unemployment?
3) What are the true values of the goods being produced, that is, what is the payback period of a solar crop dryer or computerized energy management system?
4) Is it not possible to start an enterprise on a smaller basis and grow to this level based on sales?
5) What potential after-market problems are introduced by the products, such as computer maintenance and solar collector reglazing?
6) Is a complicated product being forced upon an assembly staff, and ultimately a maintenance staff once installed, which may not have the skills required?

Given careful scrutiny in these terms, many of the projects proposed to JNIP would be found to be "inappropriate" technology, for reasons either technical, economic, or social. None of the embryonic companies already in operation in Jamaica began with a high level of investment, and it is doubtful

that the industry leader did either, although by now they may have a substantial amount invested. Among those potential entrepreneurs listed previously who were interviewed (listed as numbers 3-9), the general opinion was that $30,000 - $100,000 (U.S.) was the level of foreign exchange needed to set up operations. Examining the types of products produced and contrasting, we see more appropriate technologies which result in greater energy savings and employment generation with these projects.

Take a hypothetical case comparison between the solar crop dryer manfuacturing and some of the other technologies. The key problem is the long payback associated with solar crop dryers in the field. Suppose $1 million were invested in either of two projects, the solar crop dryer plant or a portfolio of ten other small-scale energy conservation industries. Assume that first year sales are $1 million (J), for either case. Payback periods are:

Gaskets, for repairing steam leaks which includes installation labor of 80 percent	= 3 months
Vacuum and steam clean air conditioners, labor at 90 percent	= 1 year
Pipe installation for steam and hot water systems, including labor at 60 percent	= 1 year
Seven-day timers to control air conditioners, including installation labor at 30 percent	= 3 months
Timers for outside and hall lights, including labor at 30 percent	= 6 months
Wood stoves for residences to replace gas or electric, occasional use, installation at 20 percent	= 3 years

Heat exchangers for industrial processes, including installation at 40 percent	= 2 years
Heat exchangers for hot water from hotel air conditioners, including installation at 50 percent	= 2 years
Boiler tune-up, including labor at 90 percent	= 3 months
Fluorescent light fixtures to replace incandescent, installation labor at 50 percent	= 2 years
Solar crop dryer, including installation at 30 percent	= 10 years

These payback periods are documented in the previous energy audits done in Jamaica under this project, extensive experience in installations in the U.S., and (regarding solar crop dryers) the ESI report preliminary to the GOJ/U.S. AID Project Paper. One typographical error in the ESI report showed a solar crop dryer payback of one year (it should read fifteen), while all other paybacks for crop dryers in the same table were nine to thirteen years. These paybacks are used in the comparison, Table 1.

The results of the hypothetical case comparison show several striking results. First, more employment is generated with the small-scale industries. This is the result of the products (or services) being, on the average, more labor-intensive to produce than solar crop dryers. Solar crop dryers require significant imports of glass and sheet metal which require relatively little labor to turn into the finished product. In addition, installation labor is greater for the small-scale industries, as a percentage of sales. In the aggregate, sales of their products make up only about half of the cost of actually getting the products in operation. For example, a pipefitter replacing a leaking steam line gasket may incur labor costs of four times the cost of the gasket itself, assuming the high price of imported gaskets in Jamaica. The net result is that the small-scale

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Table 1.

Hypothetical Case Comparing Appropriate and Inappropriate Industries (J $)

	SALES $	MFG LABOR % of Sales	MFG. LABOR $	INSTALLA-TION LABOR $	TOTAL LABOR $	INSTALLED COST $	ENERGY SAVINGS $/yr
Gaskets (leaks)	$ 100,000	70	$ 70,000	$400,000	$ 470,000	$ 500,000	$2,000,000
Vacuum A/C Systems	100,000	90	90,000	0	90,000	100,00	100,000
Insulation (piping)	100,000	40	40,000	150,000	190,000	250,000	250,000
A/C Timers	100,000	50	50,000	43,000	93,000	143,000	571,000
Light Timers	100,000	50	50,000	43,000	93,000	143,000	286,000
Wood Stoves	100,000	60	60,000	25,000	85,000	125,000	42,000
Indust. Heat. Exchangers	100,000	60	60,000	67,000	127,000	167,000	83,000
A/C Heat. Exchangers	100,000	60	60,000	100,000	160,000	200,000	100,000
Boiler Tune-Up	100,000	90	90,000	0	90,000	100,000	400,000
Fluorescent Lights	100,000	60	60,000	100,000	160,000	200,000	100,000
Sub-Total	$1,000,000		$630,000	$928,000	$1,558,000	$1,928,000	$3,932,000

Average payback period based on installed cost = 0.5 years
Employment generated at $12,000 per year = 130 jobs
Foreign exchange saved = $1.5 million (U.S.)

Solar Crop Dryers	$1,000,000	40	$400,000	$428,000	$ 828,000	$1,428,000	$ 143,000

Payback period = 10 years
Employment = 69 jobs
Foreign exchange saved = $60,000 (U.S.)

industry program has created a total of 130 jobs (at an average of $12,000 each) whereas the solar crop dryer industry has created only 69 jobs. In contrast, were the $1 million (U.S.) converted to Jamaican $ at $1.78 and distributed in a public works program, 148 jobs (only eighteen more than small-scale industry) would have been created and at the end of a year the money would have run out and the people would presumably have to be laid off.

Even more striking than the almost 2:1 ratio of employment generated by the small-scale industries are the energy (and, hence foreign exchange) savings realized. These savings come as a result of the products being a superior energy investment to solar crop dryers. Because of the low cost, O & M nature of many of the appropriate technologies, the average payback period of all projects is about one-half year, based on the installed cost, compared to the payback on the solar crop dryer of ten years. The resulting energy cost savings at the plant are nearly $4 million (J) for the appropriate technologies and $143,000 (J) for the solar crop dryer. When converted to foreign exchange at $1.78 and assuming a 70 percent foreign exchange component of energy costs the net result is a savings of $1.5 million (U.S.) for the appropriate technologies and $60,000 (U.S.) for the solar crop dryer. The appropriate industries have already provided GOJ with a positive foreign exchange cash flow on the $1 million (U.S.) investment whereas the solar crop dryer company will have enough systems fielded some time in their sixth year of operation to have saved $1 million (U.S.), if sales continue at $1 million (J) per year.

In summary, a funding level of $1 million (U.S.) would be sufficient to do something to stimulate the development of small-scale industry to produce energy conservation products. However, because of the extremely attractive potential rate of foreign exchange return, together with the stimulation of employment, it is recommended that this portion of the project be expanded to $3 million (U.S.) in order that even greater benefits may be realized. Furthermore, it is recommended that the energy conservation industry fund and the solar energy industry fund be pooled into one joint loan fund. Potential solar energy projects can be viewed as another energy conservation opportunity, and should stand on their merits on the same basis of comparison.

XI. SOLAR WATER HEATING INVESTMENTS

As noted previously, opportunities exist in the private sector for solar water heating in commercial and industrial (C & I) facilities such as hotels, laundries, food processing plants, restaurants, and light industry where hot water is needed for plant cleanup. Particularly attractive would seem to be the hotel and laundry industries, as these are among the largest hot water users.

During the course of the five private sector energy audits in the C & I sector, opportunities for solar water heating were actively sought. Three such potential projects were identified, for:

1) a cafeteria in a commercial office building;
2) several small unit apartments in a tourist hotel; and
3) a laundry in a tourist hotel.

The total projected energy savings for these three projects is 42,400 KWH (electricity) and 2190 IG of diesel per year. In the cases of the cafeteria and the apartments, electric water heaters are replaced, and the resulting payback period (before taxes) is 3.6 - 3.9 years. After tax simple payback is 5.5 - 5.7 years, and return on investment is about 8 percent. The laundry presently burns oil in a boiler to heat its hot water. This method is typical of the medium-sized C & I facilities, as oil provides several times more heat energy (BTU) per dollar than electricity. Investigations into the opportunity for solar at the laundry showed simple payback periods of 8.6 years before taxes and 10.5 years after taxes. The return on investment for this project is negative, even considering a 9 percent loan interest rate.

Based on the results of the energy audits, solar water heating does not appear to be a particularly attractive opportunity for the C & I sector. The main reasons are that very few C & I facilities of any size will heat water electrically. Therefore most solar installations will replace oil-fired boilers, a marginal investment at best.

One feature of solar water heating which is attractive, compared to some energy conservation opportunities, is the ability to essentially reduce fuel useage to zero, by means of alternative energy. Whereas conservation can save, say, 20 percent, solar can save 100 percent, it may be argued. However, the national interest must be determined, that is at what cost is the 100 percent saved? Could more total energy be saved by investing in a variety of other projects? Hot water energy costs are usually only a small fraction of plant energy costs in most industries. In the case of hotels, an opportunity exists to recover low-grade waste heat from the buildings' central air-conditioning system condensers. This saves almost 100 percent of the energy used for hot water, and does so for a much lower capital investment than is required for solar. The result is a payback period which is only a fraction of that required for solar, as shown in Table 1.

The indication from these case studies is that solar water heating does not merit a separate loan fund. The two primary reasons are that the technology is not as cost-effective as other competing opportunities, and that the overall need is not particularly large. For these reasons, it is recommended that the solar loan fund become part of the energy conservation and alternative energy fund. Potential solar water heating projects can be viewed as yet another energy conservation opportunity and can be judged against these projects on the basis of the national goal of saving energy

Table 1.

Economics of Solar and Energy Conservation Technologies for Water Heating, Replacing Oil-Fired Boiler

	Solar	Waste Heat Recovery
Before Tax Payback	8.6 yrs	2.0 yrs
After Tax Payback	10.5 yrs	2.9 yrs
After Tax Payback (discounted)	13.4 yrs	3.5 yrs
Return on Investment (9% loan)	-3.6%	14.6%

at the greatest return on investment. In this way, the loan fund will maximize energy savings to Jamaica.

Residential water heating in Jamaica is chiefly done electrically. However, the majority of homes have no hot water. Many of those who do have waterheaters use them sparingly, switching the units on only when needed. In addition, there are few homes with dishwashers installed and the incidence of hot baths or showers is expected to be less than in the U.S. Furthermore, the incoming ground water temperature in Jamaica is about 15°F higher than in the U.S. All of these factors taken together lead to the conclusion that less energy is used for hot water by a typical household in Jamaica than in the U.S. One problem that has been observed in Jamaica is the use of thinner layers of hot water tank insulation than in the U.S., contributing to higher standby losses (assuming the unit was not switched off).

Appliance Traders Ltd., the solar water heating industry leader in Jamaica, presently sells about 100 residential units annually. Others in the field may sell about twenty units combined. The amount of US$500,000 of loan funds, matched by local costs, would be sufficient to install about 700 units (at a cost of $3,000 (J) each) over the loan period. If the loan period were five years, this 700 units of sales roughly equals what the industry is now selling without any special stimulus.

The advantage of the residential solar hot water program, other than the (relatively small) amount of energy saved might lie mainly in the public relations and education value. Solar collectors on a neighbor's roof could be visible proof of energy being produced in Jamaica and thus

serve as a source of pride. Water heating at the residential level is the most appropriate and cost-effective solar technology yet developed. However, payback periods in Jamaica will still probably exceed three years.

At present, Appliance Traders' sales are almost exclusively cash sales to the purchaser. Very few individuals are obtaining loans for solar water heaters. Therefore loans at the prevailing interest rate for this purpose would probably not make any difference (they are already available). Thus, it is not recommended that residential solar water heating be included as a subject for financing under this program.

XII. TOTAL ENERGY INVESTMENT PROGRAM

Initial conversations between the Ministry of Mining and Energy and U.S. AID in 1981 produced a proposed energy investment program which consisted of the following elements:

CREDIT FUNDS

	AID US$	Govt. of Jamaica US$ Equivalent of J$ Contribution
	US$ Million	
Energy Conservation		
Retrofitting for Industrial/ Commercial Enterprises	3.0	4.2
Energy Conservation Industry Development (to establish or expand)	0.5	-
Alternative Sources		
Industrial/Commercial Solar Water Heating	1.0	1.3
Capacity Expansion (New or Existing) of Solar Equipment Manufacturers	0.5	0.5
Loans for Commercial Solar Drying	0.1	-
Residential Solar Water Heating	0.5	0.9
	5.6	6.9

Based on the just-completed energy survey, it appears that certain changes should be made in this energy investment program. In view of the size of perceived demand, the new program can only be a pilot effort to demonstrate that Jamaican businesses and industries will borrow funds to retrofit their facilities and repay these loans. Because of limitations on AID funding, it will only be able to cover a portion of maximum possible demand. Also, the previously-agreed breakdown of loan funds by types of investment appeared arbitrary and not sufficiently flexible to permit adaptation to the many different types of energy conservation and alternative energy projects that might merit financial support. The details of these potential investments will be known only after the completion of a thorough energy audit process for a large number of firms.

