GOVERNMENT OF JAMAICA - USAID/KINGSTON

J O I N T E V A L U A T I O N

O F T H E

E N E R G Y S E C T O R A S S I S T A N C E P R O J E C T

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Evaluation of

Jamaica Energy Sector Assistance Project

(Phases I and II)

SUMMARY

The goal of the project, implemented in two phases, is aimed at reducing Jamaica's dependence upon imported petroleum. Under Phase I, the project purpose is to strengthen the institutional capacity of the Energy Division of the Ministry of Mining, Energy and Tourism, to plan and manage energy programs, to expand and improve the GOJ's energy conservation program and to institute programs in alternative energy. Under Phase II, in addition to accomplishing the purpose of Phase I, the project provides loan funds for private businesses and industries to retrofit their facilities and to assist local energy related industries.

This evaluation has attempted to examine and review progress and accomplishments to date in relation to purposes developed and established during project planning and development. Phase I progress and accomplishment for the energy conservation and the alternative energy components has attained and in some cases exceeded program expectations when measured in terms of individual project activity completions, such as 32 solar hot water installations under construction or completed versus 25 planned. Under both of these components, it can be concluded that project purposes will be achieved, and within budgeted funding.

In addition, project funding expenditures will be less than originally estimated since original cost analyses appear to have overestimated funding needs, even after consideration of the amount of loan deobligation,

US$1.0 million under Phase I, US$4.0 million under Phase II, and the reduction in Phase I GOJ counterpart of equivalent US$2.17 million. Funding to date shows Phase I loan commitments amounting to US$3.4 million and a projected future loan funded project activity cost of US$2.0 million. With loan funding of US$6.5 authorized, this indicates a possibility for future deobligation of about US$1.0 million.

Due to the depressed state of the Jamaican economy, originally planned Phase I GOJ counterpart contribution may not be achieved. Originally planned GOJ counterpart of equivalent US$10.17 million amounts to J$18.1 million at the relatively constant exchange rate of J$1.78 of the project planning period. To date, the GOJ has disbursed only about J$10.0 million, because budget restrictions have resulted in reductions in budget allocations. The indicated balance of J$8.0 million will not likely be made available during the remaining project implementation period. To ease the Energy Division's cash flow for funding remaining project activity implementation cost, loan fund advances, in accordance with USAID procedures for other programs, are proposed.

The achievement of the strengthening of the Energy Division of the MMET still remains to be accomplished. This lack of achievement in the institutional development component had been the subject of the earlier 1983 evaluation of the ESA Project. This indicated lack of project purpose achievement can be attributed to low government salary scales and to limitations in career development opportunities and satisfying project activity work accomplishment. This has caused a continuous and high rate of staff turnover, and no degree of staff permanency is being achieved.

Funding for the Energy Credit Fund (ECF), Phase II, amounted to an AID loan of US$5.9 million and GOJ counterpart equivalent of US$5.6 million, J$15.7 million at the July 1983 exchange rate when the project agreement was signed. Due to the low level of utilization of the ECF and the short time remaining in the project implementation period, US$4.0 million of loan funding was deobligated in July 1985.

A Letter of Commitment in the amount of US$1.6 million is now being opened and GOJ counterpart of J$4.5 million (J$3.5 million initially in July 1984 and $1.0 million in 1985) has been provided for loan funding of project component activities. Five loans have been approved for a total commitment of J$2.7 million and US$0.3 million. An additional five loans are being processed and when approved, will amount to an added commitment of J$2.0 million and US$0.2 million.

Factors which are influencing the relatively low rate of loan activity under Phase II include the current depressed state of the economy and resultant lack of incentive in the private sector for assuming added and non-productive financial obligations, the lengthy time (some 3 months) and persistent delays in processing loan applications, and the high duties for imported materials and equipment needed for project activity implementation.

CONCLUSIONS

1. After four years of the five-year project implementation period, strengthening of the MMET Energy Division institutional structure with the recruitment of qualified, professional staff has not been accomplished, and this basic project purpose has yet to be achieved.

2. This lack in the project purpose achievement will persist without a definitive and purposeful initiative and effort to raise ED professional salaries and benefits to a competitive status with those of the parastatal institutions.

3. Under the alternative energy component, project activity implementation is achieving expectations. Some of the more notable accomplishments include: the organization and installation of the Energy Center at CAST; the demonstration center at Knockalva which is operational and establishment of the second now underway at Bodles; the installation of twenty solar and wind gathering stations (eleven now in place and nine others underway); 32 solar water heater installations (24 complete and 8 under construction) versus original goal of 24; and the evaluation and investigation of the potential of fuelwood and bagasse as renewable energy sources.

4. Also under the energy conservation component, project purposes are being achieved and project activities accomplished. More notable accomplishments include: a successful public education program in terms of conveying and exchanging conservation knowledge through seminars,

communication media, and a fully equipped mobile unit; the training of energy auditors, the conduct of audits in excess of those programmed, and the initiation of retrofit activities; and construction of energy conservation components below levels of originally estimated costs.

5. The low rate of activity under the ECF has been influenced principally by the depressed state of the economy and a lack of incentive in the private sector for assuming added non-productive financial obligations.

6. The need for long-term consultants has been superceded by the progress of the project. Selected highly specialized short-term consultants rather than the broad-based generalist appears more appropriate at this stage of project development.

7. The PACD of September 30, 1986, other than for the project training component which has been extended to September 30, 1987, should be maintained subject to a review of progress of the ED institutional strengthening and development at which time action can be taken on what decision progress and initiative warrants, whether to extend or to close out the project.

8. Subject to the PACD evaluation above, action on the amount and timing of funding deobligations can be taken.

RECOMMENDATIONS

1. ED be reorganized and a new professional salary structure established to be competitive with that of other GOJ parastatal entities.

2. Import duties on ECF foreign exchange funded procurement be waived.

3. PACD extensions, other than for training, and possible funding deobligations, for either the Phase I component or the Phase II component or for both components, be subject to results of favorable progress reviews, to be conducted in June 1986, as regards project activity achievement and project funding disbursements.

4. A decision be taken immediately to terminate the META Systems technical assistance contract in whatever manner is most beneficial to USAID and GOJ, and future technical assistance activity be concentrated in short-term, highly-specialized professional services contracting.

5. A decision be taken to advance loan funding to the ED for funding project activity implementation costs.

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The Members of the Evaluation Team engaged in discussion with representatives of a large number of Jamaican Energy Sector Organizations. We would like to thank all participants for the excellent co-operation that was received throughout the course of the evaluation.

Finally, this report was prepared with the quiet efficiency of Sandra Kerr of the USAID Energy Office who provided secretarial support and endured more than a simple acknowledgment can express.

I. Scope of Evaluation

The evaluation team comprised David E. Trottman, Industrial Engineer, Acting Director, Industry and Energy Planning Division, Planning Institute of Jamaica (PIOJ), Henry P. Santiago, Mechanical Engineer, Senior Analyst, Office of International Affairs, U.S. Department of Energy, and Charles S. Stevens (Chief of Party), Engineer/Consultant, Agency for International Development.

The evaluation review, conducted over a three-week period, began October 16 and ended November 4 with a joint GOJ/USAID debriefing. The review and evaluation, see Statement of Work, Attachment I, were based on interviews and examination of the project documentation and other energy related reports. For a listing of the persons interviewed and a bibliography of the more pertinent documentation and related reports, see Attachments II and III.

On Wednesday, October 30, two days before the submission of the team report by close of business on Friday, November 1, the team received a copy of State 331450, dated 29 October, Guidance for Preparing Evaluations. Coming at the end of the evaluation, the team finds it difficult to respond fully to the issues and to the guidance comments. Although many of the issues have been included in the report drafts, some have not, such as, how the project fits into the Mission's overall strategy, a separate section on development impact of the project, and description of causal

relationship factors that proved critical to project success or failure, including necessary political policy, economic, social and bureaucratic conditions within the host country and AID. The team considers it is too late to bring these issues into this evaluation, and further believes that response rightfully belongs more to the USAID after its review and internal discussion of the team evaluation report.

Within the time available, efforts were concentrated in addressing the degree of progress in attaining the project purpose, basically a strengthened Energy Division (ED) within the Ministry of Mining, Energy and Tourism (MMET) with the institutional capacity to plan and manage energy programs, expand and improve energy conservation efforts, and initiate programs in alternative energy. Hopefully, through the accomplishment of this purpose, the program goal, to achieve a reduction in Jamaica's dependence on imported petroleum, will help to lessen the negative impacts and foreign exchange problems that this dependence has created in the overall economy. In view of the relatively early stages of impact from project activities implementation and the relatively small amounts of fuel savings from each of the conservation and indigenous resource developments, goal achievement at this time is difficult to fully verify.

A. Related Energy Assessments

Imported oil is the main energy source, and as reported by the Petroleum Corporation of Jamaica, it currently supplies 98% of the energy requirements.The principal objective of Jamaica's energy policy is to reduce the cost of energy to the economy. This high degree of dependence, together with its resultant negative effect on the country's balance of payments, has created a participative interest, both nationally and internationally. MMET, PCJ, the PIOJ, and other national entities continue to examine and review this complex situation, and international agencies, World Bank, InterAmerican Development Bank (IDB), UNDP, USAID, Canadian International Development Agency (CIDA), EEC, together with respective counterpart international assistance entities of the Governments of West Germany, Italy, and Scandinavian countries, have offered and/or continue to offer assistance in planning, design, development and construction.

The latter group of countries have concentrated their assistance primarily in the sector of hydroelectric planning and development. A potential for a firm hydroelectric generation capacity of about 75 megawatts (MW) is reported to be capable of development from a series of relatively small projects, as many as 47, and varying in capacity from 0.1 MW to 6.9 MW. With West German government assistance, 6 projects with a firm capacity of 10.1 MW are now reported to be under construction. Four projects, total firm

capacity of 2.7 MW are under study by CIDA, and final design is underway on one project of 0.5 MW firm capacity with financing assistance from the Government of Italy.

1. UNDP/World Bank Energy Sector Assessment

The UNDP/World Bank assessment, conducted in March/April 1984 and discussed with the GOJ in March 1985, reports on the findings of a twelve-man team comprising a broad-based group of conservation, power, petroleum exploration, refinery, renewables, institutional, peat, hydropower specialists and macro, power and energy economists. Immediate priority and short-term recommendations, within the background of foreign exchange shortages and the high debt-service ratio of approximately 40%, have included: Jamaica Public Service (JPS) rehabilitation and preventative maintenance programs with sufficient foreign exchange for purchasing spare parts; refinery operations planned in accordance with an allocated foreign exchange budget; restructuring in the MMET to focus efforts on energy policy, planning and sector coordination; and transfer of responsibility for developing electrical generation options out of PCJ to JPS.

2. GOJ Agency Assessments

Jamaica recognizes that it is becoming increasingly necessary to develop alternative energy sources to reduce its dependence on imported oil. Projections have been prepared of Jamaica's energy supply and demand to assist in foreign exchange budgeting for

petroleum imports and for the planning and implementation of energy conservation programs. Reports have been prepared and reviews conducted for the substitution of more cost effective coal-fired electric energy generation versus that of oil-fired generation. In some government reviews of future energy usage, coal consumption is projected to reduce domestic oil demand as early as 1987-89. To date, no definitive action has been taken to initiate the implementation of this alternative.

The final series of tests are currently being conducted to evaluate the feasibility of peat mining at a site near Negril. These tests involve the excavation, maceration, pumping and dewatering of peat using commercial scale equipment to evaluate its fuel potential. These tests have been funded by Sweden and Finland and are being conducted with the assistance of Swedish and Finnish engineers. All local costs are being provided by the PCJ.