However, based upon available information, it is conservatively anticipated that the potential energy investment demand from the private sector for 1982-84 will be along the following lines:

	J$	US$ Equivalent
Energy Conservation		
Equipment to generate electricity	2,625,000	1,474,700
Investments to increase output without increasing energy utilization	12,150,000	6,825,800
Investments to reduce energy utilization while maintaining output	2,982,000	1,675,300
Subtotal	17,757,000	9,975,800
Energy Industry Development	5,340,000	3,000,000
Energy Audits	534,000	300,000
TOTAL	23,631,000	13,275,800

In making the above estimates, it was taken into consideration that the forty-nine survey firms represented about one-third of all commercial and industrial energy consumption. It was assumed that firms would make energy consumption investments based largely upon their level of energy consumption. On this basis, prospective total commercial and industrial energy conservation investment demand was estimated at three times the indicated demand from the survey firms. A strong element of conservatism was applied, however, inasmuch as no allowance was made for the prospective increases in demand for investments arising from the energy audit process. Properly-conducted audits could be anticipated to at least double the above indicated investment demand figures for energy conservation.

The amount shown for domestic energy industry development is very conservative. It should cover all the financially and economically viable domestic energy idustry development plans currently known to the Jamaican Government. However, new investment proposals in this area are presented every month, and it is likely that an amount several times the pilot project figure will actually be required over the next two to three years. In fact, just one well-conceived large project could utilize as much as US$3,000,000 without difficulty.

The amount shown for energy audits is also conservative. It assumes that only 100 audits are financed, at US$3,000 each. This is less than 1 percent of JPS's commercial and industrial customers, but represents a fifth of the approximately 500 firms which consume well over 75 percent of JPS electricity. Since only 20 percent of FWA's sample indicated that the availability of twelve-month financing would induce them to undertake an

energy audit, it may be presumed that 100 audit loans would suffice to cover a population of 500, with the balance being paid for in cash or with financing provided from normal commercial bank loans.

With regard to the foreign exchange vs. local currency composition of potential energy investment, it appears that this would be broken down approximately as follows:

(in U.S. dollars)

	Foreign Exchange	Local Currency	Total
Energy conservation	$3,492,000	$6,484,000	$9,976,000
Energy industry development	2,400,000	600,000	3,000,000
Energy audits	-	300,000	300,000
Total	$5,892,000	7,384,000	7,276,000

The currency composition of energy conservation investments was estimated at 35 percent foreign exchange/65 percent local currency based upon the thirty-three energy conservation opportunities uncovered in FWA's energy audits. The currency composition of energy industry development was based upon the average of 211 firms' proposed investments in Jamaica, reviewed by FWA in its 1981 census of manufacturing industry (80 percent foreign exchange/20 percent local currency). The substantial difference is believed attributable to the fact that many of the energy conservation opportunities are relatively simple adjustments, additions to, or servicing of existing machinery which can be done largely by local service firms, whereas energy industry development will consist heavily of the purchase of imported capital equipment for domestic manufacturing. It is assumed that all energy audits will be performed by local firms.

With regard to maximum permissible sub-loan size, the following guidelines are recommended:

	(in U.S. dollars)
Energy conservation	$500,000
Energy industry development	$500,000
Energy audits	$3,000

These limits should assure a reasonable distribution of the funds available from U.S. AID and should meet the needs of all but a very few individual projects. Needs for larger amounts of funds would have to be met by expanding the program with resources from other lenders.

The maximum repayment term offered on energy audit sub-loans should be one-year, while repayment for energy conservation and energy industry development sub-loans of up to $500,000 might be in up to five years.

ENERGY CREDIT QUESTIONNAIRE

1. Name of company _____

2. What is your line of business? ☐ Hotel ☐ Commercial

   ☐ Manufacturing ☐ Office Building ☐ Other (specify) _____

3. Have you taken any major steps in the last two years to reduce energy consumption per unit of output?

   ☐ Yes ☐ No If yes, please list _____

   _____

4. Do you plan to take any major steps in the next two years to reduce energy consumption per unit of output?

   ☐ Yes ☐ No If yes, please list _____

   _____

5. To start with, are there substantial changes which should be made in this information about your company? (From Census of Manufacturing Industry in Jamaica-1981). If your company is not listed in the Census, please give all information below.

   % ownership, local: _____ Foreign: _____

   Employment, 1979: _____ 1980: _____

   Shifts, 1979: _____ 1980: _____

   Purpose of planned investments--

   New products ☐ Repl/Rep existing machinery ☐

   Increase capacity ☐ Other ☐

   Increase warehouse space ☐ _____

(amounts in J$MN)	1979	1980	1981	1982	1983
DOMESTIC SALES					
CARICOM SALES					
OTHER EXPORTS					
RAW MATERIAL - FOREIGN					
RAW MATERIAL - LOCAL					
SPARE PARTS					
EQUIPMENT					
INSTALLATION					
LAND					
BUILDING					

6. Do your planned equipment purchases in 1982/83 now include the following?

☐ Energy generating equipment - amount (J$MN)_____

Type of equipment_____

☐ Equipment to reduce energy consumption at existing level of output - amount (J$MN)_____

Type of equipment_____

☐ Equipment to produce more output with less energy consumption per unit of output - amount (J$MN)_____

Type of equipment_____

7. When you make a capital investment, how long do you normally expect it to take to pay for itself?

☐ 5 years ☐ 4 years ☐ 3 years ☐ 2 years ☐ 1 year or less

8. How will you pay for the equipment you plan to purchase?

☐ Cash from firm's retained earnings ☐ Short-term commercial bank loan ☐ Export Development Fund loan up to 4 years

☐ Rehabilitation Fund loan up to 10 years ☐ Other (specify)_____

9. What is the maximum interest rate you are prepared to pay at present for capital equipment purchases?

☐ 23-24% ☐ 21-22% ☐ 19-20% ☐ 17-18% ☐ 15-16%

10. Would you be able to buy the equipment you plan to buy if the interest rate was 2% above the maximum you indicated above?

☐ Yes ☐ No

If it was 4% above?

☐ Yes ☐ No

If it was 6% above?

☐ Yes ☐ No

11. Are you postponing any capital equipment purchases because the interest rate available is too high?

☐ Yes ☐ No

12. If "Yes," do these postponed purchases include the following?

☐ Energy generating equipment - amount (J$MN)_____

Type of equipment_____

☐ Equipment to reduce energy consumption at existing level of output - amount (J$MN)_____

Type of equipment_____

☐ Equipment to produce more output with less energy consumption per unit of output - amount (J$MN)_____

Type of equipment_____

13. If "Yes," would you make these postponed purchases if the interest rate on borrowed money was the following?

15% ☐ Yes ☐ No

12% ☐ Yes ☐ No

9% ☐ Yes ☐ No

14. What is the maximum repayment term you can presently arrange for equipment purchase loans?

☐ 1-2 years ☐ 3-4 years ☐ 5-6 years ☐ 7-8 years

☐ 9-10 years

15. If you could arrange a loan with a repayment term twice as long as the current maximum term available to you, at current interest rates, would this induce you to make the equipment purchases you are now postponing?

☐ Yes ☐ No

If the loan term were three times longer?

☐ Yes ☐ No

16. How large is your electricity bill every month?

☐ J$ ☐ J$ ☐ J$ ☐ JS

17. If you generate your own power, how much is your average monthly fuel cost?

☐ over J$100,000 ☐ J$75,000-99,0000 ☐ J$50,000-74,000

☐ J$25,000-49,000 ☐ under J$25,000

18. Audits and associated retrofits have been shown to save a minimum of 10% and as much as 40% of energy costs for companies. In light of this would you be willing to pay a one-time fee equal to 5% of your monthly electricity bill to cover a complete professional engineering audit of your plant which would produce a series of concrete recommendations which could save you 10-20% of your monthly power bill on a regular, ongoing basis.

☐ Yes ☐ No

19. If the answer is "No", what would you consider a reasonable price for such an engineering audit?

☐ J$5,000 ☐ J$2,500 ☐ J$1,000 ☐ J$500

20. Would be much more likely to contract for such an audit if a loan were provided on a twelve-month term to help pay for it?

☐ Yes ☐ No

21. An energy audit would produce recommendations on actions and equipment which would produce savings for you. Would you implement recommendations on equipment purchases if they paid for themselves

in five years?	☐ Yes	☐ No
four years?	☐ Yes	☐ No
three years?	☐ Yes	☐ No
two years?	☐ Yes	☐ No
one year or less?	☐ Yes	☐ No

22. Other than an improved credit program to encourage purchases of energy conservation equipment, what government incentives would you like to see in this area?

☐ Tax incentives (specify)_____

☐ Duty incentives (specify)_____

☐ Other (specify)_____

u.s. aid jamaica energy credit study
energy conservation plans by company

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company:antilles chemical co ltd

ownership: not aval, 1980 employment: .

background

line of business: manuf
monthly power utilization
electricity: $40,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
closed plant, upgraded machinery, converted from diesel

energy conservation plans

major steps planned in next two years to reduce energy use:
at maximum conservation level
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: NO

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

---

company:appliance traders

ownership: domestic, 1980 employment: 180

background

line of business: manuf
monthly power utilization
electricity: $1,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee:
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: YES
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: yes
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

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u.s. aid jamaica energy credit study
energy conservation plans by company

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company:ariguanabo textile

ownership: domestic, 1980 employment: 480

background

line of business: manuf
monthly power utilization
electricity: $90,000
fuel:
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
not listed
planned energy equipment purchases for 1982/83:
generating equipment: NO
equipment to reduce consumption
while maintaining output: YES
equipment to reduce consumption
while increasing output: NO

energy audit

willing to pay audit fee:
maximum fee acceptable: $2,500
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 3
payment means for planned investments:
cash: NO loan: YES
edf : NO rf: YES
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: YES
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO
equipment to reduce consumption
while maintaining output: YES
equipment to reduce consumption
while increasing output NO

---

company:berec caribbean ltd

ownership: mixed , 1980 employment: 150

background

line of business: manuf
monthly power utilization
electricity: $6,500
fuel:
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO
equipment to reduce consumption
while maintaining output: NO
equipment to reduce consumption
while increasing output: NO

energy audit

willing to pay audit fee:
maximum fee acceptable:
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 2
payment means for planned investments:
cash: NO loan: NO
edf : YES rf: NO
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO
equipment to reduce consumption
while maintaining output: NO
equipment to reduce consumption
while increasing output NO

u.s. aid jamaica energy credit study
energy conservation plans by company

company:black block factory — ownership: domestic, 1980 employment: 50

background

line of business: manuf
monthly power utilization
electricity: $3,000
fuel:
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO
equipment to reduce consumption
while maintaining output: NO
equipment to reduce consumption
while increasing output: NO

energy audit

willing to pay audit fee:
maximum fee acceptable:
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 3
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: YES
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO
equipment to reduce consumption
while maintaining output: NO
equipment to reduce consumption
while increasing output NO

company:british american insurance co — ownership: mixed , 1980 employment: 250

background

line of business: comm
monthly power utilization
electricity: $22,000
fuel:
major steps taken in last two years to reduce energy use:
window film, timers, lighting

energy conservation plans

major steps planned in next two years to reduce energy use:
water heating, air handlers
planned energy equipment purchases for 1982/83:
generating equipment: NO
equipment to reduce consumption
while maintaining output: YES $50,000
equipment to reduce consumption
while increasing output: NO

energy audit

willing to pay audit fee:
maximum fee acceptable:
willing to pay audit fee only if financed: YES

credit demand

normal pay back period for investments: 4
payment means for planned investments:
cash: YES loan: NO
edf : NO rf: NO
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO
equipment to reduce consumption
while maintaining output: NO
equipment to reduce consumption
while increasing output NO

u.s. aid jamaica energy credit study
energy conservation plans by company

company:british american life ins co — ownership: mixed , 1980 employment: 250

background

line of business: comm
monthly power utilization
electricity: $21,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
switches, lighting

energy conservation plans

major steps planned in next two years to reduce energy use:
not listed
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 3
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: YES
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

company:broadway group of companies — ownership: domestic, 1980 employment: 300

background

line of business: comm
monthly power utilization
electricity: $7,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: NO

credit demand

normal pay back period for investments:
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: NO
preferred maximum interest rates: 17-18%
are current interest rates restricting investments?: YES
are current repayment terms restricting investments?: yes
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output YES .

u.s. aid jamaica energy credit study
energy conservation plans by company

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company:butterkist ltd

ownership: not aval, 1980 employment: .

background

line of business: manuf
monthly power utilization
electricity: $2,500
fuel: under $25,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: .
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

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company:caribbean broilers (ja) ltd

ownership: domestic, 1980 employment: 200

background

line of business: manuf
monthly power utilization
electricity: $19,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
rewire factory, preventative maint
planned energy equipment purchases for 1982/83:
generating equipment: YES .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: YES .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: .

credit demand

normal pay back period for investments: 2
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: YES
othr: YES
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

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u.s. aid jamaica energy credit study
energy conservation plans by company

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company:caribbean casting & engin — ownership: foreign , 1980 employment: 174

background

line of business: manuf
monthly power utilization
electricity: $48,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output: NO .

energy audit

willing to pay audit fee:
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output NO .

---

company:caribbean products — ownership: domestic, 1980 employment: 340

background

line of business: manuf
monthly power utilization
electricity: $58,000
fuel: .
major steps taken in last two years to reduce energy use:
broiler condensation recovery

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: .

credit demand

normal pay back period for investments: 4
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: YES
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output NO .