II. Evaluation of Phase I - Public Sector

Phase I of the Energy Sector Assessment (ESA) Project comprises three components, institutional development, development of energy conservation programs and alternative energy initiatives. The evaluation of Phase I encompasses an examination and review of the progress achieved as it relates to the project purpose, and results are herein presented under these three headings.

A. Background

Under the terms of the project agreement, the project will be jointly evaluated by the GOJ and USAID as mutually agreed when a significant set of accomplishment has been achieved The evaluation reports will assess the achievements, make recommendations aimed at improving performance of the project, the re-allocation of funding to more cost effective energy opportunities, and the redirection of funds to emphasize particular areas that may be deemed necessary by the evaluation committee to achieve the objectives of the project.

1. Project Agreement

AID loan funding for the project in the amount of $3.0 million was initially authorized and later amended to a total amount of $7.5 million. A loan agreement in the amount of $3.0 million was signed with the GOJ on September 24, 1981. The agreement stipulated that, on the basis of an eventual total contribution by AID of not less than $7.5 million, Borrower would provide resources for the project

of not less than the equivalent of US$10,168,000, and to include costs borne on an "in-kind" basis. The original PACD date was September 30, 1986, and one extension for the training component only of the project program, has been granted to September 30, 1987. Subsequently, a joint GOJ and USAID funding review resulted in an agreement to a deobligation of $1.0 million of the Phase I loan funding and a reduction in the Borrower counterpart to an equivalent US$8.0 million. It was agreed that the project was being implemented at a satisfactory pace. However, based on the several years of implementation experience then gained under the project, the illustrative budget of the project agreement could then be adjusted downward. This and other deobligated funding from other slow moving projects could then be reobligated into other projects in order to help more effectively in offsetting the downturn in the bauxite industry.

Annex I of the revised project agreement describes and amplifies the description of the basic three components of the Phase I implementation, namely institutional development, expansion and improvement of energy conservation, and initiation of programs in alternative energy.

(a) Revised Amplified Project Description Annex 1

This has only recently been approved and was prepared to describe and identify the project components in better detail and in accordance with actual implementation experience. An indicated

staff of nine professionals was developed to serve as implementation staff. A tabulation delineated the number and type of professional specialty, comprising a director, economist/planners, engineers, and librarian/media specialists.

Technical assistance has been contracted by USAID with META Systems, Inc. to provide 3 long-term advisors, an energy planner, an energy conservation specialist and an alternative energy planner. These specialists have been assigned to work with counterparts within the MMET. Two of the specialists, the energy planner and the alternative energy advisor have been late in arriving although their presence had been heretofore needed. The energy planner who is the team leader reported in July 1985. He is actually a replacement for the first nominee who departed in mid 1983, after an approximate one year assignment, because his personal background did not meet the job requirements which were at variance with the job description which he fulfilled. Subsequently, the job description was revised to conform to the job requirement. The alternative energy specialist position has been filled for the first time with the arrival of the current nominee in January 1985. The conservation advisor represents the only consultant team member who has been on board for any extended period, namely since February 1983 which was nearly 1 1/2 years after the signing of the loan agreement.

Under its contract, the META System is recruiting many of the short-term consultants who provide selected services as needed during the project implementation. To date, of a total of 87 person months programmed for these services, 54 person months have been performed or are committed.

2. Project Progress

Phase I of the project has been showing a satisfactory rate of progress. With about one year remaining of the programmed five-year project implementation period, PACD of September 30, 1986, exclusive of the training component, cumulative loan funded expenditures, through August 31, 1985, of $2.3 million represent approximately 35% of the reduced obligation of $6.5 million and commitments of $3.4 million, 52%. This, together with the previous six-month rate of expenditures of $382,052 and of commitments of $235,171, indicates a relatively slow disbursement rate. Similarly, GOJ accrued expenditures through August 31, 1985 reflect a U.S. equivalent disbursement of $3.4 million, representative of a 43% expenditure of the reduced GOJ counterpart of equivalent US$8.0 million.

Two comments have been presented in discussions on this relatively slower than programmed funding disbursement. The first, instrumental in the deobligation of loan funding of $1.0 million, pertains to probable preliminary overestimation of project costs during the project planning and development, reflecting lesser

project implementation costs than those programmed. The other rationale is based on the gradual loss in value of the Jamaican dollar throughout the project implementation, from J$1.78 during project preparation to J$6.40 US dollar equivalent as of September 25. Although the value of the Jamaican dollar has decreased, nearly four fold since the inception of the project, increases in local project activity costs, of which labor costs constitute a major increment (many times 50% of the total), do not reflect a comparable rate of increase. For example, during 1984, the Jamaican dollar declined in equivalent U.S. dollars from J$3.30 to J$4.95, a loss in value of 50%. In the same period, the domestic rate of inflation increased 31%.

As an overall result, local counterpart contribution which is expressed in US dollar equivalent will reflect an actual much larger number of Jamaican dollars participation than programmed. The equivalent US$10.17 million counterpart which converts to J$18.1 million using the rate in effect during project planning would become J$35.6 million using an average of the conversion throughout project implementation. This has placed an unanticipated burden on projected GOJ budgeting and project funding,. Nevertheless, with regard to implementation of project activities, progress, as measured by activities implementations and completions, appears to be proceeding, after unforeseen initial start-up problems and delays, well within the projected implementation time frame.

(a) USAID/GOJ Consultant Reports

Reviews of the more recent progress reports have complemented discussions with USAID, MMET and META Systems personnel. The USAID reporting now covers a 6-month period, the GOJ ED, quarterly and annual periods, and the long-term consultant presents a quarterly report.

Basically, from these reviews, the impression is presented that Phase I of the project is moving well in achieving accomplishment of two of its components, namely conservation and alternative energy. However, the project continues to experience problems with regard to strengthening institutional capacity and capability within the ED of the MMET to plan, formulate, coordinate and manage national energy programs.

During the GOJ fiscal year, 1984/85 (April 1 to March 31), the Phase I counterpart project funding amounted to J$3.2 million or about US$0.71 million. This reduced funding, originally planned at J$10.0 million, indicated a reduced level of project activity, particularly since salaries and MMET administrative costs required expenditures of J$716,000 or nearly 25% of the Jamaican dollar funding received. This would be representative of reduced impact, and, as in the previous project evaluation, personnel disatisfaction which can result from reduced project activity causing a high-rate of turnover which in turn can be an instrumental factor in inhibiting ED institutional development.

3. First USAID/GOJ Project Evaluation

This evaluation was conducted between April 20 and May 13, 1983, by a three-man evaluation team which included Mr. Henry P. Santiago, a member of the current group. This team focused its review on four major areas as follows:

(a) Progress and problems in institution building;

(b) Progress in the development of the capability to identify, analyze and pursue energy policy issues;

(c) Management and administration of the public sector conservation and alternative energy programs of Phase I;

(d) Quality and performance of the long-term energy consultants and the role of this function within the overall project.

The report notes that even then, as now, the ED is not at its full complement, and it expresses little hope of achieving the full staffing for a viable institution as needed to analyze and coordinate energy policies and programs. The low government salary structure inhibits recruitment and results in a high-rate of turnover and loss of personnel (nearly 50% of professional staff in the last year), such that program and project planning and implementation continuity is completely lacking as is sense of responsibility and delegation of authority. Suggestions for raising salaries include additional USAID funding to be used for this purpose or the establishment of a separate parastatal body outside usual government salary and similar related restrictions.

Improvements to selected operational functions are presented, such as personnel training, through the establishment of a human resources and development function to monitor career path and skill development and to develop strategies for training by objectives. The elimination of the PIU, set up by USAID for the project implementation, is recommended to remove the internal working conflicts created as a result of Ministry staff's meager salaries and the higher payroll allowed under the PIU parastatal organization process.

The comments on the META consultants provide for a suggested restructuring to substitute short-term consultants in place of the long-term advisors. Within the energy policy area, the lack of stature of the ED limits its credibility with other operational energy entities. An intense institutional friction is apparent between PCJ and ED and cannot be resolved over the short term. To address this problem, ED staff needs to be upgraded to develop and acquire a stature and capability to deal with major policy issues.

4. Funding

As previously reported, local counterpart funding expressed in Jamaican dollars may not achieve the amount projected during program planning, as a result of the depressed condition of the Jamaican economy. To date, an estimated J$10.0 million have been disbursed to the project implementation by the GOJ versus a value of J$18.1 million originally programmed, the US dollar equivalent of the US$10.17 million GOJ project counterpart funding.

Because of a decided slump in the Jamaican economy, budgeting limitations, and IMF restrictions, the GOJ is now experiencing difficulties in funding its operations. During the last fiscal year, 1984/85, the ED received only J$3.2 million for its operation and project participation, out of a requested and budgeted J$10.0 million. During the current fiscal year, 1985/86, J$4.0 million has been budgeted out of a J$8.0 million request, and based on past experience, even this amount will likely be reduced further as the fiscal year progresses.

As has been heretofore expressed, however, project progress, as measured by project events, appears to be proceeding and is being implemented in accordance with project planning. The main project component weakness appears to be that of institutional development which can be considered indirectly related to the funding deficits. The inhibiting obstacle appears to be the inability to attract the more experienced and more competent type of professionals needed to develop a solid and respected institution. This inability, resulting from regulatory limitations in the salary structure, prevents the MMET from offering competitive salaries when compared with the private sector and the parastatal government agencies. As a result, a constant turnover and change of professional personnel, in excess of 50% annually, inhibits and prevents ED growth and acceptance as the energy policy agency.

B. Institutional Development Component

The measure of achievement under this component will be evaluated by the extent to which the ED has been strengthened and staffed, trained and made capable of planning and directing a nation-wide energy program with a minimum of outside technical assistance. A national energy accounting system will have been established and a national energy model prepared. The national energy plan will be developed and updated on an annual basis.

1. The Energy Division of the MMET

The GOJ has chartered the Ministry of Mining, Energy and Tourism (MMET) as the central coordinating agency in planning, developing, and managing the country's energy programs directed at improving its energy situation. The Energy Division (ED) within this ministry has been charged with the institutional responsibility to direct and guide the performance and implementation of the country's energy policy.

(a) Permanent Staff

The Energy Division has identified a 19-person permanent professional staff in its discussions with the USAID. The World Bank staffing recommendations show a suggested staffing complement of eleven. To achieve institutional goals and purposes, a broad-gauged experienced and trained professional staff is indicated, one that has depth and broad

versatility in the complex energy sector embracing capability in all phases of coordination, development, and management of energy policy and planning to include conservation and alternative energy programs. A staff of 19 professionals would appear sufficient to undertake the scope and responsibility of the administrative/ monitoring role envisioned. The project staff will be required to be strengthened during implementation in order to manage GOJ/MMET energy activities, after the completion of the USAID supported ESA Project. Based on the revised project description, the MMET has projected a staffing need of 19 as follows: (a) a project director, coordinator nominated by and responsible to the Permanent Secretary; (b) an economic planning unit of 7 senior economists; (c) an energy development unit to staff conservation and alternative energy specialists comprising 6 senior engineers; and (d) a six-person information and public education unit to include a professional administrator/librarian and an abstractor.