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u.s. aid jamaica energy credit study
energy conservation plans by company

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company:cigarette co of ja ltd — ownership: mixed , 1980 employment: 300

background

line of business: manuf
monthly power utilization
electricity: $36,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
lighting, controlling power, etc

energy conservation plans

major steps planned in next two years to reduce energy use:
utilize waste heat
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: YES .

energy audit

willing to pay audit fee: .
maximum fee acceptable: $1,000
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: YES
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

---

company:cmp metal products ltd — ownership: domestic, 1980 employment: 200

background

line of business: manuf
monthly power utilization
electricity: $12,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
regulated furnace

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: NO

credit demand

normal pay back period for investments: .
payment means for planned investments:
cash: NO loan: NO
edf : YES rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

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u.s. aid jamaica energy credit study
energy conservation plans by company

company:colgate palmolive — ownership: foreign , 1980 employment: 160

background

line of business: manuf
monthly power utilization
electricity: $12,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
changed lamps to sodium vapor

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: YES .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: .

credit demand

normal pay back period for investments: 2
payment means for planned investments:
cash: YES loan: NO
edf : NO rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

company:cremo ltd — ownership: not aval, 1980 employment: .

background

line of business: manuf
monthly power utilization
electricity: $52,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: YES .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: $2,500
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: YES loan: NO
edf : NO rf: NO
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: YES
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output YES .

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u.s. aid jamaica energy credit study
energy conservation plans by company

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company:desnoes and geddes limited — ownership: mixed , 1980 employment: 1540

background

line of business: manuf
monthly power utilization
electricity: $200,000
fuel:
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
energy use monitoring
planned energy equipment purchases for 1982/83:
generating equipment: NO
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output: YES

energy audit

willing to pay audit fee:
maximum fee acceptable:
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: YES loan: NO
edf : NO rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output NO

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company:durable products co — ownership: domestic, 1980 employment: 130

background

line of business: manuf
monthly power utilization
electricity: $4,500
fuel:
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output: NO

energy audit

willing to pay audit fee:
maximum fee acceptable:
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: YES
preferred maximum interest rates: 17-18%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output NO

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u.s. aid jamaica energy credit study
energy conservation plans by company

company: federated pharmaceutical co — ownership: domestic, 1980 employment: 110

background

line of business: manuf
monthly power utilization
electricity: $20,000
fuel: .
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
not listed
planned energy equipment purchases for 1982/83:
generating equipment: YES $350,000
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: YES loan: YES
edf : NO rf: NO
othr: NO
preferred maximum interest rates: 17-18%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

company: gleaner company — ownership: mixed , 1980 employment: 457

background

line of business: manuf
monthly power utilization
electricity: $58,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
not listed

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: YES loan: NO
edf : NO rf: NO
othr: YES
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

u.s. aid jamaica energy credit study
energy conservation plans by company

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company: quinness ltd — ownership: mixed , 1980 employment: 305

background

line of business: manuf
monthly power utilization
electricity: $38,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
power factor correction, equip, solar tinted windows

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: YES .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: YES .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: .

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : YES rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

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company: industrial chemical co — ownership: mixed , 1980 employment: 125

background

line of business: manuf
monthly power utilization
electricity: $30,000
fuel: $25,000-49,000
major steps taken in last two years to reduce energy use:
steam line, air compressor, insulation

energy conservation plans

major steps planned in next two years to reduce energy use:
turbine generator, audit ecos
planned energy equipment purchases for 1982/83:
generating equipment: YES $200,000
equipment to reduce consumption
while maintaining output: YES $500,000
equipment to reduce consumption
while increasing output: NO

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: YES

credit demand

normal pay back period for investments: 3
payment means for planned investments:
cash: NO loan: YES
edf : YES rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

u.s. aid jamaica energy credit study
energy conservation plans by company

company: industrial commercial develop — ownership: mixed , 1980 employment: 800

background

line of business: comm
monthly power utilization
electricity: $15,000
fuel:
major steps taken in last two years to reduce energy use:
reinsulation of refrigeration warehouses

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: YES
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output: NO

energy audit

willing to pay audit fee:
maximum fee acceptable:
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 4
payment means for planned investments:
cash: NO loan: YES
edf : YES rf: YES
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output NO

company: industrial gases co ltd — ownership: not aval, 1980 employment: .

background

line of business: manuf
monthly power utilization
electricity: $27,000
fuel:
major steps taken in last two years to reduce energy use:
plant operation cut, servicing of equip

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output: NO

energy audit

willing to pay audit fee:
maximum fee acceptable:
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: YES
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output NO

u.s. aid jamaica energy credit study
energy conservation plans by company

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company: j wray and nephew co ltd

ownership: domestic, 1980 employment: 1600

background

line of business: manuf
monthly power utilization
electricity: $50,000
fuel: over $100,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
equipment, recover steam
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: YES .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 3
payment means for planned investments:
cash: YES loan: YES
edf : YES rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

---

company: j.l.a. hatchery ltd

ownership: mixed , 1980 employment: 28

background

line of business: manuf
monthly power utilization
electricity: $10,500
fuel: under $25,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: YES .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: YES

credit demand

normal pay back period for investments: 1
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: YES
preferred maximum interest rates: 17-18%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

---

u.s. aid jamaica energy credit study
energy conservation plans by company

company: jamaica biscuit co — ownership: mixed , 1980 employment: 300

background

line of business: manuf
monthly power utilization
electricity: $11,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
clean burners, electrical devices, etc

energy conservation plans

major steps planned in next two years to reduce energy use:
translucent roofing
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption while maintaining output: YES .
equipment to reduce consumption while increasing output: NO .

energy audit

willing to pay audit fee:
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments:
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: YES
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output YES .

company: jamaica frozen food ltd — ownership: domestic, 1980 employment: 220

background

line of business: manuf
monthly power utilization
electricity: $9,500
fuel:
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
use of solar energy to dry fish
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output: YES .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: .

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: YES loan: YES
edf : NO rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output NO .

u.s. aid jamaica energy credit study
energy conservation plans by company

company: jamaica oxygen and atyl ltd — ownership: mixed , 1980 employment: 60

background

line of business: manuf
monthly power utilization
electricity: $55,000
fuel: over $100,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: $2,500
willing to pay audit fee only if financed: YES

credit demand

normal pay back period for investments: 4
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: YES
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: YES
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: YES .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output NO .

company: jamaica package ind ltd — ownership: foreign , 1980 employment: 250

background

line of business: manuf
monthly power utilization
electricity: $13,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: NO

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : YES rf: NO
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output NO .

u.s. aid jamaica energy credit study
energy conservation plans by company

company: jamintel — ownership: mixed , 1980 employment: 301

background

line of business: other
monthly power utilization
electricity: 1200000
fuel:
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: .
payment means for planned investments:
cash: YES loan: YES
edf : NO rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: yes
postponed purchases:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output NO .

company: johnson and johnson co — ownership: foreign , 1980 employment: 62

background

line of business: manuf
monthly power utilization
electricity: $78,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
not listed
planned energy equipment purchases for 1982/83:
generating equipment: YES .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: YES
edf : NO rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output NO .

u.s. aid jamaica energy credit study
energy conservation plans by company

company:kiskimo ltd

ownership: domestic, 1980 employment: 62

background

line of business: manuf
monthly power utilization
electricity: $16,000
fuel:
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable:
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 3
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: YES
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: yes
postponed purchases:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output NO .

company:metal box jamaica ltd

ownership: foreign , 1980 employment: 417

background

line of business: manuf
monthly power utilization
electricity: $20,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
close down during break, compressor control system

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output: NO .

energy audit

willing to pay audit fee:
maximum fee acceptable:
willing to pay audit fee only if financed: .

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : YES rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: yes
postponed purchases:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output NO .

u.s. aid jamaica energy credit study
energy conservation plans by company

company:national continental corp — ownership: not aval, 1980 employment: .

background

line of business: comm
monthly power utilization
electricity: $60,000
fuel: over $100,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: YES .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: $2,500
willing to pay audit fee only if financed: YES

credit demand

normal pay back period for investments: 3
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: YES
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: YES
are current repayment terms restricting investments?: yes
postponed purchases:
generating equipment: YES .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

company:new yarmouth ltd — ownership: domestic, 1980 employment: 700

background

line of business: manuf
monthly power utilization
electricity: $20,000
fuel: over $100,000
major steps taken in last two years to reduce energy use:
preheaters, steam line lagging, fuel

energy conservation plans

major steps planned in next two years to reduce energy use:
oxygen trim, instrumentation
planned energy equipment purchases for 1982/83:
generating equipment: YES $100,000
equipment to reduce consumption
while maintaining output: YES $40,000
equipment to reduce consumption
while increasing output: NO

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: YES

credit demand

normal pay back period for investments: 4
payment means for planned investments:
cash: NO loan: YES
edf : NO rf: NO
othr: NO
preferred maximum interest rates: 17-18%
are current interest rates restricting investments?: YES
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO
equipment to reduce consumption
while maintaining output: YES $2,000,000
equipment to reduce consumption
while increasing output YES $120,000

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u.s. aid jamaica energy credit study
energy conservation plans by company

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company: servwell stove ja ltd — ownership: domestic, 1980 employment: 155

background

line of business: manuf
monthly power utilization
electricity: $19,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
recycling, equip, maximize use of furnace

energy conservation plans

major steps planned in next two years to reduce energy use:
rehabiliation of equipment
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: YES .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: .
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: YES
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: yes
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

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company: shaw park beach hotel — ownership: foreign , 1980 employment: 150

background

line of business: hotel
monthly power utilization
electricity: $25,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
heat recovery, control systems, hot water
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: YES $200,000
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: YES

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: YES
edf : NO rf: NO
othr: YES
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

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u.s. aid jamaica energy credit study
energy conservation plans by company

company: the alkali group of companies

ownership: mixed , 1980 employment: 40

background

line of business: manuf
monthly power utilization
electricity: $41,000
fuel:
major steps taken in last two years to reduce energy use:
cost analysis and study

energy conservation plans

major steps planned in next two years to reduce energy use:
replacement of old and outdated equipment
planned energy equipment purchases for 1982/83:
generating equipment: YES
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output: NO

energy audit

willing to pay audit fee:
maximum fee acceptable:
willing to pay audit fee only if financed: YES

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: YES
edf : NO rf: NO
othr: NO
preferred maximum interest rates: 17-18%
are current interest rates restricting investments?: YES
are current repayment terms restricting investments?: yes
postponed purchases:
generating equipment: YES
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output NO

company: thermo plastic co ltd

ownership: domestic, 1980 employment: 350

background

line of business: manuf
monthly power utilization
electricity: 1200000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
sheets in roofing, air conditioning control

energy conservation plans

major steps planned in next two years to reduce energy use:
replace machinery
planned energy equipment purchases for 1982/83:
generating equipment: NO
equipment to reduce consumption while maintaining output: YES
equipment to reduce consumption while increasing output: YES $50,000

energy audit

willing to pay audit fee:
maximum fee acceptable: $2,500
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: YES
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: YES
are current repayment terms restricting investments?: yes
postponed purchases:
generating equipment: NO
equipment to reduce consumption while maintaining output: YES
equipment to reduce consumption while increasing output YES $50,000

u.s. aid jamaica energy credit study
energy conservation plans by company

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company:tropical battery co ltd

ownership: domestic, 1980 employment: 132

background

line of business: manuf
monthly power utilization
electricity: $7,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
change bulbs, roof

energy conservation plans

major steps planned in next two years to reduce energy use:
new factory will be designed
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: YES .
equipment to reduce consumption
while increasing output: YES .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: YES
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

---

company:united dairy farmers

ownership: domestic, 1980 employment: 200

background

line of business: manuf
monthly power utilization
electricity: $30,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
cogeneration, heat recovery, insulation, reactors
planned energy equipment purchases for 1982/83:
generating equipment: YES $225,000
equipment to reduce consumption
while maintaining output: YES $70,000
equipment to reduce consumption
while increasing output: YES $4,000,000

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: YES

credit demand

normal pay back period for investments: 4
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: YES
othr: YES
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: yes
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

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u.s. aid jamaica energy credit study
energy conservation plans by company

company:universal stores ltd — ownership: domestic, 1980 employment: 300

background

line of business: comm
monthly power utilization
electricity: $44,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: YES .

energy audit

willing to pay audit fee: .
maximum fee acceptable: $2,500
willing to pay audit fee only if financed: YES

credit demand

normal pay back period for investments: .
payment means for planned investments:
cash: YES loan: NO
edf : NO rf: NO
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: YES
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output YES .

company:urban development corp ltd — ownership: domestic, 1980 employment: 250

background

line of business: other
monthly power utilization
electricity: $85,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
lighting fixture

energy conservation plans

major steps planned in next two years to reduce energy use:
none
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed: NO

credit demand

normal pay back period for investments:
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: YES
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: YES
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: YES .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

u.s. aid jamaica energy credit study
energy conservation plans by company

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company:van leer jamaica ltd

ownership: foreign , 1980 employment: 42

background

line of business: manuf
monthly power utilization
electricity: $81,000
fuel: under $25,000
major steps taken in last two years to reduce energy use:
switches, lights, oven, roof

energy conservation plans

major steps planned in next two years to reduce energy use:
audit
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: $2,500
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 3
payment means for planned investments:
cash: NO loan: NO
edf : YES rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

---

company:west indies glass company ltd

ownership: domestic, 1980 employment: 310

background

line of business: manuf
monthly power utilization
electricity: $120,000
fuel: over $100,000
major steps taken in last two years to reduce energy use:
complete refurbishing of furnace and equipment

energy conservation plans

major steps planned in next two years to reduce energy use:
will rely on more efficient methods
planned energy equipment purchases for 1982/83:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output: NO .

energy audit

willing to pay audit fee: .
maximum fee acceptable: $5,000
willing to pay audit fee only if financed: NO

credit demand

normal pay back period for investments:
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: NO
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption
while maintaining output: NO .
equipment to reduce consumption
while increasing output NO .