The MMET would prefer that this staffing plan identify the positions as those of senior and upper grades in order to attract and retain highly qualified and experienced professional personnel. However, reviews and discussions with the ED, confirmed by the USAID and META consultant, show a continued high turnover rate in professional personnel. At the time of the evaluation, 15 professionals were on the staff, comprising six economists in the

planning unit, five engineers in conservation and alternative energy, and four professionals in the public education program. Of this number, 7 to 8 will depart in the coming year, and this high turnover rate, 25 to 50%, continues to plague the ED, resulting in a general lack of program background knowledge and continuity, limiting project implementation responsiblity and authority, and placing inhibiting limitations in achieving the institutional development goals. Situations are reported where, upon return from project financed training, engineers and other ED professional staff resign to take more lucrative positions in the private sector and/or parastatal, semi-autonomous entities, such as Petroleum Corporation of Jamaica (PCJ) and Planning Institute of Jamaica (PIOJ), created by special government decree to allow operation outside of usual governmental salary and budgeting limitations. A government top-grade engineer (J$15,000 for a beginner) receives a base annual salary of J$25,000 plus allowances of J$6,400 base for travel plus J$1.00 per mile for official travel, J$2,200 for housing, and J$600 to 1,200 for official entertainment. A chief engineer in the private sector receives a base annual of J$40,000 plus allowances which include a car, not just a car allowance, similarly full house expense and not just a housing allowance, and actual entertainment costs. The parastatal entities as created by the government offer salary benefits and allowances generally in between those of government and the private sector, about J$5,000 less in renumeration, together with benefits comparable to those of the private sector including that of a car.

The government finds it next to impossible to match the amount of renumeration and related benefits of the parastatal entities and private sector. The current foreign exchange problems requiring increasing Jamaican dollar contributions, together with IMF restrictions, are definite inhibiting considerations. Also, the GOJ has to confront the effect on the overall country-wide government salary structure, its impact on the budgetary process, and its relation to the current unfavorable national economic picture.

(i) Other Affiliated Government Agency Staff

Selected participation by staff from other government agencies affiliated and linked to energy planning and development through the MMET will be provided. These agencies include: (a) the Meteorological Office for the collection and analysis of climatic data; (b) the Bureau of Standards for standards on solar technology; (c) CAST and UWI responsible for the Energy Center and Solar Energy Institute; and (d) the Forestry Department for fuelwood resources research and assessment. Other energy planning entities also include the JPS, PCJ, PIOJ and MPUT.

(b) Staff Capability to Plan, Manage and Coordinate Energy Programs

The ED is attempting to strengthen its institutional and staff capacity to plan, manage and coordinate the country's energy programs. However, because of the high-rate of personnel turnover, staffing of the ED would be considered weak and ineffective since much of the professional staff is relatively young and inexperienced, consisting of recent graduates marking time while seeking more lucrative assignments.

During the past fiscal year, the program management of the project continued to experience further serious disruptions through resignations and terminations. Of eight departing professionals, including the project director, only five replacements were made and three vacancies persisted. However, some strengthening occured with four additions, a contracted economist, a contracts/ procurement person, a librarian and an abstractor.

Gradually, it is eliminating the various implementation functions of this project from its responsibilities by the use of consultants and contractors. In spite of this, it would appear that project goals are yet to be achieved and that there is still a lack of program and responsibility definition. Efforts are continuing to develop a smaller, qualified and experienced staff (economists, engineers, information specialists), with a core of senior professionals who are well respected by government ministries, parastatal groups and the private sector for competence in the energy field. Attempts are also being made to raise salaries and benefits to attract the type and competence of professionals needed. It has also been suggested that the government should consider the statutory procedure of reorganization of the ED in order to attract competent personnel with a salary base which is competitive with that of the private sector.

(i) Economic, Conservation and Alternative Energy Planning Units

These units will form the basis for the ED capability to plan and direct a nation-wide energy program with a minimum of outside technical assistance. Comprehensive plans will be formulated to develop a national energy plan to be updated annually, energy consuming and energy supplying sector surveys, and a comprehensive energy conservation plan. To date, a national energy accounting system has been established, and an energy conservation plan has been initiated. A national energy plan is the goal of a joint interministerial and private sector steering committee now beginning to organize itself into selected task forces which will prepare and review issues papers that will form the basis of a national energy plan.

(ii) Linkages with Related Energy Consuming and Energy Supplying Agencies

Discussions with the ED staff indicate concerns that full linkages are lacking and that ED is not really coordinating the country's energy assessment efforts. There is also the feeling that the ED lacks the capability to assume responsibility of overall planning and coordination as envisioned. Others feel that, at this time, the MMET is not structured to plan and develop the basic information for a national energy plan. Concerns continue to be expressed that the strengthened institution to coordinate energy planning has yet to materialize.

(c) Staff Development

The ED staff, throughout the project implementation, was relatively inexperienced in energy matters, and additional training was programmed. This was provided through three modes: on-the-job training by long and short-term, loan-funded advisors, short-term training courses offered in Jamaica, the U.S. or a third country, and long-term academic training. Participants in training have been either staff members from ED or representatives of agencies that are cooperating with the ED in its planning functions, agencies such as PCJ, JPS, MPUT, BOS. This should strengthen the linkage between ED and related energy consuming and energy supplying public sector agencies.

Fifty individuals have completed or are in training in the U.S., 8 of long-term and 42 of short-term duration. Similarly, eighty seven participants have received or are participating in in-country training, 26 of long-term and 61 of short-term duration. Long-term post-graduate U.S. training is programmed for a total of 12 individuals to study energy economics, energy conservation and alternative energy. It is reported that ED trainees have not always returned to work in the ED to share training experiences and to assume key roles in strengthening and developing its institutional capabilities as originally envisioned.

2. National Energy Plan

The development of the national energy plan and the monitoring of programs in energy conservation and alternative energy has been viewed as the principal functions of the ED. This activity is the responsibility of the economic planning unit with other units of the ED to assist in a complementary role.

A "National Energy Plan" was developed in 1982. This document examined energy supply and demand and described the possible sources of indigenous energy and the efforts being made to evaluate the feasibility of exploitation. It had limited value as a planning document.

A second National Energy Plan (NEP) was produced in 1983. While this document contained more policy content, it provided little analysis of the interplay between the policy options. As a result, it too had limited value as a planning document.

Since the development of these documents the GOJ, assisted by the Argonne National Laboratory, has developed an extensive data base of energy end use and a computer model, the "Jamaican Integrated National Energy Planning" (JINEP) model, to assist in evaluating the policy options and the fuel switching opportunities available. Training was also provided for selected staff members of the Economic Planning Unit (EPU) to insure proficiency in the use of and interpretation of the model results for planning purposes. Additional training was provided on data collection to insure that

the EPU would be able to update the data base needed for the model. Another planning model has been developed at PCJ which was used to produce the "National Energy Outlook" in early 1985. Unlike the JINEP, the PCJ model uses regression analysis techniques to project past performance into the future. While useful and reasonably accurate for near term analysis, such an analytical technique has limited value in analyzing the potential for conservation and fuel switching. However, the National Energy Outlook offered superior insight to the policy options available to Jamaica than did the previous National Energy Plans.

Efforts are now underway to produce a new National Energy Plan under the guidance of the Director of the Energy Planning Unit. As part of this activity, an interMinisterial group has been established to provide input to the planning process by conducting a set of special studies on selected projects. This inter-ministerial group includes participants from the key GOJ agencies involved in energy supply and demand.

This group was established in late September, and at such an early stage, it would appear presumptious to evaluate the NEP planning process and to judge the adequacy and ability of this process to produce a suitable NEP; however, some thoughts on this effort can be offered at this time.

For example, the process to be used to integrate the various activities involved in the development of the new NEP does not appear to be documented. What policy options will be evaluated? What are the prospective economic scenarios to be used? What assumptions will be made regarding future oil prices and coal prices; and others? A document which addresses these issues and describes how the model activity and the interagency steering committee activity will be integrated to insure objective analysis of the policy options, should be prepared to provide participants and the decision makers an understanding of how the policy options will be evaluated and recommendations produced.

3. Conclusions

As was noted in the first evaluation, conducted in 1983, and confirmed in this evaluation, the goal of a strengthened ED institutional capacity and capability to develop energy policy and to plan, manage and coordinate energy program development has yet to be achieved. Both evaluations have concluded that the extremely high-rate of staff turnover is primarily due to the low salary scale of government employees.

Many alternatives have been explored to resolve this indicated project progress impasse. These have included such suggested solutions as added USAID financing to top off salaries, personal services contracting of the permanent staff as a means of circumventing salary restrictions, organizing or transferring the

ED into a GOJ parastatal entity, again as a means of circumventing salary restrictions, or increased benefits, as provided by parastatal entities and the private sector as a means for attracting and retaining staff. These other measures are at best temporary stop gap solutions which can be pursued as temporary measures.

GOJ contributions to date approach J$10.0 million, and the J$18.1 million, US$10.17 million equivalent, projected for GOJ counterpart during project planning and development, may not be achieved. To complete, GOJ counterpart participation as originally projected, J$8.1 million will be required during the remaining approximate one-year life of the project, a goal which will not be met with a current ED budget of J$4.0 million.

Because of reductions in budget allotments, project activity implementation has been affected and has faced delays. Approved budgets have been reduced, such as J$10.0 million to J$3.2 in last fiscal year and J$8.0 million to J$4.0 in the current year. Under these conditions, planned projects have been delayed since approved contracting and commodity procurement must be deferred pending future year funding.

To help ease the Energy Division's cash flow for funding remaining project activity implementation cost, loan fund advances, in accordance with USAID procedures for other programs, would be proposed.

The need for long-term consultants, the META Systems Inc. type of services, has been superceded by project events and activities. It appears now more appropriate to contract short-term highly specialized consultants to respond to selected individual project activity needs.

In the conservation and alternative energy components, project activities have been implemented and completed in accordance with original planning and scheduling. Basically, preliminary cost estimates, prepared at the time of project planning, provided funding in excess of project activity needs, and as a result, originally planned project activity as measured by the number of individual projects has been exceeded.

(a) PACD

The strengthening of the ED institutional structure, a most basic and critical objective, may not be fully accomplished before the PACD of September 30, 1986. Implementation of the other project objectives, embracing the conservation and alternative energy components of Phase I, appear to be proceeding well, and project activity accomplishment within the PACD is foreseen.

To propose extension of the PACD at this point in time, nearly a year ahead of time, would appear premature. Any decision for a PACD extension would appear a condition of a progress review to be conducted in June 1986. At that time, an evaluation can be made, and dependent upon the extent and degree of improvement in the institutional component development, a decision can be taken whether or not to extend the PACD.

C. Energy Conservation Program Component

Two broad strategies are being pursued by the ESA Project to achieve the basic objective of conservation:

i) To replace imported energy resources with alternate domestic energy; and

ii) To improve the efficiency with which energy is used throughout the economy.

This section evaluates the Energy Conservation Program to date in terms of direct, indirect and imputed benefits against established targets.

Straight energy conservation is considered the least cost method of saving on petroleum products and in effect increasing energy availability without additional investment. However, an equally important element of the overall energy conservation effort is the technical fixes to equipment which requires capital. Thus improvement in the use of energy in direct fashion by way of retrofits to energy end use devices and indirectly by straight conservation brought about via consumer awareness or pricing mechanism are both elements of the ESA Project. The conservation program under Phase I of the ESA Project consists of:

i) Public Education and Information

ii) Public auditing and retrofitting

Phase I was officially initiated in September 1981 and after early organizational and staffing problems has been proceeding relatively well.

1. Specific Project Goals and Objectives

(a) Public Education and Information

One of the prime goals of the ESA Project is to establish a fully equipped and operational Energy Information Center. The specific objectives of this unit are two-fold:

(i) To greatly increase the holdings and diversity of the MMET's existing Energy Information Library and upgrade systems for the storage, retrieval and dissemination of various energy technologies and conservation measures. This unit is primarily aimed at the technical and institutional audience.

(ii) To undertake the promotion of energy conservation awareness and public education on energy related issues.

Indicators of the units performance will be:

- Establishment of a computerised Energy Bibliography System;
- Collection of the Energy Bibliography of other libraries;
- Establishment of a linkage between the EIC and international Data Base;
- Increased media coverage highlighting energy technology;
- Increased public awareness and knowledge of the methods of conservation.