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u.s. aid jamaica energy credit study
energy conservation plans by company

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company:west indies home contractors — ownership: mixed , 1980 employment: 200

background

line of business: manuf
monthly power utilization
electricity: $3,000
fuel:
major steps taken in last two years to reduce energy use:
none

energy conservation plans

major steps planned in next two years to reduce energy use:
not listed
planned energy equipment purchases for 1982/83:
generating equipment: YES
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output: NO

energy audit

willing to pay audit fee:
maximum fee acceptable:
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 4
payment means for planned investments:
cash: NO loan: YES
edf : YES rf: YES
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output NO

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company:west indies pulp, paper group — ownership: domestic, 1980 employment: 300

background

line of business: manuf
monthly power utilization
electricity: $120,000
fuel:
major steps taken in last two years to reduce energy use:
boiler modification

energy conservation plans

major steps planned in next two years to reduce energy use:
improvement of broilers
planned energy equipment purchases for 1982/83:
generating equipment: NO
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output: YES

energy audit

willing to pay audit fee:
maximum fee acceptable:
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : NO rf: YES
othr: NO
preferred maximum interest rates: under 15%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO
equipment to reduce consumption while maintaining output: NO
equipment to reduce consumption while increasing output NO

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u.s. aid jamaica energy credit study
energy conservation plans by company

company: zero processing & storage ltd — ownership: domestic, 1980 employment: 40

background

line of business: manuf
monthly power utilization
electricity: $37,000
fuel:
major steps taken in last two years to reduce energy use:
fluorescent lights, phase out cooling tower, etc

energy conservation plans

major steps planned in next two years to reduce energy use:
using one major plant room instead of two
planned energy equipment purchases for 1982/83:
generating equipment: NO
equipment to reduce consumption while maintaining output: YES $134,000
equipment to reduce consumption while increasing output: NO

energy audit

willing to pay audit fee: .
maximum fee acceptable: .
willing to pay audit fee only if financed:

credit demand

normal pay back period for investments: 5
payment means for planned investments:
cash: NO loan: NO
edf : YES rf: NO
othr: NO
preferred maximum interest rates: 15-16%
are current interest rates restricting investments?: NO
are current repayment terms restricting investments?: no
postponed purchases:
generating equipment: NO .
equipment to reduce consumption while maintaining output: NO .
equipment to reduce consumption while increasing output NO .

JMEC CENSUS DATA

(IN J$MN)

SECTOR: RUM & LIQUEUR

CATEGORY: I

RL03 GUINNESS JA LTD , EDF: NO

% OWNERSHIP, LOCAL: 51, FOREIGN: 49
EMPLOYMENT, 1979: 278, 1980: 305
SHIFTS, 1979: 2.0, 1980: 2.0

PURPOSE OF PLANNED INVESTMENTS —
- NEW PRODUCTS: NO
- INCREASE CAPACITY: YES
- INCREASE WAREHOUSE SPACE: NO
- REPL/REP EXISTING MACHINERY: NO
- OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	11.520	18.100	23.300	33.500	46.500
CARICOM SALES	0.150	0.061	0.060	0.100	0.200
OTHER EXPORTS	0.129	0.135	0.150	0.250	0.350
RAW MATERIAL - FOREIGN	2.100	2.500	3.500	4.000	4.500
RAW MATERIAL - LOCAL	5.200	6.200	7.000	9.000	10.500
SPARE PARTS	0.000	0.000	0.000	0.000	0.000
EQUIPMENT	1.000	1.200	1.400	3.400	1.800
INSTALLATION	0.000	0.000	0.000	0.000	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.250	1.600	0.000

RL10 WRAY & NEPHEW , EDF: YES

% OWNERSHIP, LOCAL: 100, FOREIGN: 0
EMPLOYMENT, 1979: 675, 1980: 700
SHIFTS, 1979: 1.0, 1980: 1.0

PURPOSE OF PLANNED INVESTMENTS —
- NEW PRODUCTS: YES
- INCREASE CAPACITY: YES
- INCREASE WAREHOUSE SPACE: YES
- REPL/REP EXISTING MACHINERY: YES
- OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	56.700	61.200	67.000	80.000	91.000
CARICOM SALES	0.665	0.725	1.100	1.400	1.900
OTHER EXPORTS	2.300	3.300	4.100	6.100	7.100
RAW MATERIAL - FOREIGN	3.600	4.000	5.000	5.500	6.000
RAW MATERIAL - LOCAL	12.400	16.800	20.000	25.000	30.000
SPARE PARTS	0.354	0.479	0.500	0.550	0.600
EQUIPMENT	0.423	0.140	0.000	3.200	0.000
INSTALLATION	0.000	0.000	0.000	0.350	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	2.000	0.000	0.000

RL11 DESNOES & GEDDES LTD , EDF: YES

% OWNERSHIP, LOCAL: 94, FOREIGN: 6
EMPLOYMENT, 1979: 1333, 1980: 1540
SHIFTS, 1979: 3.0, 1980: 2.0

PURPOSE OF PLANNED INVESTMENTS —
- NEW PRODUCTS: YES
- INCREASE CAPACITY: YES
- INCREASE WAREHOUSE SPACE: YES
- REPL/REP EXISTING MACHINERY: NO
- OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	10.460	10.798	12.850	14.135	15.548
CARICOM SALES	0.415	0.557	1.500	1.650	1.815
OTHER EXPORTS	0.000	0.591	0.650	0.716	0.787
RAW MATERIAL - FOREIGN	45.942	51.072	56.179	61.797	67.977
RAW MATERIAL - LOCAL	8.760	10.871	11.958	13.153	14.469
SPARE PARTS	2.354	2.721	2.993	3.292	3.622
EQUIPMENT	1.978	2.063	3.331	0.000	0.000
INSTALLATION	0.000	0.000	0.000	0.000	0.000
LAND	0.000	0.012	0.000	0.000	0.000
BUILDING	2.174	1.378	0.490	0.000	0.000

ANNEX "D"

JNEC CENSUS DATA

(IN J$MN)

SECTOR: PLASTIC PRODUCTS

CATEGORY: II

PL13 THERMOPLASTICS JA LTD : , EDF: YES

% OWNERSHIP, LOCAL: 100, FOREIGN: 0
EMPLOYMENT, 1979: 309, 1980: 285
SHIFTS, 1979: 3.0, 1980: 3.0

PURPOSE OF PLANNED INVESTMENTS —
- NEW PRODUCTS: YES
- INCREASE CAPACITY: YES
- INCREASE WAREHOUSE SPACE: YES
- REPL/REP EXISTING MACHINERY: YES
- OTHER: YES

	1979	1980	1981	1982	1983
DOMESTIC SALES	9.851	12.993	14.891	15.635	18.058
CARICOM SALES	2.154	3.700	5.000	6.000	7.000
OTHER EXPORTS	0.000	0.000	0.180	0.734	1.754
RAW MATERIAL - FOREIGN	2.910	4.235	5.500	6.500	7.500
RAW MATERIAL - LOCAL	0.000	0.000	0.000	0.000	0.000
SPARE PARTS	0.489	0.411	0.617	0.700	0.800
EQUIPMENT	0.162	0.629	2.200	1.000	1.500
INSTALLATION	0.000	0.063	0.220	0.100	0.150
LAND	0.000	0.045	0.000	0.000	0.000
BUILDING	0.000	0.255	0.080	0.000	0.000

ANNEX "D"

JNEC CENSUS DATA

(IN J$MN)

SECTOR: PHARMACEUTICAL & COSMETICS

CATEGORY: II

PC11 JOHNSON & JOHNSON • EDF: NO

% OWNERSHIP, LOCAL: 0, FOREIGN: 100
EMPLOYMENT, 1979: 26, 1980: 26
SHIFTS, 1979: 1.0, 1980: 1.0

PURPOSE OF PLANNED INVESTMENTS —
NEW PRODUCTS: YES
INCREASE CAPACITY: YES
INCREASE WAREHOUSE SPACE: YES
REPL/REP EXISTING MACHINERY: YES
OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	4.247	5.231	5.100	6.000	6.900
CARICOM SALES	0.093	0.135	0.220	0.251	0.289
OTHER EXPORTS	0.000	0.000	0.000	0.000	0.000
RAW MATERIAL - FOREIGN	0.370	0.420	0.500	0.600	0.800
RAW MATERIAL - LOCAL	0.060	0.070	0.080	0.100	0.130
SPARE PARTS	0.040	0.025	0.027	0.010	0.015
EQUIPMENT	0.025	0.010	0.000	0.500	0.000
INSTALLATION	0.000	0.000	0.000	0.000	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.000	0.100	0.000

PC27 COLGATE PALMOLIVE • EDF: NO

% OWNERSHIP, LOCAL: 0, FOREIGN: 100
EMPLOYMENT, 1979: 189, 1980: 160
SHIFTS, 1979: 2.0, 1980: 1.0

PURPOSE OF PLANNED INVESTMENTS —
NEW PRODUCTS: YES
INCREASE CAPACITY: YES
INCREASE WAREHOUSE SPACE: NO
REPL/REP EXISTING MACHINERY: YES
OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	16.000	8.600	10.300	12.400	15.000
CARICOM SALES	1.900	1.300	1.600	2.000	2.400
OTHER EXPORTS	0.000	0.000	0.000	0.000	0.000
RAW MATERIAL - FOREIGN	3.000	1.600	6.800	7.800	9.000
RAW MATERIAL - LOCAL	1.400	0.800	5.300	6.100	7.100
SPARE PARTS	0.180	0.125	0.291	0.380	0.430
EQUIPMENT	0.000	0.000	0.230	0.350	0.400
INSTALLATION	0.000	0.000	0.000	0.000	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.000	0.000	0.000

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JNEC CENSUS DATA

(IN J$MN)

SECTOR: PAPER PRODUCTS & PACKAGING

CATEGORY: II

PA29 METAL BOX — EDF: YES

% OWNERSHIP, LOCAL: 0, FOREIGN: 100
EMPLOYMENT, 1979: 434, 1980: 417
SHIFTS, 1979: 0.0, 1980: 0.0

PURPOSE OF PLANNED INVESTMENTS —
- NEW PRODUCTS: NO
- INCREASE CAPACITY: NO
- INCREASE WAREHOUSE SPACE: NO
- REPL/REP EXISTING MACHINERY: YES
- OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	16.990	17.032	18.736	20.609	22.670
CARICOM SALES	0.012	0.013	0.014	0.016	0.017
OTHER EXPORTS	0.000	0.000	0.000	0.000	0.000
RAW MATERIAL - FOREIGN	9.590	8.354	9.284	10.927	14.564
RAW MATERIAL - LOCAL	0.647	0.522	0.593	0.697	0.930
SPARE PARTS	0.000	0.000	0.000	0.000	0.000
EQUIPMENT	0.076	0.064	0.228	0.023	0.000
INSTALLATION	0.000	0.000	0.000	0.000	0.000
LAND	0.000	0.039	0.039	0.000	0.000
BUILDING	0.000	0.166	0.039	0.000	0.000

PA32 VAN LEER — EDF: YES

% OWNERSHIP, LOCAL: 0, FOREIGN: 100
EMPLOYMENT, 1979: 40, 1980: 41
SHIFTS, 1979: 1.0, 1980: 1.0

PURPOSE OF PLANNED INVESTMENTS —
- NEW PRODUCTS: YES
- INCREASE CAPACITY: YES
- INCREASE WAREHOUSE SPACE: NO
- REPL/REP EXISTING MACHINERY: NO
- OTHER: YES

	1979	1980	1981	1982	1983
DOMESTIC SALES	4.002	4.757	5.500	6.220	6.713
CARICOM SALES	0.033	0.030	0.040	0.040	0.050
OTHER EXPORTS	0.000	0.000	0.000	0.000	0.000
RAW MATERIAL - FOREIGN	2.736	3.075	3.714	4.119	4.441
RAW MATERIAL - LOCAL	0.176	0.271	0.283	0.363	0.391
SPARE PARTS	0.035	0.038	0.045	0.050	0.055
EQUIPMENT	0.011	0.008	0.172	0.050	0.000
INSTALLATION	0.000	0.000	0.010	0.005	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.000	0.100	0.000

PA33 W.I. GLASS — EDF: NO

% OWNERSHIP, LOCAL: 100, FOREIGN: 0
EMPLOYMENT, 1979: 309, 1980: 310
SHIFTS, 1979: 3.0, 1980: 3.0

PURPOSE OF PLANNED INVESTMENTS —
- NEW PRODUCTS: NO
- INCREASE CAPACITY: YES
- INCREASE WAREHOUSE SPACE: NO
- REPL/REP EXISTING MACHINERY: YES
- OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	8.464	10.189	14.400	20.000	26.000
CARICOM SALES	0.372	0.245	0.400	2.000	3.000
OTHER EXPORTS	0.000	0.000	0.000	0.000	0.000
RAW MATERIAL - FOREIGN	1.300	1.170	2.000	2.500	2.700
RAW MATERIAL - LOCAL	0.650	0.600	1.300	1.600	1.700
SPARE PARTS	0.100	0.250	0.200	0.400	0.800
EQUIPMENT	0.000	0.000	13.300	0.000	0.000
INSTALLATION	0.000	0.000	0.000	0.000	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.000	0.000	0.000