(b) Energy Audits

The Public and Private Sector Energy Auditing and Retrofitting Programmes were both designed to:

i) Identify and implement direct energy saving measures within the sectors;

ii) Serve to demonstrate what is achievable on a cost effective basis in the area of energy management;

iii) Firmly establish the concept of energy management within the public sector.

(c) Building Energy Conservation through Passive Design and Energy Management

Development of an Energy Conservation Manual for the Building and Construction Industry is an objective of the ESA Project. It is expected to act as a catalyst in promoting energy efficiency in buildings through the dissemination of technology on both Passive Building Design for Energy Conservation and Energy Management Systems for Buildings.

(d) Transportation Energy Conservation

The specific objectives for Transportation Sector Conservation fall within the ambit of the Public Education Program and the Energy Conservation Program for the Public Sector and is not reflected as a budget line item. There are no specific outputs in the original project, the program being designed to sensitise motorists and fleet operators to the importance and methods of energy conservation in relation to transportation.

(e) Electricity Sector Conservation

The World Bank has an active lending program in the electricity sector which focuses on Power System Rehabilitation and improving the energy efficiency of the JPS. USAID assistance to the

electricity sector under the Project has so far been limited to short term training or consulting provision. However, some conservation measures for the electricity sector do fall within the ambit of the Public Education Program and the Jamaica National Energy Conservation Plan which is itself a specific output of the ESA Project. These measures relate to:

i) Sensitising electricity consumers to the importance and methods of energy conservation; and

ii) Electricity rate structuring to provide incentive for conservation.

2. Organization, Management and Administration

The first ESA Project Evaluation Report of May 1983 revealed that the Energy Division of the MMET which has overall implementation responsibility for the Project was experiencing some difficulties related to the organization and management of the Project. In accordance with the recommendations of the Evaluation Committee, the functions of the former Project Implementation Unit (PIU) are being carried out by staff in the various areas of the Energy Division. Overall co-ordination of the project activities is performed by the Project Director via the individual unit heads in the Energy Planning Unit and the Energy Development Unit. The Energy Development Unit is responsible for the Conservation Program, Alternate Energy and Information and Public Education. This unified project structure has tightened implementation control and improved reporting and accountability.

In order to ensure effective monitoring of project activities, the Energy Division submits quarterly reports for all components of the ESA Project to USAID within 3 weeks after the end of each quarter. These reports include financial data showing the expenditures and performance for each sub-activity of the Project. Reports to USAID by consultants attached to the project are also submitted through the Project Director.

The Energy Office of USAID monitors the Project on a continuous basis to ensure that the stated project goals and objectives are being achieved in an efficient and timely manner and consistent with terms of the Loan Agreement.

3. Program Performance

The Energy Conservation Program is one of the notable successes of the Project. The conservation effort and the World Bank's Power Rehabilitation Program for the electricity sector stand out in the entire energy sector in terms of tangible results. Table II.3.1. summarizes the performance of the conservation program against the established targets.

TABLE II.3.1

Conservation Program Performance

(August 1985)

Output	Cumulative Planned/Actual	
Energy Audits	62	57
Conservation in Buildings (Handbook and Seminar)	1	1
Retrofits (Project Goal as %)	80%	50%
Energy Auditors and Energy Managers Courses (No.)	5	5
% of Energy saved Through Retrofits	15%	13%

(a) Public Education and Information

The Public Education Program has been successful in terms of the introduction of the knowledge and methods of conservation to the general public and identified target groups. Activities of the Energy Education Unit include the conduct of seminars on fleet management and driver efficiency training, the development of a pilot Primary Schools' Energy Education Program including curriculum development, workshops and teacher education and the publication of handbooks and other media material. The fully equipped mobile unit is an important support element for the Public Education Unit. The Unit is regularly invited to give talks and participate in symposiums and displays such as Denbigh and Farm Tech.

The main target groups implied by the objectives of the Public Education Program have been identified as Industrial, Commercial and Hotel Enterprises, Motorists, Farmers and Students. About 75 audiences of approximately 20,000 persons have been addressed via the Mobile Unit.

The Energy Information Center, like the Energy Education Unit, is coordinated by the Director of Energy Conservation. The Library of the MMET has been significantly expanded as intended, to serve not only the needs of the MMET but also the needs of the other GOJ organizations working in the field of energy, as well as the needs of the public for energy information. The holdings of the EIC is evenly developed in all areas owing to the specific inputs of the SRC, CAST, UWI, Geological Survey Dept., NRCD and PCJ. It is expected that by year end printout of the National Energy Bibliography will have been accomplished as targeted. Establishment of the computerised data base of the EIC is well advanced.

(b) Technology Transfer

The Public Sector Energy Auditing and Retrofitting Program has been eminently successful in the dissemination of energy conservation technology. To date, audit reports for 54 establishments have been prepared showing a potential fuel saving of US$4.62 M. and 29 retrofits completed with an indicated saving of US$1.02 M.

Energy Audit activity has begun to wind down as nearly all public sector hotels and factories targeted have been audited. The audit and retrofitting program in the public sector has forcefully demonstrated that the priority placed on energy conservation is fully justified as the cost of the retrofits completed and in progress are less than one million dollars U.S. indicating a payback of less than one year.

The auditing and retrofitting program has succeeded in building a cadre of locally competent auditors and significantly strengthening the technological energy infrastructure of the country. The Jamaica Energy Auditors Handbook and the Energy Conservation Manual for Buildings have been produced and have gained acceptance by the technical community. As a result, the performance of the private sector Jamaican consultant energy auditors has been good, on the average. A significant benefit which can be imputed from the audit program is the tendency to improve operation and maintenance of plant and equipment as a result of audit exposure and activity. While difficult to quantify this factor is known to have resulted in a 20% energy saving in one plant without undertaking of retrofits.

(c) Training

Careful attention is being given to training and the quality of auditing performed by energy auditors. After graduating from the CAST auditing course, an examination is given which must be

passed. For those passing the audit course, a one-day contract is awarded to audit a facility. The conservation advisor reviews the audit result on site to determine whether performance was satisfactory. If so, the auditor is allowed to compete for contracts awarded by the Ministry and arising from activity related to the Energy Credit Fund.

The major training components of the ESA Project relate to the CAST Energy Center and the institution building program for the MMET. The Energy Center is expected to impact all areas of energy sector development and management. The Center has been established as an autonomous unit at CAST and is involved in training and research as well as fulfilling the role of an Alternative Energy Demonstration Center.

Significant training is also occuring under the project in an informal way via seminars by the Energy Sector advisors under the META contract. In addition to counterpart training, the project supports the long term overseas training of MMET staff in selected energy courses.

(d) Development of Project Ideas

A Draft National Energy Conservation Plan has been prepared for discussion by the META Energy Conservation Advisor. This Plan includes project ideas, budget and staffing to accelerate the Energy Conservation Program. Project Profiles have been prepared for projects in the transport, power, residential and industrial

and commercial sectors. In addition, concept papers have been developed for some of the project ideas. The concept paper on Electric Energy Pricing has been submitted to the JPS and a fullscale rate structure study commissioned by the JPS is now underway.

Development of the Conservation Plan has contributed significantly to prioritization of projects on a rational basis.

A total of 40 projects in energy conservation with a budget of $3,392,000 (J) and $876,000 (US) are outlined in the Conservation Plan. The individual projects range in scope from a $10,000 (J) study to develop a Residential Building Energy Code to $1,000,00 (J) and $300,000 (US) for the installation of a fullscale bagass drying system in a sugar factory.

The conservation program has also led to a comparative review of conservation measures in other countries in order to assist with the focus and direction of the Jamaican effort.

Economic and Financial Performance

(e) The Energy Conservation program which largely comprised of a public audit and retrofitting component had an initial foreign exchange budget of US$1.79 million and the equivalent of US$1.28 million in local currency to be provided by the GOJ. The elements of the conservation program and corresponding foreign exchange budget is shown in Table II.3.2 below:

TABLE II.3.2

Conservation Program Foreign Exchange Budget

Element	FX Budget (US)
TA - Long and Short Term	347,000
Public Education Program	211,000
Mobile Demo. Unit	23,000
Energy Conserv. Ind. Dev.	33,000
Energy Conservation Manual	41,000
Private Sect. Audit & Retrofit	72,000
Public Sect. Audit & Retrofit	1,061,000
Total	1,788,000

From the 62 public sector audits and approximately 40 retrofits carried out, indicated energy savings amounting to 57% of the potential energy savings identified, were achieved. This is due to the fact that not all Energy Conservation Opportunities (ECO's) identified have been implemented. On an average, the retrofits show a simple payback period of less than 1 year. The actual dollar savings to the enterprises represent approximately 13% of previous energy costs and 8% of the barrel of oil equivalent.

In addition to benefits under the program as a result of retrofits involving the replacement of equipment and parts and/or installation of new equipment, a large percentage of ECO's involved basic operation and maintenance procedures which should properly have been part of ongoing maintenance in the establishments. As a result of these 'easy technical fixes,' foreign exchange spending on the audit and retrofit segment of the program has been significantly under budget. On the other hand, the budgetary constraints of the GOJ has restricted the flow of local counterpart funds to the Project.

With the objective of relating reimbursement from USAID to the actual foreign exchange costs of projects, USAID/MMET developed a formula for USAID reimbursement for foreign exchange costs of actual completed works as follows:

Solar Water Heating Installations	0.396	or	39.6% of total cost
Audits and Retrofits	0.513	or	51.3% of total cost

MMET pays the full cost for the above project activity accomplishment. Reimbursement are then made by USAID to MMET based on these formulae and upon project activity completion. However, reimbursements made by USAID under the present project arrangement does not improve the cash flow position of the MMET as these funds are paid over to the Ministry of Finance. The MMET in turn is dependent on the Ministry of Finance to provide the budgeted allocation to the project and this is often not forthcoming on a timely basis nor at the levels desirable.

4. Conclusions on the Energy Conservation Program

(a) Project Impact

The Energy Conservation Program has significantly improved the technological energy infrastructure of Jamaica. The project has been successful in developing an institution, in the private sector, of energy auditors, retrofit contractors and solar water heater suppliers. Such a private sector institution, through its own sales initiatives is expected to accomplish more in spin offs than the project can ever hope to fund.

In the case of energy audit and retrofitting, the project goals are being achieved at foreign exchange expenditure levels significantly below levels of cost indicated in the project, as the major portion of the inputs are being supplied by local suppliers rather than imports. Also, the tendency toward implementing the easy technical fixes first has reduced the GOJ's expenditure rate.

The fact that the audit and retrofit program has achieved the target of 62 audits planned ahead of schedule is instructive. It indicates the advantages of the project management model and of having a single agency charged with the responsibility to initiate as well as to see that things are done.

(b) Project Strengths

The major achievements of the ESA Project conservation program are:

(a) The firm establishment in Jamaica of the concept of energy management within the public and private sectors;

(b) The building of the energy infrastructure of the country in terms of knowledge base and the development of an energy industry manufacturing and technical base.These are elements that should over time develop their own synergy and ensure the accomplishment of the objectives of energy conservation and management beyond the life of the Project.

(c) Project Weaknesses

(i) Incentives: The general administrative and tax costs associated with implementation of energy conservation measures requires urgent attention. Although the public education and information effort has been successful in raising public awareness on energy conservation practices by way of publications, the electronic media demonstration units and symposia, the specific need exists to give the public the incentive and confidence to tackle energy conservation issues on an individual basis. This is particularly so in the electricity sector where the JPS rate structure has created a perception in peoples minds that conservation does not reflect in savings to them.