ANNEX "D"

JNEC CENSUS DATA

(IN J$MN)

SECTOR: PAPER PRODUCTS & PACKAGING

CATEGORY: II

PA06 GLEANER CO LTD , EDF: NO

% OWNERSHIP, LOCAL: 97, FOREIGN: 3
EMPLOYMENT, 1979: 465, 1980: 457
SHIFTS, 1979: 2.0, 1980: 2.0

PURPOSE OF PLANNED INVESTMENTS —
- NEW PRODUCTS: NO
- INCREASE CAPACITY: YES
- INCREASE WAREHOUSE SPACE: YES
- REPL/REP EXISTING MACHINERY: YES
- OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	20.100	25.400	27.940	30.734	33.807
CARICOM SALES	0.000	0.000	0.000	0.000	0.000
OTHER EXPORTS	0.105	0.100	0.110	0.121	0.133
RAW MATERIAL - FOREIGN	2.300	4.800	7.000	9.000	9.900
RAW MATERIAL - LOCAL	0.250	0.275	0.300	0.330	0.363
SPARE PARTS	0.100	0.150	0.165	0.181	0.200
EQUIPMENT	0.000	0.000	0.000	0.000	0.000
INSTALLATION	0.000	0.200	0.000	0.000	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.000	0.000	0.000

PA08 JAMAICA PACKAGING LTD , EDF: YES

% OWNERSHIP, LOCAL: 0, FOREIGN: 100
EMPLOYMENT, 1979: 288, 1980: 275
SHIFTS, 1979: 2.0, 1980: 2.0

PURPOSE OF PLANNED INVESTMENTS —
- NEW PRODUCTS: NO
- INCREASE CAPACITY: YES
- INCREASE WAREHOUSE SPACE: NO
- REPL/REP EXISTING MACHINERY: YES
- OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	11.400	12.500	12.700	14.000	15.000
CARICOM SALES	0.296	0.000	0.800	0.500	0.800
OTHER EXPORTS	0.000	0.000	0.000	0.000	0.000
RAW MATERIAL - FOREIGN	12.000	7.500	12.000	12.500	3.000
RAW MATERIAL - LOCAL	0.200	0.250	0.300	0.300	0.400
SPARE PARTS	0.240	0.378	0.500	0.500	0.600
EQUIPMENT	0.000	0.000	0.000	0.000	0.000
INSTALLATION	0.000	0.000	0.000	0.000	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.000	0.000	0.000

PA21 W.I. PULP & PAPER , EDF: NO

% OWNERSHIP, LOCAL: 94, FOREIGN: 6
EMPLOYMENT, 1979: 290, 1980: 300
SHIFTS, 1979: 3.0, 1980: 3.0

PURPOSE OF PLANNED INVESTMENTS —
- NEW PRODUCTS: YES
- INCREASE CAPACITY: YES
- INCREASE WAREHOUSE SPACE: NO
- REPL/REP EXISTING MACHINERY: NO
- OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	16.900	17.900	24.400	30.000	32.000
CARICOM SALES	0.276	0.000	0.520	1.000	1.250
OTHER EXPORTS	0.000	0.000	0.000	0.000	0.000
RAW MATERIAL - FOREIGN	7.500	9.000	11.000	12.500	14.375
RAW MATERIAL - LOCAL	1.000	1.200	1.200	3.000	3.450
SPARE PARTS	0.325	0.250	0.350	0.300	0.345
EQUIPMENT	0.000	0.000	0.000	0.000	0.000
INSTALLATION	0.314	0.000	0.400	0.000	0.460
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.000	0.000	0.000

ANNEX "D"

JNEC CENSUS DATA

(IN J$MN)

SECTOR: FOOD

CATEGORY: I

F003 BUTTERKIST , EDF: NO

% OWNERSHIP, LOCAL: 0, FOREIGN: 0
EMPLOYMENT, 1979: 0, 1980: 0
SHIFTS, 1979: 0.0, 1980: 0.0

PURPOSE OF PLANNED INVESTMENTS —
NEW PRODUCTS: NO
INCREASE CAPACITY: YES
INCREASE WAREHOUSE SPACE: NO
REPL/REP EXISTING MACHINERY: YES
OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	5.424	7.458	11.280	13.030	15.040
CARICOM SALES	0.202	0.410	0.600	0.725	0.800
OTHER EXPORTS	0.045	0.072	0.120	0.145	0.160
RAW MATERIAL - FOREIGN	3.186	3.927	6.500	7.500	8.000
RAW MATERIAL - LOCAL	0.000	0.000	0.000	0.000	0.000
SPARE PARTS	0.029	0.019	0.075	0.100	0.120
EQUIPMENT	0.198	0.823	0.600	0.450	0.300
INSTALLATION	0.000	0.016	0.012	0.010	0.010
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.010	0.037	0.050	0.000	0.000

F022 JAMAICA BISCUIT CO. , EDF: NO

% OWNERSHIP, LOCAL: 0, FOREIGN: 0
EMPLOYMENT, 1979: 0, 1980: 0
SHIFTS, 1979: 0.0, 1980: 0.0

PURPOSE OF PLANNED INVESTMENTS —
NEW PRODUCTS: YES
INCREASE CAPACITY: YES
INCREASE WAREHOUSE SPACE: NO
REPL/REP EXISTING MACHINERY: YES
OTHER: YES

	1979	1980	1981	1982	1983
DOMESTIC SALES	10.060	14.585	21.560	23.716	26.088
CARICOM SALES	0.040	0.040	0.100	0.110	0.121
OTHER EXPORTS	0.100	0.175	0.340	0.374	0.411
RAW MATERIAL - FOREIGN	3.787	5.268	5.600	6.700	7.370
RAW MATERIAL - LOCAL	2.021	3.500	3.750	4.500	4.950
SPARE PARTS	0.000	0.030	0.500	0.600	0.660
EQUIPMENT	0.316	0.000	0.180	0.120	0.000
INSTALLATION	0.058	0.000	0.012	0.012	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.000	0.000	0.000

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JNEC CENSUS DATA

(IN J$MN)

SECTOR: ELECTRICAL APPARATUS & APPLIANCES

CATEGORY: II

EA01 APPLIANCE TRADERS

% OWNERSHIP, LOCAL: 100, FOREIGN: 0
EMPLOYMENT, 1979: 43, 1980: 45
SHIFTS, 1979: 1.0, 1980: 1.0

PURPOSE OF PLANNED INVESTMENTS —
NEW PRODUCTS: YES
INCREASE CAPACITY: YES
INCREASE WAREHOUSE SPACE: NO
REPL/REP EXISTING MACHINERY: YES
OTHER: NO

	1979	1980	1981	1982	1983
EDF: YES					
DOMESTIC SALES	2.627	1.975	2.700	2.500	3.000
CARICOM SALES	0.738	1.034	1.300	1.700	2.000
OTHER EXPORTS	0.000	0.000	0.000	0.100	0.250
RAW MATERIAL - FOREIGN	1.910	0.865	1.400	1.750	2.188
RAW MATERIAL - LOCAL	0.477	0.216	0.350	0.472	0.547
SPARE PARTS	0.012	0.015	0.024	0.012	0.018
EQUIPMENT	0.037	0.000	0.050	0.040	0.000
INSTALLATION	0.001	0.000	0.002	0.003	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.036	0.000	0.000	0.000	0.000

EA01 ANONYMOUS

% OWNERSHIP, LOCAL: 100, FOREIGN: 0
EMPLOYMENT, 1979: 54, 1980: 54
SHIFTS, 1979: 1.0, 1980: 1.0

PURPOSE OF PLANNED INVESTMENTS —
NEW PRODUCTS: YES
INCREASE CAPACITY: YES
INCREASE WAREHOUSE SPACE: YES
REPL/REP EXISTING MACHINERY: YES
OTHER: NO

	1979	1980	1981	1982	1983
EDF: NO					
DOMESTIC SALES	0.509	0.819	1.200	1.560	1.716
CARICOM SALES	0.436	0.366	1.500	2.000	2.200
OTHER EXPORTS	0.000	0.000	0.000	0.000	0.000
RAW MATERIAL - FOREIGN	0.917	1.253	1.560	2.028	2.636
RAW MATERIAL - LOCAL	0.304	0.253	0.329	0.428	0.556
SPARE PARTS	0.002	0.007	0.009	0.010	0.013
EQUIPMENT	0.007	0.060	0.000	0.000	0.000
INSTALLATION	0.000	0.000	0.000	0.000	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.026	0.000	0.000	0.000

EA07 BEREC CARIBBEAN

% OWNERSHIP, LOCAL: 60, FOREIGN: 40
EMPLOYMENT, 1979: 150, 1980: 150
SHIFTS, 1979: 1.0, 1980: 1.0

PURPOSE OF PLANNED INVESTMENTS —
NEW PRODUCTS: NO
INCREASE CAPACITY: NO
INCREASE WAREHOUSE SPACE: NO
REPL/REP EXISTING MACHINERY: YES
OTHER: YES

	1979	1980	1981	1982	1983
EDF: YES					
DOMESTIC SALES	4.000	6.000	9.000	9.000	12.000
CARICOM SALES	2.000	1.000	2.000	3.500	3.000
OTHER EXPORTS	0.000	0.000	0.000	0.000	0.000
RAW MATERIAL - FOREIGN	2.500	3.000	3.500	4.500	4.800
RAW MATERIAL - LOCAL	0.100	0.100	0.150	0.175	0.200
SPARE PARTS	0.333	0.114	0.300	0.350	0.400
EQUIPMENT	0.000	0.000	0.324	0.600	0.800
INSTALLATION	0.000	0.000	0.000	0.000	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.000	0.000	0.000

ANNEX "D"

JNEC CENSUS DATA

(IN J$MN)

SECTOR: CHEMICALS

CATEGORY: II

CH01 ALKALI LTD , EDF: YES

% OWNERSHIP, LOCAL: 90, FOREIGN: 10
EMPLOYMENT, 1979: 40, 1980: 40
SHIFTS, 1979: 2.0, 1980: 2.0

PURPOSE OF PLANNED INVESTMENTS —
NEW PRODUCTS: NO
INCREASE CAPACITY: NO
INCREASE WAREHOUSE SPACE: NO
REPL/REP EXISTING MACHINERY: YES
OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	3.693	5.420	6.000	6.600	7.200
CARICOM SALES	0.438	0.536	0.600	0.700	0.800
OTHER EXPORTS	0.000	0.000	0.000	0.000	0.000
RAW MATERIAL - FOREIGN	1.400	1.800	2.100	2.400	2.800
RAW MATERIAL - LOCAL	0.150	0.170	0.200	0.220	0.250
SPARE PARTS	0.120	0.150	0.180	0.210	0.250
EQUIPMENT	0.000	0.000	0.200	0.000	0.000
INSTALLATION	0.000	0.000	0.000	0.000	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.000	0.000	0.000

CH10 INDUSTRIAL CHEMICAL CO , EDF: YES

% OWNERSHIP, LOCAL: 100, FOREIGN: 0
EMPLOYMENT, 1979: 90, 1980: 90
SHIFTS, 1979: 3.0, 1980: 3.0

PURPOSE OF PLANNED INVESTMENTS —
NEW PRODUCTS: NO
INCREASE CAPACITY: NO
INCREASE WAREHOUSE SPACE: NO
REPL/REP EXISTING MACHINERY: YES
OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	2.006	3.233	4.000	5.500	7.500
CARICOM SALES	0.150	0.130	0.200	0.250	0.300
OTHER EXPORTS	0.000	0.000	0.000	0.000	0.000
RAW MATERIAL - FOREIGN	0.850	0.800	1.500	2.000	3.000
RAW MATERIAL - LOCAL	0.000	0.000	0.000	0.000	0.000
SPARE PARTS	0.300	0.450	0.500	0.500	0.600
EQUIPMENT	0.000	0.000	0.000	0.000	0.000
INSTALLATION	0.000	0.000	0.000	0.000	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.000	0.000	0.000

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ANNEX "D"

JNEC CENSUS DATA

(IN J$MN)

SECTOR: BUILDING PRODUCTS

CATEGORY: II

BP08 CARIB CASTING

EDF: NO

% OWNERSHIP, LOCAL: 0, FOREIGN: 100
EMPLOYMENT, 1979: 176, 1980: 174
SHIFTS, 1979: 4.0, 1980: 4.0

PURPOSE OF PLANNED INVESTMENTS —
NEW PRODUCTS: YES
INCREASE CAPACITY: YES
INCREASE WAREHOUSE SPACE: NO
REPL/REP EXISTING MACHINERY: NO
OTHER: NO

	1979	1980	1981	1982	1983
DOMESTIC SALES	3.519	4.303	6.000	6.600	7.260
CARICOM SALES	0.906	0.465	0.800	0.880	0.968
OTHER EXPORTS	0.227	0.370	0.400	0.440	0.484
RAW MATERIAL - FOREIGN	0.250	0.300	0.330	0.333	0.350
RAW MATERIAL - LOCAL	0.900	1.000	1.100	0.111	0.120
SPARE PARTS	0.050	0.100	0.110	0.115	0.120
EQUIPMENT	0.000	0.020	0.000	0.000	0.000
INSTALLATION	0.000	0.000	0.000	0.000	0.000
LAND	0.000	0.000	0.000	0.000	0.000
BUILDING	0.000	0.000	0.030	0.000	0.000

PROPERTY OF
FIRST WASHINGTON ASSOCIATES

JAMAICA

PRIVATE SECTOR ENERGY CREDIT FUND PROJECT

CREDIT PROGRAM GUIDELINES

VOLUME FIVE

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I. OBJECTIVES

The Energy Conservation Fund (ECF) is expected to contribute to the realization of Jamaica's economic objectives by improving the balance of payments, fostering the development and expansion of local industries on a sound basis, and increasing the employment of labor.