(ii) Staffing: Both the Public Education Unit and the Energy Information Center continue to be understaffed. This is primarily attributed to low salaries and the Governments efforts to force cutbacks in public sector staffing via redundancies and budgetary constraints in order to meet IMF conditionalities.

(iii) Uncertainty Surrounding Funding: The originally planned GOJ contribution to the audit and retrofit segment of the conservation program was the local currency equivalent of US$1.8M. Uncertainty surrounding receipt of budgeted GOJ allocations by the MMET has created a severe handicap for the program in terms of structured planning of the implementation effort.

The uncertainty surrounding the receipt of funding (together with the re-organization of the Jamaica Information Service (JIS)) has also had negative impact on the Public Education Program.

With the re-organization of the JIS, the Public Education Unit no longer enjoys use of the JIS reproduction facilities and the media program formerly handled via JIS now has to be handled through a private sector advertising firm at considerably greater expense. Also, because of the nature of a media campaign involving the booking of slots on the electronic media and the operational practices of the local advertising agencies, it is difficult to have an advertising campaign conducted without some up front cash. Under the current ESA Project administrative rules, the Unit is experiencing difficulty with access to the Advance Account on which it operates and as a result the media campaign has been severely curtailed.

(iv) Program for Transportation & Residential Sectors: Energy conservation in the transportation and residential sectors was not included in the project design, except as public education. Additional mechanisms for technology transfer of energy conservation specifically targeted at these sectors are needed. The Public Education Unit, through its Energy Co-ordinators Association, has written the JPS regarding its rate structure and at time of writing an electricity rate structure study commissioned by the JPS is in progress.

(v) Follow-Up on Initiatives: The Primary Schools Pilot Energy Conservation Program has successfully demonstrated that energy conservation can be taught in all subject areas. Evaluation of the pilot project has been handed to the Ministry of Education for further action. However, efforts to get the Ministry of Education to implement a widespread curriculum program for Primary Schools has not yet been successful as this would add one more extra burden to the overburdened primary school teacher. In the meanwhile, lack of full staffing in the Public Education Unit is limiting the ability of the unit to maintain or expand the primary schools program.

(vi) Verification of Energy Savings

The verification of actual energy savings as opposed to calculated values will reinforce the credibility of the conservation program. To this end, the MMET has instituted a program of post audits in

some of the establishments retrofitted to evaluate performance on an actual basis. This process requires refinement in the form of an institutionalized energy management information and reporting system.

The Ministry of Finance has indicated interest through the Energy Co-ordinators Association in the establishment of posts for energy co-ordinators in public sector institutions. The energy bill for the public sector is in excess of J$50M annually. This sector is thus an area of great potential for the energy conservation program.

D. Alternative Energy Sector Component

1. Project Goals and Objectives

The purpose of this component of the project is to assist the Government of Jamaica in its efforts to develop its indigenous energy resources.

As with the other components of this project, achievement of this overall goal would be by:

(a) strengthening Jamaica's institutional capability through training, technology transfer, and developing a coordinated network of institutions.

(b) improving the data base for alternative energy opportunities and developing a strategy for their exploitation.

(c) promoting the use of alternative energy resources through implementation of selected projects.

The goals and objectives of each of these three major elements are briefly described below.

(a) Institutional Strengthening - The project is to provide for an increase in the number and quality of the professional staff in the Energy Division and to establish and build up the capability of other allied organizations.

At the start of the Project, the Alternative Energy Branch was to be increased to 8 to 10 professionals. A subsequent revision to the project, undated, reduced the staffing level for the Alternative Energy Branch to 4 engineers of which 2 were to support the technical phase of the USAID energy project.

The Project will also provide for the development of an Energy Center at the College of Arts, Science, and Technology (CAST). The Center will offer all the courses and all the local training planned under the project. The Center will promote training in practical research and technology on solar and solar crop drying appropriate to Jamaica.

Among the training to be offered at CAST and the Vocational Training Development Institute (VTDI) will be the "Solar Systems Designers and Installers" program, a series of courses to provide practical training in the design and installation of solar operated equipment.

A third element of institution building for Alternative Energy development is the establishment of standards and testing procedures to certify quality designs and construction of solar equipment. This effort will be located within Jamaica's Bureau of Standards (BCS).

A fourth element is to establish Demonstration Centers in various parts of the country to disseminate and promote small scale Alternative Energy technologies among the rural populace, including solar water heaters and crop dryers, charcoal kilns, biogas digesters, and other suitable technologies.

The final element in Institution Building for Alternative Energy Development is to promote the development of a viable and active private sector alternative energy industry.

For all of these elements, training programs both long term and short term, were to be made available and necessary equipment, including vehicles, were to be purchased. In addition, consultants, long term and short term, were to be provided urder various contracts to provide hands-on expertise in the various technologies and to provide on-the-job training. These additional supports are described in the next section.

(b) Improving Data Base - Extensive work had been done to identify the Alternative Energy Resource Base available to Jamaica, including such resources as hydro, peat and biomass, although additional detailed information is needed in other areas. To integrate Alternative Energy Opportunities within the overall objective of reducing Jamaica's dependence on imported oil, an overall strategy for exploiting Alternative Energy resources will be developed including the potential quantitative contribution from the various resources and the time horizon for their availability. In addition, more detailed solar and wind data will be gathered to better identify the extent and availability of these resources. The project will support a total of 10 climatic stations to be set up throughout the country to collect this data. The Meteorological Office of Jamaica will manage this data collection activity.

(c) Promoting Alternative Energy Use - Installation of solar hot water heaters will be promoted both in the public and private sector and the results monitored to identify the oil savings

resulting from the installation. USAID and the Government of Jamaica will jointly support this effort. The original target was to install 25 solar water heaters (15 hospitals, 5 hotels, 5 public sector enterprises); however, the target level was revised to 32 installations. For those public establishments that earn profit, a cost sharing system is to be worked out. For the remainder, installations of the solar water heaters will be free.

Such installations will not only demonstrate the effectiveness of this technology as a cost effective energy saving technology, it will also provide a market for the further development of the solar hot water industry.

Post installation evaluations will be conducted to insure that the original estimates of energy savings are verified.

Another obvious potential is the use of biomass for energy, particularly fuelwood and sugar cane. One aspect of this program is to provide further research into fast growing trees for fuelwood and the more effective use of this and other biomass energy sources. Another aspect is to improve the use of bagasse, the fiber residue of sugar cane after the sugar and molasses have been extracted, as a fuel supply. This latter is not an original effort under the Energy Project but emerged as a result of an assessment by USAID in October 1984 indicating the significant gains which could be made if bagasse consumption for energy end use could be enhanced through growth of sugar cane with higher fiber content (energy cane) and retrofit of more efficient boilers and other equipment in the sugar industry. This pilot project is known as the "Energy Cane" Project.

2. Organization, Management and Administration

As previously mentioned, the Alternative Energy Program will be managed by an Alternative Energy Branch within the Energy Division of the Ministry of Mining, Energy and Tourism. This branch will comprise 1 senior engineer plus 3 other engineers. In addition, other Government organizations will be strengthened to assist in the development of alternative energy resources. For example, CAST will manage the Energy Center, provide specialized training, and conduct research and development; BOS will test and certify locally manufactured solar projects; the MO will manage the 10 climatic stations, collecting the data periodically and providing them to CAST and UWI; and finally, demonstration centers will be installed at Knockalva and Bodles to promote adoption of small scale alternative energy technologies for the rural population.

To support these organizations, extensive training opportunities and consultant services are to be provided including long term university training, a long term alternative energy consultant in-country and a total of about 60 person months of short-term consultancy. A training plan will be prepared by the Energy Development Unit.

3. Budget

Funds for the Alternative Energy segment of the Project funds are to be provided over a 5-year period from AID and the GOJ. For the A.E. segment, USAID was initially to provide nearly $3.7 million (U.S.) plus $120 thousand (U.S.) in local currency over the 5-year period while the GOJ was to provide about $4.6 million (U.S.) in local currency. Of the USAID contribution, $1.5 million (U.S.) was to support implementation of the solar hot water heaters in the public sector; $1.1 million (U.S.) was for technical assistance to include $560 thousand (U.S.) for the META contract; $588 thousand (U.S.) for training support and $508 thousand (U.S.) for equipment and vehicles.

A subsequent revision which reduced the overall AID contribution for the ESA Project from $7.5 million (U.S.) to $6.5 million (U.S.), resulted in some reduction in the above figures.

The originally planned GOJ contribution of $4.6 million (U.S.) included $1.1 million (U.S.) for salaries; $467 thousand (U.S.) for buildings and offices; $352 thousand (U.S.) for equipment and vehicles and $2.3 million (U.S.) for design, construction and installation of solar water heaters in the public sector. A subsequent revision reduced the overall GOJ contribution to the Project from $10.168 million (U.S.) to $8.0 million (U.S.) resulting in a commensurate reduction to the alternative energy sector.

4. Program Performance

(a) Achievement of Goals

(1) Strengthening Jamaica's Institutional Capability - At the outset it must be stated that the ESA Project's goals in this area of the alternative energy sector have been achieved or can be expected to be achieved by the end of the Project, with one potentially notable exception. The Alternative Energy Branch within the Energy Development Unit of the Ministry of Mining, Energy and Tourism is not at the staff level now envisioned, three professionals in lieu of the 8 originally proposed, and there appears to be little hope of achieving the goal of a stable, well trained staff of suitable size in the time remaining. Inadequate salaries, reduced and intermittent GOJ project funding, and IMF constraints, have inhibited the development of the staff within the entire Energy Division. Of the 13 original professionals in place in the ED when the ESA Project was initiated only three remain, one of them on contract. It is remarkable that despite this, the other goals set out for the Alternative Energy sector are being successfully achieved.

The Energy Center at CAST is housed and in place; equipment has been purchased, programs on solar energy research and solar crop drying are underway and local training in selected energy courses

is established. The "Solar Systems Designers and Installers" program has to date trained over 60 engineers and technicians and the program has been given four times with an average of 15 students. Standards and testing procedures for certifying the design and construction of solar equipment have been developed and are in the process of being adopted and the specifications for the test equipment have been developed and bids will soon be solicited. BOS personnel have already received training on the use of this equipment. A demonstration center has been established at Knockalva and a second is in the process of being established at Bodles. The Knockalva Center is operational but difficulties in GOJ payment to the director have arisen. Special attention to the resolution of this problem is being given to insure that this demonstration center does not become overly dependent on Peace Corps volunteer administration.

Lastly, through the use of training and contracting, a private sector has been promoted and is in place ready to pursue profitable ventures in alternative energy development, particularly the design, construction and installation of solar water heaters. Unfortunately, the current depressed state of the Jamaican economy and the dampening effect of the present tax structure limits significantly the extent of these alternative energy opportunities. That the goals in this sector are being achieved and in some cases exceeded (see below), despite the personnel problems of MMET is as stated earlier, a remarkable achievement.

One reason for this success is that early action has been taken to restructure the institutional responsibilities by altering the role of the Energy Division to one of planning and coordination and distributing the implementation responsibilities to other institutions, thereby reducing the workload of the MMET staff. Another reason is that despite the departure of key personnel from MMET, they remained available within the overall government structure, moving for example to the Petroleum Corporation of Jamaica (PCJ) and have continued to play important roles and exercising some continuity in the energy Project. Another reasor is that notwithstanding the shortcomings of employment within the Civil Service, some quality personnel have been retained allowing the Energy Division to perform its functions.

(2) Improving Data Base

Eleven solar and wind gathering stations have been set up throughout Jamaica and nine other stations are being incorporated into this data gathering system. Ten (10) of these stations were developed with the support of the Energy Project while the remainder were supported directly by GOJ. The data collected is being sent to the MMET as well as to CAST and the University of the West Indies for research purposes. The Meteorological Office, whose personnel have received the needed training, are responsible for these stations and for the collection of the data. Equipment problems have arisen and are being addressed.