Specifically, the ECF is expected to support projects that will:

(1) Directly reduce the consumption of energy per unit of output, thus lowering the amount of imported petroleum and byproducts.

(2) Directly substitute renewable energy sources for non-renewable ones, similarly lowering the amount of imported petroleum and byproducts.

(3) Support the development of domestic industries to provide alternative energy and energy conservation equipment and services, both for local consumption and export.

(4) Identify specific energy conservation opportunities to interested firms in the private sector, which may be implemented without need for substantial capital expenditure.

These objectives appear completely consistent with the broader objectives of the National Development Bank (NDB), which are to promote the increased availability of medium and long-term finance in all sectors of the Jamaica economy; to supplement scarce domestic funds with funds from overseas; to assist in the creation or development of business, resources, properties and industries in Jamaica; to expand, widen and develop opportunities for Jamaicans to participate in the economic development of Jamaica.

II. ORGANIZATIONAL ASPECTS

A. Statutory Form

The ECF will be a trust fund, operated by the NDB on behalf of the Government of Jamaica in accordance with this written statement of policies and procedures agreed with participating lenders, the Ministry of Finance, and the Ministry of Mining and Energy.

B. Duration

The ECF will remain in existence until all loan funds advanced by U.S. AID and any other financial institution have been fully repaid.

C. Authority

The ECF will be operated under general authority granted the NDB in accordance with its Articles and Memorandum of Association, which includes the right to carry on the business of development banking and all matters and things incidental thereto; to advance and lend money on real, personal, and mixed securities; to grant loans; to guarantee loans; to furnish financial advice and provide or assist in obtaining managerial, technical and administrative services for development enterprises; to invest money; to contract for public and private loans; to act as agents for any government or other authority; to borrow for meeting its obligations or discharging its functions; to accept and discount promissory notes and other negotiable instruments; to enter into any financial arrangements with government that may seem conducive to the attainment of NDB's objectives; to invest in tourism, manufacturing, industrial, commercial, or other enterprises; and to carry out all the

above on commercial lines and in the best interests of the shareholders and the national interest.

D. Initial Funding

The ECF will initially be funded by a US$5.9 million from U.S. AID, and a US$7.4 million loan from the Government of Jamaica.

E. Other Resources

The ECF may obtain such other short, medium, and long-term loans from private banks, official lenders, and international financial institutions as may be necessary and desirable to fufill its objectives.

F. Independence of Accounts

NDB shall establish and maintain separate books and records of account for the ECF, satisfactory to the lenders providing funds for those operations. Statistical and financial information on the ECF shall be incorporated in regular separate reports to management and interested lenders.

G. Conduct of Operations

All lending and investing operations carried out by the NDB with ECF funds shall be conducted in accordance with sound business principles. Operations shall conform to this written statement of Policies and Procedures, which may be amended from time to time by action of the NDB Board of Directors.

H. Board of Directors

The basic authority for the adoption of policy guidelines for the ECF and for general supervision of its affairs is vested in the NDB's Board of Directors, which includes representatives of the Jamaican private sector, Bank of Jamaica, Ministry of Finance and Planning, Ministry of Industry and Commerce, Ministry of Mining and Energy, and National Development Bank.

I. Management

The ECF will be administered by NDB under the terms of a subsidiary loan agreement(s) with the Government of Jamaica . A separate unit within the NDB will have special responsibility for promoting the program, analyzing loan applications, and supervising the administration and monitoring of approved sub-loans. As compensation for its services, NDB will retain a managment fee in the form of an agreed percentage of the principal amount of each outstanding sub-loan under the program.

III. QUALIFICATION OF FINANCIAL INTERMEDIARIES

A. General

All sub-loans under the ECF program shall be extended through financial intermediaries which will on-lend the funds to ultimate beneficiaries. Financial intermediaries will be responsible for receiving sub-loan applications, making a thorough financial and technical analysis, administering approved sub-loans, and assuring prompt repayment to NDB. Since financial intermediaries will assume the credit risk on sub-loans, and NDB will look to the financial intermediaries for repayment, it is important for NDB to assure itself that participating financial intermediaries possess the administrative and financial capacity to assume ECF program success and prompt repayment of all sub-loans.

B. Eligible Institutions

Institutions which are eligible for participation as financial intermediaries under the ECF program shall include commercial banks and merchant banks which are adequately capitalized, soundly administered, in good financial condition, with qualified staff to assure meaningful participation in the program.

C. Qualification Procedure

Prior to the first extension of an ECF sub-loan to a financial intermediary, NDB shall prepare a written analysis of its financial condition and administrative capacity. Based upon this analysis, NDB's Credit Committee shall decide whether or not to qualify the

institution for ECF Program participation. After approval, NDB staff shall prepare an annual updating of this analysis to justify continued program participation by particular financial intermediaries.

IV. APPROVAL OF SUB-LOANS

A. General

All sub-loans under the ECF program must meet the creditworthiness and security criteria of the financial intermediary, and the general purpose and economic criteria of the NDB. A uniform application form should be used by all sub-loan applicants, which will be submitted to the financial intermediary, preliminarily approved, and passed to the NDB for consideration. If the NDB also approves the sub-loan, it will so notify the financial intermediary, which in turn will inform its client of final approval.

B. Eligible Applicants

Applicants eligible for ECF consideration may be new or established business firms. Ownership may be Jamaican, mixed or foreign, provided the company is established in Jamaica, owns property in Jamaica, and carries on business related to the economic interests of Jamaica. The form of business may be a corporation, partnership or proprietorship. Firms in the following sectors will be eligible: manufacturing, tourism, and commerce.

C. Priority of Projects

In the consideration of applications, NDB shall give priority to those projects which demonstrate the best pay-back on investment, the most beneficial impact on the balance of payments, the greatest demonstration

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effect on other potential energy-saving projects, and the best corollary effects on employment, backward and forward linkages, etc.

D. Information Required

Sub-loan application forms shall contain information satisfactory to demonstrate that there is reasonable assurance of repayment and that the project is technically, financially, and economically sound, and that it meets ECF program objectives and criteria.

V. TERMS AND CONDITIONS OF SUB-LOANS

A. Repayment Terms

Sub-loans shall be repayable in regular installments, not less frequently than semiannually, with the terms of payment to NDB identical to the erms of payment to the financial intermediary. Repayment terms shall be determined based upon the financial capacity of the ultimate beneficiary and the cash flow characteristics of the project, and in no event shall exceed five years for projects of less then US$500,000 or seven years for projects in excess of that amount.

B. Grace Periods

Grace periods appropriate to the project may be approved, during which payments of principal but not interest may be deferred. In no event shall grace periods exceed twelve months after completion of a project.

C. Equity Participation

In all cases the borrower shall be required to have a reasonable equity participation in the project, to be established on a case-by-case basis. In considering the borrower's equity participation, consideration may be given to amounts already invested in plant and equipment which are to be upgraded by the planned new investment.

D. Interest Rates

Interest rates to be charged on all new sub-loans for their entire term shall be established by NDB every six months, based on rates

prevailing in international money and capital markets, NDB's cost of borrowing to fund the program, related charges, and the rates being charged for similar loans in Jamaica. The interest rate to be charged initially on all sub-loans shall be 15 percent per annum. Any change in interest rates shall be agreed by NDB's Board of Directors.

E. Commitment Fees

Commitment fees shall be charged on the undisbursed balance of all sub-loans approved by NDB. Commitment fees initially shall be set at ½ percent per annum, but these shall be reviewed as part of the semi-annual interest rate review, and may be modified by action of the Board of Directors.

F. Currency of Payment

All sub-loans to be denominated, and repayable, in Jamaican dollars equivalent to the amount of local and foreign currency disbursed thereunder. In the case of imports financed under the sub-loan, disbursements shall be charged against the sub-loan note at the official rate of exchange prevailing on the date of disbursement.

G. Late Charge

In the event of non-payment or incomplete payment of a sub-loan, a late charge will apply equal to percent per annum on principal amounts outstanding and late in payment.

H. Prepayment Penalties

Prepayment penalties are not anticipated under this program. In the event program managers wish to assess such charges, they should be agreed to by the Board of Directors of NDB.

VI. DISBURSEMENT PROCEDURES

A. Disbursement by Financial Intermediary to Overseas Supplier

As condition precedent to first disbursement of a sub-loan, the financial intermediary shall obtain a properly executed promissory note from the ultimate beneficiary in the full amount of the approved sub-loan, shall endorse such note, and pass it on to the NDB for safekeeping.

The financial intermediary will assure that all procurements to be financed under this program utilize appropriate procedures as required by U.S. AID and the NDB.

Under each approved sub-loan the financial intermediary will arrange for payment direct to the overseas supplier upon shipment of the related goods and delivery of the related documents to its correspondent bank.

The financial intermediary must receive and subsequently submit to the NDB such documentation as may be required by U.S. AID, included but not necessarily limited to original supplier's invoice, prepaid bills of lading, and/or other customarily accepted instruments.

B. Disbursements by the NDB to Financial Intermediaries

At the request of the financial intermediary, NDB will disburse funds on a sub-loan by reimbursing the financial intermediary for monies paid on the ultimate beneficiary's behalf to an overseas supplier.

The financial intermediary must submit to the NDB a banker's report of payment and a prescribed request for reimbursement together with such documentation as may be required by U.S. AID including but not limited to cash receipts, receipted invoiced, prepaid bills of lading, and/or any other customarily accepted instruments.

C. Disbursement by U.S. AID to the NDB

As requested by the NDB, U.S. AID will make an advance of funds in U.S. dollars to cover the NDB's estimated needs, under the sub-loan(s) for procurement requiring U.S. dollars for a three-month period. This three-month estimate will be disaggregated by equipment procurement, contract for personnel services, and other requirements. The estimate will also include brief narrative statements describing the uses to be made of the fund.

Quarterly, or more often as may be agreed upon, the NDB should prepare and submit to U.S. AID for approval a request for reimbursement and replenishment of funds. Special documentation such as the prescribed request for reimbursement, schedule of payments, and a financial report normally must be submitted to document the use of funds under an existing advance before U.S. AID can advance additional funds.

Evidence of payment (cash receipts, receipted invoices, prepaid bills of lading, and/or customarily accepted instruments) must be kept on file at NDB for a period of three years after the last disbursement of the AID loan.

VII. REPAYMENT PROCEDURES

A. General

NDB will provide periodic advance billings to all financial intermediaries informing them of amounts due on sub-loans. Financial intermediaries will be responsible for collecting from all ultimate beneficiaries and remitting the proceeds to NDB on due date.

B. Incomplete Payments

In the event of incomplete payment of a sub-loan, the amount received shall be applied first to the required interest payments and then to the outstanding principal balance.

C. Application of Interest

Of the interest received on sub-loans, 3 percent shall go to the financial intermediary to pay for its administrative costs and risk-taking, 1 percent shall go to the Ministry of Finance to pay for its assumption of foreign exchange responsibilities, 2 percent shall be retained by NDB to compensate for its administrative expenses, and the balance shall be used to augment the resources of the ECF and to meet the debt service to AID, the Venezuelan Investment Fund, the Central Bank of Mexico, and any other sources of funds for the program.

D. Rescheduling and Refinancing

NDB shall grant sub-loan rescheduling and refinancing only in special circumstances; namely when

1. temporary problems prevent timely payment;
2. when rescheduling is clearly needed;

3. when the rescheduling plan appears capable of fufillment; and

4. when similar treatment is being offered by other creditors.

All loan reschedulings shall be submitted to NDB's Board of Directors for review and approval.

E. Monitoring

NDB shall carefully monitor the status of all sub-loans, from initial approval to final repayment. Ultimate beneficiaries will be expected to submit information on an annual basis relating to the economic and financial aspects of their operations, which will be incorporated in reports for NDB management and external lenders.

VIII. GUARANTEE PROGRAM

A. Rationale

It may be difficult or impossible for some Jamaican firms with desirable energy conservation or alternative energy projects to utilize the ECF because of financial intermediaries' very conservative lending practices. In these cases, it may be in the national interest for NDB to offer a partial guarantee of payment on the sub-loan to encourage the financial intermediary to proceed with the transaction. Such a guarantee will serve to assure the broadest possible utilization of the ECF for desirable projects, even for firms which are marginally credit-worthy but nonetheless offer, in NDB's judgement, a reasonable assurance of repayment.

B. General Guidelines

The guarantee program will be expected to -

(1) be self-sustaining (i.e., charges should be sufficient to meet all related operational expenses and permit the set-aside of adequate amounts for reserves);

(2) achieve a spread of risk between interested parties (i.e., NDB should not take all the risk by itself); and

(3) provide for adequate additional security to NDB in cases where this is seen as desirable or necessary.

C. Approval Procedures

In carrying out its approval procedures ultimate beneficiaries benefitting from guarantees, NDB will rely on detailed information submitted in connection with the application for sub-loan. A determination will have to be made that the beneficiary is financially, technically and managerially sound and that the beneficiary offers reasonable assurance of repayment although financial intermediaries are unwilling to extend further credit to the applicant without guarantees from NDB.

D. Collateral

On a case-by-case basis, NDB will require such collateral as might be necessary, desirable and available. On any individual sub-loan, NDB will attempt to ensure that the participating commercial bank enjoys no greater collateral rights than NDB itself.

E. Coverage

If approved, guarantees will cover 50 percent of the principal and interest payable on commercial bank sub-loans to a specified beneficiary under the ECF program. The guarantee will assure payment to the commercial bank of the guaranteed amount if the beneficiary fails to pay, for whatever reason.

F. Guarantee Fee

The financial intermediary recipient of the guarantee shall pay a fee to NDB equal to 2 percent per annum of the principal amount of the sub-loan guaranteed, payable at the same times that interest is payable.

G. Claims

In the event of a default on the sub-loan note, the financial intermediary will have ninety days to make claim on NDB. NDB will have thirty days after receipt of such claim in which to make payment to the financial intermediary.

H. Collections

After payment of a claim, NDB and the commercial bank will have equal rights of collection against the defaulted sub-loan beneficiary and will share equally in any funds recovered from the beneficiary.

IX. POSSIBLE VENEZUELAN AND MEXICAN FUNDING

Since January 1981 crude oil has been supplied to Jamaica on a Government to Government basis by the Governments of Venezuela and Mexico through their state oil companies, Lagoven and Petroleos Mexicanos (PEMEX). Payment for the crude is effected through separate credit agreements between the Bank of Jamaica and the Central Banks of Venezuela and Mexico in which there is a 30 percent rebate on the value of crude imported by Jamaica.

In the case of Venezuela, through a credit and clearing agreement between the Central Bank of Venezuela and Bank of Jamaica the Central Bank of Venezuela pays Lagoven for the full value of the crude exported to Jamaica 30 days after the Bill of Lading date of each shipment (shipping schedule is provided by Petroleum Corporation of Jamaica), and debits BOJ's account. Clearing takes place every four months at the end of April, August and December.

The 30 percent rebate for the Venezuelan supplies is effected by the Venezuelan Investment Fund (VIF) into the Bank of Jamaica, quarterly in advance, 30 percent of the value of crude expected to be imported by Jamaica in the ensuing quarter. Adjustments are made in the following quarter to reflect the exact amount of crude imported in the preceding quarter. The VIF deposits have a maturity of five years and bear interest at the rate of 4 percent per annum. During the five-year period the deposits are convertible to long-term loans for financing eligible

projects. The long-term loans will have a maturity of 20 years including five years grace, with interest at 2 percent per annum. Deposits not converted after five years have to be repaid. A draft of the Venezuelan agreement is included herewith as Annex "A".

In the case of Mexico, again, under a credit arrangement between BOJ and the Central Bank of Mexico, the Bank of Jamaica pays into the Central Bank of Mexico for the account of PEMEX, 70 percent of the value of crude imported 30 days after the Bill of Lading date of each shipment (schedule of loadings is provided by Petroleum Corporation of Jamaica). The Bank of Mexico in turn pays PEMEX 100 percent of the value and takes Promissory Notes from the Bank of Jamaica covering the unpaid 30 percent. The Promissory Notes have a maturity of five years and bear interest at 4 percent per annum. During the five-year period they are convertible to long-term loans for financing eligible projects, with a maturity of 20 years including five years grace and interest at 2 percent per annum. Promissory Notes not converted during the period are repayable at maturity.

These arrangements could well be turned to the advantage of the proposed AID-sponsored private sector energy credit fund. It is believed that the projects to be financed by the energy credit fund would fit in well with the Venezuelans' and Mexicans' expressed desire to finance "investment programs and projects which will contribute mainly to the development of energy resources, the national utilization of natural resources, the development of domestic production," and energy conservation. If Venezuelan and Mexican funds were utilized, they could finance domestic or foreign exchange expenditure and have a highly beneficial impact on

Jamaica's balance of payments, changing the country's obligation to repay the oil producers from a 5 year term to a 20 year term, and reducing the rate of interest on such loans from 4 percent to 2 percent. It should be stressed that these moneys are in no way substitutes for the proposed AID loan, since they do not involve a source of new foreign exchange for the economy, but rather represent a valuable postponement of repayment on a previously-used foreign exchange advance. The Venezuelan and Mexican funds might be utilized as part of the Government of Jamaica contribution to the initial $13 million program, or they could be used to expand the program and give it a more permanent character.

X. ENERGY AUDIT FINANCING

Because of its special characteristics, FWA believes that energy audit financing should be handled differently than financing for the rest of the program. Individual energy audit loans should be very small (US$3,000 or so), short-term (not more than a year repayment), and involve no immediate payback to the corporate customer in the form of increased revenues or savings. However, energy audits can be expected to have a high leverage effect in terms of ultimate energy investments and related energy savings and thus loans to finance such audits should be encouraged by U.S. AID and the Government of Jamaica.

In recognition of their special characteristics, it is believed that an arrangement should be made between NDB and PSJ, whereby a loan for the entire amount of US$100,000 for energy audits would be transferred to PSJ, and made repayable by PSJ to NDB in eight equal quarterly installments, with accrued interest. PSJ would have the responsibility of receiving and approving applications from eligible consumers for energy audit financing, disbursing the requisite funds directly to energy audit engineering firms based upon submission to PSJ of copies of the completed energy audits, and billing the customers for the audits as part of their regular monthly electricity bills over a 12-month period. Interest would be payable by the consumers at the same rate payable by PSJ to NDB, recommended to be the same rate paid by corporate customers to commercial banks/NDB for other types of loans under this program.

XI. INSTITUTIONAL CHANGES AT NDB, COMMERCIAL BANKS

On June 26, 1982, the Ministry of Mining and Energy contracted with First Washington Associates to prepare a detailed analysis of the institutional changes required to channel the private sector energy credit fund through a variety of commercial banks, using the NDB as the government's financial intermediary. In this connection, FWA is currently performing the following tasks, which will be completed by July 30, 1982:

1. Undertake a current review of Jamaican public sector financial institutions to determine which should be the primary implementing agency under the project, analyzing their managerial, aministrative, technical and financial capabilities to carry out the project and their prospects for future development.
2. Undertake a current analysis of Jamaica private sector financial institutions to determine whether they should play a role in the project and, if so, how their participation should be structured in order to maximuze program success.
3. Identify actions which would need to be taken by the institutions either prior to the signing of a loan agreement and/or during the implementation of the project to assure that the credit program will be carried out efficiently and effectively.
4. With respect to tasks 1, 2 and 3 -
   (i) examine in particular the extent to which an administrative system could be used in which program funds could be channelled through the commercial banks with the NDB operating as the Government's financial intermediary and primary

agency for ensuring that policy objectives are met and that program requirements are carried out by the commercial banks;

(ii) provide proposals for such an administrative system;

(iii) establish -

(a) what should be appropriate operating procedures for the NDB if it were to operate within the above-mentioned administrative system;

(b) what revisions should take place in operating procedures of the commercial banks if they were to operate within the above-mentioned administrative system.

5. Add the findings, conclusions and recommendations arising from this work, together with all pertinent information and statistical data, to consultants' final report to U.S. AID on the credit demand study.

SECOND

ECONOMIC COOPERATION AGREEMENT

Between the

VENEZUELAN INVESTMENT FUND

and the

CENTRAL BANK OF JAMAICA

ARTICLE 1: BASIC OBJECTIVES AND RESPONSIBILITIES

CLAUSE 1:

The objective of this Agreement is the introduction of a programme of economic cooperation between the parties, intended to facilitate the Republic of _____ in importing goods and raw materials for domestic consumption through the placing of financial deposits by THE FUND in favour of the BANK which in turn will provide for the financing of investment programmes and projects which will contribute mainly to the development of energy resources, the rational utilization of natural resources, the development of domestic production and the promotion of exports. In addition, these arrangements aim to promote the advancement of regional economic integration schemes and the development of trade between Venezuela and the Republic of _____

CLAUSE 2:

To achieve the objectives outlined in the foregoing Clause, THE FUND is committed to:

a) Make deposits in the Central Bank of Venezuela for the account of the BANK in an amount equal to US$_____, 50% of which will be in dollars and 50% in Bolivars in accordance with b) of this Clause. The deposits referred to will be made every three months beginning September 30, 1980, and ending July 30, 1981.

b) The amount of the quarterly deposits will be equal to 30% of the selling price on each barrel of petroleum which is estimated to be exported by Venezuela to the Republic of _____ in the quarter following the deposit and up to a daily volume of _____ barrels of petroleum.

The first disbursement will be made up of financing corresponding to the volume exported by Venezuela to the beneficiary country from August 3, 1980.

The volume of petroleum and the quarterly average selling price which will

/serve...

serve as a basis for the deposits will be determined by the Quarterly Report by the Ministry of Energy and Mines and any discrepancies will be adjusted in the subsequent deposit.

The deposits referred to will be effected against the issuing by THE BANK in favour of THE FUND of individual five (5) year Deposit Certificates as per the specimen attached marked "A" and they will be subjected to conditions of repayment set out in this Agreement and will be surrendered to THE FUND by THE BANK at the time and place which the former might designate.

To determine the equivalent in Bolivars of the deposits referred to above as well as effects of long term utilization of the deposits in accordance with Article III of this Contract, the exchange rate declared by Venezuela to the International Monetary Fund in force at the date of each transaction will be applicable.

CLAUSE 3:

The deposits will earn an interest of not less than four per cent (4%) per annum, payable quarterly in the respective currency of the deposit, free of any charges and without any deduction for any reason whatsoever.

CLAUSE 4:

The deposits, consistent with the procedure established in previous clauses, may be used for long term financing in accordance with Clauses 7 onward of this Agreement. It must be understood that this long term utilization is applicable only to the principal of the deposits and not to the interest they may earn. These must be paid in to THE FUND by THE BANK.

/ARTICLE II.....

ARTICLE II: GUARANTEE OF CONVERTIBILITY AND TRANSFER

CLAUSE 5:

THE BANK is obliged to:

a) Repay the deposits referred to in Clause 2 on their due dates and in the same currency in which they were made except where they have been destined for long term financing.

b) Allow conversion of currency and the transfer abroad of amounts owed to THE FUND as a result of the implementation of this Agreement.

c) Take necessary steps to see to it that payments which other institutions or companies have to make with regard to this Agreement are made in the currency and at the time specified.

CLAUSE 6:

Payments which THE BANK or any other Institution or Company has to make to THE FUND relating to this Agreement will be made on their respective due dates to the account of THE FUND in the offices of the Central Bank of Venezuela, Caracas, Venezuela, unless THE FUND specifies some other place giving THE BANK not less than ten (10) days notice in advance.

ARTICLE III: LONG TERM UTILIZATION OF DEPOSITS

CLAUSE 7:

For deposits to be used for long term financing of development projects and programmes in the Republic of _____ THE BANK is obliged to pay in advance partially or wholly the deposits agreed on in this Contract for the

/purposes.....

purposes and under the conditions indicated below, provided that THE FUND so authorizes it and on the request or approval of the Government of the Republic of _____

A. PURPOSES:

a) Loans for financing of development projects and programmes in the Republic of _____ for purposes anticipated in Clause 1 and in conformity with the criteria and procedures set out below..

b) Financing of purchases of goods and services in the territory of the Republic of Venezuela, required for the carrying out of projects mentioned in a) above.

c) Financing of feasibility studies related to the development of mineral and energy resources.

d) The deposits may also be used to repay expenditures incurred by THE FUND in carrying out the anticipated duties in this Agreement whether these are carried out within or outside the territory of the Republic of _____ in which case request or approval ~~by~~ is needed from the Government of the Republic of_____

B. CRITERIA AND CONDITIONS:

a) The loans will be used for the development of investment projects and programmes in the Republic of _____ which have been considered priority areas by the competent authorities of the country and approved by THE FUND.

b) These loans will be used to finance domestic expenditure, including working capital, foreign exchange expenditures required as payment for goods and services acquired abroad as well as for the participation of the Republic of _____ in regional economic integration projects and programmes.

/c).....

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c) Loans for investment projects and programmes will have an amortization period not exceeding twenty (20) years including a period of grace which will in no case exceed five (5) years in such a way that the period of each loan will not exceed (or reduce) the period of twenty (20) years running from the date of the signing of this Agreement, ~~and~~ or the authorization date of the respective loan. In any case, each project will have an amortization period determined by its financial projection.

d) Loans will earn an interest of not less than two (2%) per cent payable every six months and depending on the nature may also incur other charges for supervision of operations.

e) Without detriment to energy projects, general loans may be authorized in support of national, agricultural, industrial or agro-industrial programmes and for export credit, including preshipment.

f) Financing operations may be carried out with the Government of the Republic of _____ or with advance authorization, with any political sub-division or government department or with any public, private or mixed enterprise located in the territory of said country, including multilateral or latinamerican corporations or those belonging to Caribbean countries.

g) In loan operations for projects with parallel financing from other international financial institutions, guarantees equal to those already established or which may be established with those institutions are required.

h) Loans issued in accordance with this Agreement will be in Bolivars and their amortization and interest payments and other charges will be in Bolivars.

/i).....

i) As is anticipated in Clause 1, expenditures of foreign currency to acquire goods and services to which reference is made in b) above, under equal conditions and taking all possibilities into consideration, those goods available from Venezuela will have priority.

j) Loans which are authorized with the resources of these deposits will be guaranteed by Government, the Central Bank ~~of~~ or international banks and/or other financial institutions approved by THE FUND.