Additionally, with the assistance of a short-term consultant, the Energy Division staff compiled a reasonably comprehensive data base of all renewable energy sources in Jamaica ("Review of Potential for Renewable Energy Sources in Jamaica") which is being used to evaluate the cost effectiveness of the various technologies and their potential for significant contribution to Jamaica's energy requirements.

This effort is incorporated into the overall development of the National Energy Plan.

The shortage of staff at MMET may, however, limit the scope and depth of this effort.

(3) Promote Alternative Energy Use

Installation of solar water heaters in the public sector has proceeded smoothly and with few apparent problems. Because this effort has proceeded so well and at expenditure rates well below budget, the original target of 25 installations have been revised upward to 32 installations. Twenty Four (24) installations were completed and 8 in construction as of March 1985. MMET staff estimated total energy savings of 1442 barrels of oil equivalent (BOE) per annum for those units already completed with an additional 638 boe for those under construction. An annual energy savings of 2080 boe signifies a value of $60,000. For all units the average payback period will be 4.26 years assuming the estimated energy savings are realized.

Verification of these estimated energy savings is essential to demonstrate the cost effectiveness of these units and to publicize nationwide the value of this effort. The verification effort has, however, been hindered to some extent by the lack of personnel in the Energy Division and the failure of some institutions to collect the needed data. This problem needs to be resolved.

The use of solar water heaters is a well established alternative energy technology and if the estimated energy savings from the completed installations are verified and publicized, the high cost of electricity and fuel in Jamaica should provide the needed incentive for increased use of this technology. The Energy Project has already underwritten the development of a solar water technology industry, and the establishment of the Energy Credit Fund (ECF) makes available a source for funding additional solar water and conservation technology in the private sector including residences. Yet the installation of solar water heaters in Jamaica remains at a relatively low level.

Conversations with various individuals in industry, the Banking community and government indicates that a root cause, if not the primary cause, for this lack of activity is the present tax structure.

A 16% import duty is imposed on any raw material to be used to fabricate the solar water heaters. The duty is higher on finished

goods but appears to average around 25% of the ad valorem value of the import. A 10% excise tax is then imposed on the manufacturers when the unit is built. An additional 27 1/2% "consumption" tax on the ad valorem value of the product is imposed on the manufacturer after building the unit, regardless of whether it is sold or stored for later sale. Finally, a 10% retail tax is imposed when the unit is sold.

It is evident that these taxes more than doubles the ultimate cost of these units. Further, the consumption tax discourages mass production and storage for later sale. As a result, unit manufacturing costs are higher than they would otherwise be making it difficult to develop an industry able to export solar water heaters.

It is evident that a policy conflict exists between the Government's desire to reduce imported energy and its need for income. It is possible that real benefits may accrue to the economy from the savings in foreign exchange, growth in employment and development of an exportable product; which could arise from a reduction in taxes on energy saving equipment, in this case solar hot water units.

A careful analysis may show that the seeming loss of income from removal of the consumption tax, for example, would be more than offset by the increase in income arising from increased sale of

these units (including income from taxes on profits and salaries) as well as the reduction in demand for foreign exchange arising from lower energy imports. Additionally, since much of the energy backed out would be in the form of electricity, the incremental reduction in electricity demand has further benefits in reducing the capital requirements for electrical supply.

It is recommended that such an analysis be performed so that potential benefits of the Energy Project can be fully explored. This will assist the GOJ in assessing the potential for increasing energy savings and spreading these savings across a wider spectrum of the Jamaican economy, as well as the potential for nurturing an industry able to produce energy saving equipment not only for the domestic market but for export as well.

Fuelwood is another potential renewable energy source in Jamaica. A recent study described the uses of fuelwood, current and potential, and the level and distribution of this resource, along with the costs involved in developing and establishing forest plantations for fuelwood.

A total of 32 acres have been planted with tree types of various species in 8 different locations and plans are underway to develop a 550 acre pilot tree plantation at Long Pond sugar factory, using the fuelwood to produce steam and electricity for consumption within the factory and backing out the current use of imported heavy fuel oil. Current analyses indicate that the Long Pond pilot project would have about a 4-year payback period.

Another, more ambitious, biomass project has been initiated at the Monymusk sugar plantation and factory, this one involving the evaluation and development of more energy efficient bagasse by the production of sugar cane with higher fiber content and higher BTU fuel potential. The energy cane project will be integral to an overall plantation improvement project to be funded by the World Bank.

The energy portion of the pilot project involves the experimental planting of selected sugar cane varieties and energy cane types on 500 acres of land. In accordance with experiment results, the entire plantation of 20,000 acres will be given over to such new varieties as increase the quantity and fuel quality of bagasse for use as a substitute energy fuel. It is ultimately hoped that the combination of additional bagasse and more efficient energy production will allow Monymusk to sell electricity to JPS under a cogeneration agreement.

Of all of the projects initiated under the Renewable Energy phase of the USAID Energy Project, the energy cane project appears to offer the most significant benefits not only in terms of developing an indigenous energy supply able to provide a meaningful contribution to Jamaica's energy needs but also in helping to revitalize the sugar industry in Jamaica through the commercialization of energy from sugar plantations.

At present this project is moving along well, receiving the interest and attention of U.S. private industry (Bechtel Corp) as well as the GOJ.

(b) Funding Commitment and Expenditures

As previously mentioned, funding from USAID of $3.86 million (U.S.) and from GOJ of $4.6 million (U.S.) were to be provided to underwrite and support the alternative energy phase of the Energy Project.

The largest single increment ($1.53 million from AID and $2.3 from GOJ) were targeted for the public sector solar water heater installation component. To date, this phase has expended and committed only a total of about $2.0 million (J), or using the current exchange of $6 (J) to $1 (U.S.), about $330 thousand (U.S.). This seemingly low level of expenditures and commitments can be explained by two factors; overgenerous planning estimates of the cost of this phase of the project and increases in the "J" dollar conversion rate which were not reflected in original cost projections.

Annex I of the original Project Paper contained estimates for solar water installation in hospitals which overall averaged about $100 (J) per installed gallon of hot water. The actual costs have run about $90 (J) per installed gallon. When other facilities (hotels, health centers, etc.) are included, actual costs declined to about $70 (J) per installed gallon. Thus the amount of funds allotted to this effort was more than necessary.

Secondly, and more important, the conversion rate at the time of Project approval was $1.78 (J) to $1 (U.S.). This rate has since climbed to over $6 (J) to $1 (U.S.). As a result, this phase of

the project, even with the current expansion, is being successfully implemented below the budget originally projected. A similar situation has developed through all elements of the Alternative Energy segment. For example, a combined level of over $600 thousand (U.S.) was budgeted for the fuelwood study, not counting consultant expenses. Expenditures to date show only about $60 thousand (J) expended, yet this effort appears to be meeting its targeted goals. It should, however, be noted that the demonstration center at Bodles has now entered the phase of major equipment purchases and expansion of operation, which will involve a significant increase in expenditure levels. As a result, USAID has committed $450 thousand (U.S.) for this expanded phase. If the goals for this final year are met, the funds targeted for this project should be fully used.

Unfortunately, problems have developed with respect to the level of funds provided by GOJ. Due to IMF constraints, GOJ funding has been reduced. Warrants on a monthly basis have been provided to the Energy Division defining how much will be available for that month to pursue the Energy Project. Such an arrangement makes it impossible to pursue planned activities, particularly those involving capital expenditures. The problem is compounded by the fact that reimbursement from USAID does not occur until after the GOJ expenditure is made. This reimbursement does not go to the MMET for continuation of its activities but to the Ministry of Finance.

This situation applies to the entire Energy Project and not just the Alternative Energy phase of it. It is evident that some alternative arrangement is necessary to insure that the project is not inadvertently starved of funds because of the IMF strictures.

(c) Effectiveness of Consultants

Under the Alternative Energy phase of the Project one long term Alternative Energy consultant (about 5 years) was to be made available shortly after the project began (Sept. 1981). The primary purpose was to provide to the MME's Energy Division an individual knowledgeable in various aspects of alternative energy technologies, who could provide advice and assistance during the early stages of the Project. Additionally, a total of 60 person months were budgeted to provide assistance in various phases and disciplines involved in this phase of the Project.

Although various candidates for the long term consultancy position were presented for consideration, none were found suitable and the position remained essentially unfilled until January 1985. The individual currently in place is on a one year contract and unless renewed, will depart around January 1986.

It must be reiterated that the original intention in placing a long term advisor in place was to provide needed expertise during the formative early phase of the project when counterpart knowledge of alternative energy technologies would be limited. During the prolonged delay (Sept. 81 - Jan. 85), extensive formal and

on-the-job training has resulted in the growth of knowledge of alternative energy technologies both in MMET and in allied organizations. As a result the intended value of this position may have been overtaken by events. It appears that the current incumbent to this position is functioning more as a senior staffer to the Energy Division than as an advisor on alternative energy technologies.While this situation is understandable and in some instances acceptable because of the current staff shortage in the Energy Division, it does not conform to the original purpose for having this advisor in place.

In view of the level of knowledge which has been developed on alternative energy technologies within Jamaica, as evidenced by the progress noted in pursuing the various alternative energy projects, it appears at this stage that the need for such an advisor is no longer necessary and consideracion should be given to terminating this role at the conclusion of the incumbent's current contract.

The use of short-term consultants for the alternative energy phase appears to have been effective and productive, based on a check of the types of consultants and the reported results, as well as discussions with various GOJ personnel. Examples are the reports produced by Messrs. John Arnold, Norman Brown, and Charles Laws and the training performed by Messrs. Banta, Delucia and others.

In view of the apparent success of the short-term consultant activity, at least for this phase of the Energy Project, in providing knowledge and training on a timely basis, it is

recommended that the remaining technical assistance funds made available by termination of the long-term consultant on Alternative Energy technology, be utilized to expand the opportunity for use of short-term consultants.

(d) Linkages with other Institutions

Unlike the situation which existed at the time of the previous evaluation, communication of the Energy Division with other GOJ institutions involved in energy matters appears to be at the least amicable.

III. Evaluation of Phase II - Energy Credit Fund (ECF)

The energy sector assistance project has been planned to be implemented in two phases. Phase I, as previously reported, deals with public sector institutional development and conservation and alternative energy activities. Phase II whose evaluation follows has been planned and developed to provide low interest loans for private sector conservation and alternative energy investment, and for the manufacture of energy saving devices.

A. Background

The original project document, prepared to seek AID/W loan funding authorization, basically included the information for the review of Phase I activities of the program. Before authorization of Phase II activities, a demand analysis for the amount of the energy credit fund needed within the private sector was necessary. The First Washington Associates Consultant study analyzed energy conservation opportunities (ECO) and determined the credit demand within the private sector for the proposed activities.

A total of thirty-three ECO's were identified, evaluated and found to be economically attractive and technically feasible. Projected energy savings for these ECO's amounted to 32% in electricity and 36% in fuel consumption. The total capital for implementing all thirty-three ECO's was J$2.8 million (US$1.57 million) of which US$970,000 represented foreign exchange costs. Projected simple payback of all projects was 2.5 years and the foreign exchange payback 1.9 years.

1. Project Agreement

AID loan funding in the amount of $5.9 million was authorized on July 27, 1983. A loan agreement was signed with the GOJ on July 29, 1983 with a resource requirement by the Borrower of the equivalent of US$5.6 million (J$15.7 at then exchange rate) including costs borne on an "in-kind" basis. The PACD was set at September 30, 1986, the same as the PACD of Phase I. Because of unforeseen initial promotional and organizational needs, the fund was not officially initiated until June 1, 1984. A recent joint GOJ and USAID funding review resulted in an agreement to a deobligation of $4.0 million of the Phase II loan funding leaving a balance of $1.9 million. At the time, July 30, 1985, given the relatively small level of utilization of the energy credit fund (ECF) and the relatively short time remaining in the project, the amount of the deobligation appeared to be within reason.
Annex I of the project agreement outlines and amplifies the description of the Phase II implementation. The project purpose will be achieved by the establishment of the ECF to finance local and foreign exchange costs for energy projects in conservation, alternative energy, energy industry development and energy audits. Loans for these projects will be made available to qualified borrowers from commercial banks accredited by the National Development Bank (NDB) to participate in the ECF. Overall responsibility for the ECF will rest with the NDB. The MMET will provide technical support to the NDB in this activity.

2. Project Description

The initial project activity funding of the ECF provides $1.6 million (US) from the AID loan and $1.0 million (US) equivalent from the GOJ.

The funds are to be made available from the NDB through a select group of commercial and merchant banks, known as Approved Financial Institutions (AFI's). The AFI's are sub-lenders of the fund. They are responsible for the appraisal, approval, and supervision of the energy projects financed by the ECF and they bear all of the risks. Every candidate must first have a detailed energy audit conducted of their facility by a Certified Energy Auditor. The energy audit must contain, the energy consumption data, energy usage and flow analysis, identification of ECO's, and economic analysis of all ECO's for the proposed site. The loan applicant must then submit to an AFI a loan application which contains a brief description of the type of business, history and financial status of the firm, and a description of what energy conservation projects they want to be financed by the ECF. The AFI then evaluates the credit worthiness of the applicant, the proposed ECO's and the approved list of energy conservation investments. After the AFI has approved the application, it must then be submitted to the NDB for review to assure conformance with ECF guidelines. In addition to approval of the application, a firm applying for funds from the ECF must be fully Jamaican (registered in Jamaica), be privately owned, and incorporated as Limited Liability Companies to be eligible.

The AFI's will be authorized to approve loans up to a maximum of $200,000 (US) over a maximum repayment period of 5 years. Loans exceeding $200,000 (US) and up to a limit of $500,000 (US) will require USAID approval. Interest rates are set below market rates. The current interest rate is set at 20%, from which 1% will be paid to the GOJ to cover exchange rate risks assumed by the Government, 2% to the NDB for administrative fees, 3% to the AFI for risk compensation and administrative costs; and the balance to meet AID debt service requirements and to replenish and augment the ECF.

B. Progress

USAID originally committed $5.9 million (US) to the ECF with the GOJ committing $5.6 million (US). However, because of the pressing need for funds elsewhere and the low level of disbursement occuring in the ECF, USAID deobligated and reprogrammed $4.0 million (US) from the ECF to other programs. As a result, only $1.9 million (US) is now available from USAID. The fund was established in February 1984 with an initial GOJ contribution of $3.5 million (J) to which an additional $1.0 million (J) was subsequently added. A Letter of Commitment is being opened with Citibank for $1.6 million (US) authorizing Jamaica's National Development Bank (NDB) to draw against this Letter of Commitment for overseas purchases associated with ECF loans.

Conversations with NDB project manager for the ECF indicated that, to date, five loans had been approved for a total commitment of about $1.0 million (J) and $300 thousand (US). An additional four to five loans are now being processed through the Affiliated Financial Institutions (AFI's) which, if approved by NDB, will involve additional commitments of about $2.0 million (J) and $200 thousand (US). Another 15 energy audits are underway, completed or under evaluation. Latest reports indicate that new applications are beginning to flow into the AFI's but lack of initiative the AFI's slows the process somewhat from this point.

To obtain further insight into the operation of the ECF and to understand the relatively slow rate of activity, the team visited one company (Kingston Ice Ltd.) who had already received a loan; one company (Seprod) in the process of applying for a loan; two companies who have sought loans or who have tried to interest their customers in requesting ECF loans (Energy Management Ltd. and Graymill Engineering Ltd.); two banks who have processed loans for their customers (Scotia Bank Ltd. and Eagle Merchant Bank Ltd.), and the National Development Bank.

From all of these interviews and discussions, one factor was considered primarily responsible for the apparent low level of activity; the current depressed state of the economy and the resultant unwillingness of industry to take on additional debt. It is, however, the view of the evaluation team that a second factor may be contributing to the current apparent low rate of activity within the ECF; the lapse of time and detail required by the ECF loan application process.

The requirement that a full energy audit accompany the application, can add about a three-month delay or more, to the process. When the audit identifies energy conservation opportunites (ECO's) which can be performed immediately within current operating costs and practices, the applicant will often perform these first before proceeding further with the application, thereby creating further delay.

Thus, unreported and sizeable energy savings probably are being obtained from the ECF loan request process. A recent study done by David Marsh, a U.S. graduate student, "The Effectiveness of the Energy Credit Fund as an Incentive for Conservation," indicated that about 1500 barrels of oil equivalent/annum were currently being saved as a result of actions taken on ECO's identified by the ECF audit, but not requiring ECF funds, and a further 8300 barrels of oil equivalent/annum from ECO's being implemented or planned to be implemented for a total of nearly 9800 barrels of oil equivalent/annum. This signifies a potential savings of $275,000 per year.

Another factor which may be contributing to the apparent low rate of commitments from the ECF, is the existence of high import duties and other indirect taxes on the equipment which is imported under the ECF. The taxes increase the size of the loan required to implement the energy conservation opportunity, reducing the value of the energy savings and increasing the payback period.

Some of the interviewers indicated that prospective clients to the ECF were making qualitative judgements that the cost of implementing the energy savings, which included the taxes, would not be worth the benefits.

The presence of high import duties may also explain the low level of the foreign exchange component (that portion of the loan to be underwritten by the AID portion of the ECF) in the approved and prospective loans. While the GOJ portion for approved and prospective loans is about $4.7 million (J), the foreign exchange component involves only about $500 thousand (U.S) or a little more than 25% of the $1.9 million (U S.) budgeted for this effort. While the time involved in processing a loan application (two months or longer) appears lengthy, the bulk of this time is spent in conducting and evaluating the energy audit, and this has valuable operational spin off benefits that enhance the usefulness of the process.

Other aspects of the ECF, such as the level of interest charged (20% versus 30-35% for commercial loans), the type of collateral required by the AFI's, the compensation allowed the AFI (three percentage points of the 20 percent charged to the client), do not appear to be factors affecting the performance of the ECF at this time. For example, while one bank indicated that the compensation allowed the AFI was low and did not encourage the bank to aggressively promote the ECF, the other bank considered the fee level to be reasonable given the current state of the economy. Additionally, as pointed out by the NDB project manager, the availability of foreign exchange in the ECF makes this fund more attractive to prospective clients than commercial loans.

IV. Evaluation of Contracting

This evaluation has been conducted primarily through discussions with MMET, NDB, META and USAID personnel. The purpose and intent was to determine that open, competitive, and contracting procedures were being implemented and followed in project activity, planning and development.

A. Contracting Procedures

GOJ contracting procedures are consistent with competitive practice necessary to receive most advantageous and lowest price quotations. Within the MMET, all contract awards are competitive and approvals go through an internal contract committee. Awards in excess of J$150,000 are required to go to the GOJ Ministry of Works for approval. Loan funded US dollar contracting is required to generally be consistent with and to follow AID contracting and competitive procedures.

For U.S. commodity and equipment procurement, MMET has entered into a purchasing agent agreement with the Afro-American Purchasing Center, Inc. (AAPC). AAPC which charges a fee of 7 1/2% has performed as the purchasing agent in a multitude of AID programs throughout the world.

AAPC also conducts training courses for foreign nationals to assist and familiarize them with AID procurement regulations and competitive bidding/quotation, insurance and shipping procedures. Three participants from Jamaica have received this training, one

now working at the Ministry of Education and two at the MMET. The latest procurement documents from the MMET reflect this new capability. Whereas previous reviews resulted in considerable USAID editorial revisions and corrections, the latest documents have been generally acceptable as submitted.

B. Disbursements

Phase I construction activities are fully paid for by the MMET, and upon each individual project construction completion, the MMET has submitted the required documentation for USAID foreign exchange cost reimbursement from loan funding. In accordance with the original planning, 40% of the construction activities would involve foreign exchange costs to be paid out of loan funds. An evaluation of actual costs based on implementation experience indicated a minor reduction of the foreign exchange component of solar hot water installations to 39.6%, while the disoursement ratio for energy audits had been increased to 51.3%.

Other disbursements under the loan are made as the costs are incurred.

C. Performance

Contractor performance, namely that of the long-term consultant, META, has been evaluated on the basis of conclusion reached from discussions with MMET personnel, project activity reviews, both in the office and field, with META representatives, and reviews of META progress and related energy reports on planning, conservation, and alternative energy.

(1) META Systems, Inc.

The performance of this long-term contractor has received both favorable and critical review. The conservation advisor who has been in-country for over 2 1/2 years has been well received and highly respected, has also provided highly effective, professional and well appreciated advice, and MMET which has already granted two extensions to his contracted time would like him to continue. The energy planner and chief of party has only recently come on board, July 1985, to fill a vacancy that has existed since mid-1983 when the incumbent was released after only an approximate one-year stay, primarily because his qualifications and experience were inconsistent with position need and requirements. A alternative energy advisor has only relatively recently arrived in-country for the first time in January 1985.

It becomes difficult to really evaluate META performance in fulfilling its staffing obligations under its contract. Considering its failure to provide the staff on a timely basis, its performance on this count has to be judged in the poor category. Of the two incumbents initially assigned, one evaluated a success and the second released before completing his contracted time period, overall performance again would become a poor to possibly fair evaluation.

The evaluation of the current two relatively newly arrived incumbents also becomes problematic because of the relatively short duration of tenure and the questionable need for their type of professional expertise at this advanced point in time of overall project activity. In fact, it now is considered that shorter-term advisors to provide a broader spectrum of expertise would more closely respond to current project activity needs, and experience with short-term consultants has been very satisfactory.

Other comments indicate a feeling that advisory/consultant type of project input now comes more from the MMET than from the advisors. Also, general feeling exists that the long-term consultants now fill more of a staffing role than an advisory/consultant position. In fact, overall it is considered that a change in long-term consultants maybe in order at this time to bring a new outlook and new ideas into project activity thinking.

In discussions and reviews of the project documents and progress reports, the above view was conveyed, that of staff operation

rather than consultant/advisor. Consultant reported collaboration, coordination, and discussions with other government agencies and international financial entities and reported training activities for U.S. peace corps representatives would appear to be local government functions and staff responsibility of the MMET.

V. Future On-Going Activities

The ongoing activities of the Energy Division at the end of the ESA Project should be directed to focus on the core areas of energy policy, energy planning and co-ordination and collaboration with outside energy sector entities.

While these functions center around the activities of the Economic Planning Unit, the how of achieving adequate availability of energy whether by increasing supply, demand management or conservation requires a sound knowledge base and the keeping abreast of technology. The development and maintenance of the EIC must therefore be a priority in the future ongoing activities of the Energy Division.

The development and establishment of the processes to enable the planning function to be successfully undertaken in future years should be fully in place before the end of the ESA Project. This includes the models, information gathering system and methodologies. It is not expected that the implementation and project management functions presently being performed in respect of the public audit and retrofit program and the solar program will extend beyond the PACD date.

VI. Conclusions

The evaluation has been based on the Statement of Work provided to the team members at the start of the three-week evaluation, see Attachment II.

A. Phase I

Phase I activities as pertains to the energy conservation and alternate energy components are now advancing well, are achieving and in some cases exceeding program expectations, after the unforeseen delays as many times experienced in initiating and implementing project activity. Institutional development, however, appears to be lagging.