CLAUSE 8:

When for long-term utilization of the resources THE BANK makes restitution of part of a deposit, a new Deposit Certificate will be issued for the difference between the original deposit and the amount applied by THE FUND to the long term financing. The new certificate will earn interest at the same rate as the original certificate and will have the same due date.

CLAUSE 9:

Payment for long term financing will be made as is agreed on in the terms of the respective Contract between the borrower and THE FUND and the instructions which the latter may issue. Said terms will be made known to THE BANK so that the latter may take the necessary steps to make payments on the dates agreed on in the Contract. As from the date of repayment of the deposit THE BANK will no longer be required to pay interest on the amount which has been repaid. On that same date THE BANK will send a substitute certificate as is described in the foregoing Clause and THE FUND will return the original Deposit Certificate.

/CLAUSE 10:.....

CLAUSE 10:

For authorization of financing of long term projects and programmes, the following is required:

a) Request prepared or authorized by the Government of the Republic of _____ through the Ministry of _____

b) Approval by THE FUND of each operation on the basis of information and documentation that it may consider necessary to examine for this purpose.

c) The signing of a contract or contracts between The FUND and the institutions or firms benefiting from the long term financing.

CLAUSE 11:

The long term use of deposits will remain in force for the duration of the respective Contract between THE FUND and the respective institutions and enterprises, notwithstanding the conditions laid down below:

a) THE FUND may request at any time during the period of study, negotiation and administration of operations, information which it may require from solicitants or receivers of loans as well as reports, studies, evaluations, contractual obligations and any other document prepared by financial organizations which may participate directly or indirectly in the operations.

b) THE FUND will determine the maximum amount of financing which it will authorize for the carrying out of a specific project, taking into consideration the amount of Venezuelan financial resources intended for such projects.

c) THE FUND will determine for each operation the nature of the accounting records which must be kept by the borrower and the content and periodicity of the financial reports which must be presented to THE FUND. These are to be accompanied by audited reports prepared by independent public auditors

/as.....

as THE FUND may require.

d) The general loans referred to in Clause 7(b)(e) will be treated similarly.

CLAUSE 12:

It is THE BANK'S responsibility to repay the deposit at due date even if requests for its long term utilization whether in part or whole is under study, with the understanding that THE FUND reserves the right to participate in the financing under consideration even after the repayment has been made.

ARTICLE IV: ~~ANTICIPATED~~ Pre- PAYMENT

CLAUSE 13:

THE BANK will have the right to repay before due date, the deposits made by THE FUND in which case the corresponding interest will be cancelled.

ARTICLE V: DURATION OF THIS AGREEMENT

CLAUSE 14:

The contractual obligations of this Agreement will remain in force as long as there are transactions being undertaken by THE FUND by virtue of the operations anticipated herein. However, with the consent of both parties this Agreement may be terminated on the date determined for this purpose.

ARTICLE VI: BREACHES

CLAUSE 15:

The total principal of the deposits made and the interest earned will be considered due and their payment can be immediately called if any of the following breaches

/should.

should occur.

a) If THE BANK does not pay on due date the relevant principal or interest or any amount by which under the terms of this Agreement it is indebted to THE FUND, and this failure to make payment exceeds thirty (30) consecutive days.

b) If THE BANK does not fulfil any other obligation contained in this Agreement and the breach is maintained for thirty (30) days after THE FUND has given written notification of said breach.

c) If it can be proven that any document or declaration tendered by THE BANK is in any way false.

d) If THE BANK fails to make payments of the principal or interest on deposits or loans which have been authorized and if any of these payments are demanded for any reason and this is not made within thirty (30) days.

ARTICLE VII: FINAL CONDITIONS

CLAUSE 16:

THE BANK guarantees free convertibility and transfer of resources which under this Agreement are to be paid to THE FUND and in case there is a delay in said convertibility or transfer, will pay interest to THE FUND at a rate of one (1%) per cent monthly from the due date to the time when payment is actually received by THE FUND. This will be the case notwithstanding Article VI of this Agreement.

CLAUSE 17:

All expenditures incurred in the carrying out of this Agreement by way of staff, office equipment, communications etc. will be for the account of the party incurring these expenditures. Expenditures incurred by THE BANK in engaging the services of a third party for the carrying out of this Contract will be the responsibility of THE BANK.

/CLAUSE 18:

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CLAUSE 18:

In case there is an unfavourable Balance of Payments situation in Venezuela, which, in the opinion of THE FUND, will impede the fulfilling of any obligation under this Agreement, THE FUND may cease making deposits and granting long term financing for new projects - notifying THE BANK at least thirty (30) days in advance.

CLAUSE 19:

For purposes of this Contract the parties will use the city of Caracas, Venezuela, as domicile.

Signed by the Venezuelan Investment Fund and the Central Bank of the Republic of _____ with two identical copies on the _____ day of the month of _____ nineteen hundred and eighty.

FOR THE VENEZUELAN INVESTMENT FUND

FOR THE CENTRAL BANK OF THE REPUBLIC OF _____

Leopoldo Díaz Bruzual
Minister of State
President

CENTRAL BANK OF THE REPUBLIC OF .....

DEPOSIT CERTIFICATE

FOR _____ NO._____

DUE _____

The Central Bank of the Republic of _____ certifies that the Venezuelan Investment Fund, an institution created and governed by the Laws of the Republic of Venezuela, deposited to its order in the Central Bank of Venezuela the _____ day of _____ the sum of _____ as a fixed deposit for four (4) years counting from the present date, and as a result the Central Bank of the Republic of _____ agrees to repay said amount to the Venezuelan Investment Fund or to the legitimate holder of this Certificate on the _____ day _____

This deposit will earn interest at the rate of _____ per cent (%) annually payable every three months.

The repayment of capital and the payment of interest are to be in the same currency indicated in this Deposit Certificate in the manner and place indicated by the Venezuelan Investment Fund or the legitimate holder of this Certificate.

Place_____

Authorized signatures of the Central Bank of the Republic of _____

_____ _____

Office Office

JAMAICA

PRIVATE SECTOR ENERGY CREDIT FUND PROJECT

CONCLUSIONS AND RECOMMENDATIONS

VOLUME SIX

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I. CONCLUSIONS

1. Energy audits were carried out for five companies in five different industries in the Jamaican private sector. The present annual energy consumption of the five plants is about 6 million kilowatt-hours (KWH) of electricity and 175,000 million British termal units of fuel (MBTU).
2. A total of thirty-three energy conservation opportunities (ECO's) were identified, evaluated, and found to be economically attractive and technically feasible.
3. The projected energy savings for all ECO's were nearly 2 million KWH per year and about 63,000 MBTU per year. This amounts to a 32 percent savings in electricity and 36 percent in fuel consumption.
4. The total capital cost of all thirty-three ECI's is about J$2,800,000, of which about US$970,000 is in foreign exchange costs.
5. The simple payback of all projects is about 2.5 years, while the foreign exchange payback is 1.9 years.
6. Clearly, professional energy audits can uncover large potential areas of energy saving for companies in Jamaica.
7. Investment proposals resulting from energy audits can be anticipated to be attractive to the firms concerned and to the economy as a whole
8. The present financial system in Jamaica is relatively well developed to handle firms' working capital needs, but deficient in providing facilities for capital investment.
9. Major impediments to energy investment financing from the commercial banks are lack of foreign exchange resources, excessive conservatism in the extension of loans, high interest rates, and short repayment term requirements.

10. Major shortcomings of the government's financial programs are that most foreign exchange lines require short-term repayment, are limited to exporters (EDF), or are believed to be inadequate in amount to handle the anticipated demand (RF).

11. Another major constraint in the government's facilities has been the absence, until recently, of an active bank dedicated to providing development financing to all parts of the private sector.

12. Based on the energy audits, a thorough survey was conducted by FWA to analyze the demand by forty-nine private sector firms for energy conservation and alternative energy equipment and services, and associated credit demand.

13. The survey firms accounted for about 20 percent of JPS electric energy consumption, over 10 percent of Gross Domestic Product, and more than 33 percent of manufactured goods exports. They are believed to constitute a representative sample of the commercial and industrial sectors of Jamaica.

14. Sixty-five percent of the firms surveyed were interested in having a professional energy audit done to establish ways for them to conserve electricity, and were willing to pay their own money for such an audit.

15. Forty-nine percent of the survey firms had already taken concrete steps in the last two years to conserve electric power, and 51 percent indicated plans to do so in the next two years.

16. Largely without energy audits, the firms interviewed indicated plans to make energy conservation investments of almost J$6,000,000 in 1983-84, provided adequate financing is available.

17. Three-quarters of the respondents indicated that they would need, or want to use, medium-term (over one-year repayment) financing to cover their energy-saving investments. A large majority implied that the repayment term should be a maximum of five years, while 20 percent indicated that a term of up to ten years would be convenient.

18. With regard to interest rates, most respondents are apparently willing to pay 15 percent per annum, with one out of nine firms willing to pay a rate as high as 17-18 percent per annum.

19. It was obvious from the survey that Jamaican firms are very interested in making investments which can save on their already very high energy bills. Many firms have had to postpone investments because of the unavailability of foreign exchange financing on reasonable terms.

20. In addition to a well-structured energy credit program, many survey respondents suggested that a reduction of import duties on energy-saving equipment would encourage investment in this area. Other favored incentives included reducing electricity rates for firms which make energy conservation investments, streamlining import licensing procedures, and granting foreign exchange priority for firms importing energy-saving equipment.

21. Based on separate interviews with about a dozen actual and prospective energy industry investors in Jamaica, it appears that there is also a substantial demand for credit for investments in the energy conservation and solar equipment industries.

22. There are only five companies which are truly active in this area at present, providing energy saving and alternative energy equipment and services. A number of proposed new projects have been identified, many of which may be only marginally interesting. However, the potential payback in terms of energy saving, foreign exchange benefits, additional employment, and general economic activity from this area clearly justifies serious government support.

23. In contrast to the above, residential solar water heating is expected to save a relatively small amount of energy, and the establishment of a loan fund for that purpose would involve administrative complexities and costs per dollar lent far in excess of that contemplated for the rest of the program.

24. Based upon this intensive evaluation of the performance, actions, plans, and aspirations of Jamaica's commercial and industrial sector, it appears that the establishment of a loan fund to encourage energy saving and alternative energy investments would yield benefits to the economy far in excess of the costs involved and would fully justify the necessary expenditure of time, effort, and financial resources.

25. The National Development Bank would be the logical administering agency for this loan fund. The NDB should offer the resources of this fund through the commercial banks (or in the case of energy audits, through PSJ) to private sector firms which meet the program's objectives and creditworthiness criteria.

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II. RECOMMENDATIONS

1. That U.S. AID cooperate with the Government of Jamaica to establish an Energy Credit Fund (ECF) with the following composition:

(in U.S. dollars)

	Foreign Exchange	Local Currency	Total
Energy conservation	$3,492,000	$6,484,000	$9,976,000
Energy industry development	2,400,000	600,000	3,000,000
Energy audits	-	300,000	300,000
Total	$5,892,000	$7,384,000	$13,276,000

2. That U.S. AID make a loan to the Government of Jamaica for the foreign exchange requirements of the ECF and that the Government of Jamaica utilize moneys from the oil facility agreements concluded with Mexico and Venezuela to meet its local currency counterpart contribution and/or to extend the ECF resources to finance energy-related projects after exhaustion of the U.S. AID money.
3. That ECF be a trust fund, operated by NDB on behalf of the Government of Jamaica in accordance with a written statement of policies and procedures agreed with participating lenders.
4. That all lending operations carried out by NDB and ECF funds be conducted in accordance with sound business principles, with separate books, records of account, and management reports on the program.
5. That NDB give priority to individual projects which demonstrate the best pay back on investment, the most beneficial impact on the balance of payments, the greatest demonstration effects, and the best corollary effects on employment, backward and forward linkages, etc.

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6. That repayment terms on sub-loans not exceed five years for energy conservation and energy industry development projects under $500,000 or one year for energy audits.

7. That interest rates initially be set at 15 percent per annum for the sub-borrower, with a commitment fee of ½ percent per annum. Various fee and charges shall be paid out of the interest rate.

8. That sub-loans be repayable in J$, with the exchange risk being assumed by the Government of Jamaica in exchange for a fee of 1 percent per annum, payable out of the interest rate.

9. That an administrative fee be paid to NDB equal to 2 percent per annum, payable out of the interest rate.

10. That a spread be paid to the participating commercial bank equal to 3 percent per annum, payable out of the interest rate.

11. That the balance of interest payments (9 percent if interest is 15 percent) be used to augment the resources of the ECF and meet the debt service requirements of U.S. AID.

12. That special mechanics be established to finance energy audits, with NDB lending the funds to PSJ, which will on-lend them to its clients, based upon procedures recommended in this report.

13. That a guarantee facility be established by NDB to encourage commercial banks to lend for energy-saving investments on reasonable terms and conditions.

14. That NDB establish a special unit to handle this program and take the other institutional steps necessary to ensure its smooth and successful operation.

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15. That special mechanics be established to assure full participation by the commercial banks in this program, and that those institutions be given the necessary training, and be encouraged to take any other measures required, to serve as effective financial intermediaries between NDB and the ultimate beneficiaries of the Energy Credit Fund.