1. Institutional Development

(a) The first project evaluation, conducted in late April and early May 1983, expressed little hope that the ED could achieve the full staffing needed for a viable organization.

(b) The current evaluation also concludes that full staffing as needed for a viable and professionally functioning ED unit is still lacking.

(c) Both evaluations conclude that the principal factor producing the extremely high-rates of personnel turnover, annual rates in excess of 50%, is the low salary scale of the MMET.

(d) Without increases to salaries that at least are competitive with those of other parastatal organizations created by the GOJ, staffing problems will persist, and the ED will continue to experience personnel and related staffing problems inhibiting to real institutional development.

(e) Discussions and reviews indicate no other real and practicable solution to this continued high staff turnover rate. Other ideas, such as USAID financing to top off salaries, personal services contracting or permanent staff as a means of circumventing salary scale restrictions, organizing or transferring the ED into a GOJ parastatal entity, again as a means of circumventing salary restrictions, or increased benefits, as provided by parastatal entities and the private sector as a means for attracting and retaining staff, are at best temporary stop gap solutions which can be pursued as temporary measures.

2. Alternative Energy

(a) The Energy Center at CAST is housed and in place, equipment has been purchased, programs on solar energy research and solar crop drying are underway, and local training in selected energy courses are established.

(b) The solar systems designers and installers program has to date trained over 60 engineers and technicians. The program is given several times a year with an average of 20 students. Standards and testing procedures for certifying the design and construction of solar equipment have been developed and are in the process of being adopted. The specifications for the testing of equipment have been prepared, and bids will soon be solicited. BOS personnel have already received training in the use of this equipment.

(c) A demonstration center has been established at Knockalva, and establishment of a second center is underway at Bodles. The Knockalva Center is operational, but personnel and staffing related difficulties have arisen. Resolution of this problem will be needed to avoid that the operation of this center does not become overly dependent on the Peace Corps volunteer in attendance.

(d) Through the use of training and contracting, a private sector has been promoted in the alternative energy field, and it is in place ready to pursue profitable ventures, particularly in the design, construction and installation of solar water heaters. The currently stressed state of the Jamaican economy and the inhibiting effect of the tax structure, however, could work to significantly limit the opportunity for growth and development.

(e) Eleven solar and wind gathering stations have been established, and nine other stations for a total of twenty, are being added.

(f) A comprehensive data base of all renewable energy sources for Jamaica has been compiled, "Review of Potential for Renewable Energy Sources in Jamaica." This compilation is being used to evaluate the cost effectiveness of various technologies and their potential for significant contribution to Jamaica's energy requirements.

(g) The original goal of 25 solar water heater installations has been revised upward with the contracting of 32 units. As of March 1985, 24 public installations were completed and 8 were in construction.

(h) To complete the evaluation of fuelwood as a potential renewable energy source, plans are underway to develop a 550-acre pilot tree plantation at Long Pond sugar factory.

(i) Consultants are on board and experimentation has been initiated at the Monymusk sugar plantation and refinery to explore the fuel values of varying types of bagasse to be developed from higher fiber content sugar cane. Of all the project activity initiated under the renewable alternative energy phase, this energy cane project analysis appears to offer the most potential and significance in benefits in amount of energy (60MW) to be developed and resultant financial gain to be derived.

3. Energy Conservation

(a) The Public Education Program has been successful in terms of the introduction of the knowledge and methods of conservation to the general public and identified target groups. Activities include the conduct of seminars on fleet management and driver efficiency training, the development of a pilot primary school energy education program, together with curriculum development, workshops and teacher education, and the publication of handbooks and other media material. The fully equipped mobile unit is an important element for the public education unit.

(b) The Energy Information Center, the library of the MMET, has been significantly extended to provide energy information to the other GOJ organizations and to serve the general public.

(c) To date, energy audit evaluations have been completed for 54 public establishments and 29 retrofit activities have been implemented.

(d) The project has trained and developed 15 locally competent energy auditors and has significantly strengthened the energy infrastructure technology of the country. Energy audit exposure to conservation activity has resulted in initiatives toward better and more efficient plant energy and equipment operation and maintenance practices.

(e) The Jamaican Energy Auditors Handbook and the Energy Conservation Manual fc Buildings have been published and distributed, and they have received good acceptance by the professional and construction community.

(f) A draft National Energy Conservation Plan has been prepared to identify potential project activity, together with related budgeting and staffing needs. A total of 40 projects in energy conservation activity with a budget of J$3.4 million and US$0.88 are identfied.

(g) The project has successfully encouraged and developed a capability and capacity in the private sector of energy auditors, retrofit contractors and solar water heater suppliers.

(h) The energy audit program has exceeded its goal of 62 programmed audits ahead of schedule.

(i) Project energy conservation construction goals are being achieved at expenditure levels significantly below cost levels estimates of the project agreement.

4. Funding

(a) Based on the continued decline, throughout implementation, of the Jamaican dollar against the US dollar, counterpart contributions by the GOJ to project activities may not achieve original planning of Jamaican dollar contributions projections. Some J$10.0 million actually has been expended versus a planned J$18.1 million, the US dollar equivalent of the US$10.17 million counterpart value at the exchange rate during initial planning.

(b) As of June 30, 1985, loan funds in the amount of $3.4 million remained uncommitted. The GOJ has developed a program to utilize $2.0 million of these uncommitted loan funds by the PACD of September 30, 1986. This indicates a later loan deobligation possibility of $1.0 million.

(c) During the six-month period, ending August 31, 1985, loan funds in amounts of $0.38 million have been expended and $0.24 million committed indicating slow disbursement.

(d) During the previous fiscal year, the ED received GOJ funding of J$3.22 million out of J$10.0 million budgeted. During the current fiscal year, the ED has been allocated J$4.0 million of J$8.0 requested. This indicates a need to consider loan funding advances in accordance with already established USAID procedures in order to ease ED cash flow problems from reduced budget allocations.

5. Consultants

(a) The need for long-term consultants has been superceded by the progress of the project. Selected highly specialized short-term consultants rather than the broad based generalist appears more appropriate at this stage of the project development.

(b) Such other short-term consultants would benefit the project with a new look and high degree of specialization.

(c) The META System consultant contract type, long-term broad-based individuals, is no longer applicable and should be terminated.

B. Phase II

(1) The Energy Credit Fund has disbursed funds at a rate lower than was originally contemplated. The reasons for this are the current depressed state of the domestic economy, the length of time to process applications through to ECF approval and disbursement and a lack of incentive in the private sector for assuming added non income producing financial obligations.

(2) At this time, 5 loans have been approved, totalling $1 million (J) and $310 thousand (US). Additional loan requests are being evaluated.

(3) The foreign exchange component for the approved and pending loans is lower than originally contemplated because the high cost of imported material is deterring applicants from pursuing energy savings projects with a high import component.

(4) The NDB appears to be administering and promoting the ECF in a satisfactory manner.

C. Project Assistance Completion Date

1. The PACD of September 30, 1986 for Phase I, other than training, should be maintained, subject to a review of progress in the ED institutional strengthening and development to be conducted in June 1986.

2. The PACD of September 30, 1986 for Phase II should be maintained subject to a review of loan disbursements to be conducted in June 1986.

D. Other Energy Related Activities

1. UNDP, IBRD, IDB, USAID, CIDA, and the Governments of West Germany, Italy, United Kingdom and Scandinavian countries are offering multilateral and bilateral financial and technical assistance to the GOJ in the energy sector.

2. Other statal and parastatal agencies involved in the energy sector include the PIO/J, PCJ, JPS, and the MPUT.

3. Other energy related activities, principally financed by the international participating agencies, include hydroelectric planning and development, peat energy fuel substitution research and pilot-plant investigations, coal energy fuel substitution reviews and investigations, and investigation and examination to improve JPS operation and power generation.

4. In view of the unusually broad international interest and support in the energy sector, continued USAID participation would appear limited for other than selected short-term consultancies and special project activities reviews and reporting within the area and scope of the current ESA Project.

E. Energy Savings

The ESA Project has resulted in an indicated annual energy savings of 36,270 barrels of oil equivalent (BOE) or $1.02M (U.S.) per year. The projects in the pipeline initiated under the Project are expected to produce additional savings in the order of 40-60000 BOE per annum. Full exploitation of the indigenous energy resources available to Jamaica (excluding conservation) has been reviewed and estimated as shown below:

Potential Energy Supply

Solar	140,000	BOE
Bagasse	1.4	MBOE
Peat	1.4	MBOE
Hydro	2.1	MBOE
Biogas	11,000	BOE
Fuelwood	200,000	BOE
Total	5.25	MBOE

VII. Recommendations

A. ED be reorganized and a new professional salary structure established to be competitive with that of other GOJ parastatal entities.

B. Import duties on ECF foreign exchange funded procurement be waived.

C. PACD extensions, and possible funding deobligations, for either the Phase I component or the Phase II component or for both components, be subject to results of favorable progress reviews, to be conducted in June 1986, as regards institutional development achievement and project funding disbursements.

D. A decision be taken immediately to terminate the META Systems technical assistance contract in whatever manner is most beneficial to USAID and GOJ, and future technical assistance activity be concentrated in short-term, highly-specialized professional services contracting.

E. A decision be taken to advance loan funding to the ED for funding project activity implementation costs.

ATTACHMENT # 1

STATEMENT OF WORK

The consultant will serve as a member of the Evaluation Team as well as the Chief of Party. The Team will conduct an in depth evaluation of the Energy Sector Assistance Project (Phase I and II) starting October 16, 1985. The consultant will prepare the team report on the evaluation and submit three (3) copies to the Office of Engineering, Energy and Environment, USAID/Kingston and twelve (12) copies to the Project Director, Energy Division, Ministry of Mining, Energy and Tourism, 2 St. Lucia Avenue, by the close of business on Friday November 5, 1985.

The Evaluation and Report will cover the following topics:

A PHASE I (PUBLIC SECTOR)

1. Background Material

Project Agreement, Project Paper
First Evaluation of Project
Revised Annex I to Project Agreement (Proposed)
Quarterly Reports (USAID, GOJ)
Financial Reports (USAID, GOJ)
UNDP/World Bank Report "Jamaica: Issues and Options in the Energy Sector"

2. Provide overall evaluation of each component of the Project based on an assessment of the sub activities within each component.

a) Component: Institution Building at the Energy Division

Economic Planning Unit, staff, staff (long term) training, National Energy Plan and Program development, short term training on: Energy Models, Economic Analysis, Financial Analysis, Linkages with energy supply and energy demand sectors in the public sector, computer facilities and training for energy data gathering, storing and retrieval capability.

energy savings through audits and actual energy savings with retrofits, overall % of energy savings to actual energy consumption before retrofits, total number of walk through and full scale audits, total number of retrofits, training in energy conservation in buildings, transportation fleet, boilers, hotels, etc.

c) Component: Alternative Energy Programs

Staff, long term training of staff, Energy Center at CAST (replaces Solar Energy Institute), Solar Hot Water Installations, Demonstration Center at Knockalva, Energy Cane Project, Meteorological stations for solar and wind data, Solar Hot Water Unit Certification at Burcau of Standards, Fuelwood and charcoal, Courses on solar hot water design and installation.

3. Spotcheck host country and USAID contracts prccedures and disbursements for compliance with USAID procedures.

4. Assess the performance of the long and short term consultants provided by prime contractor: Meta Systems.

5. Issues and recommendations

In addition to the team's overall evaluation of the Project, the team will comment on the following:

- The World Bank/UNDP Report has identified projects to be implemented but has not identified funding sources. Rank the projects recommended in the Report.

- USAID funding ends on Sept. 30, 1986, what recommendations would the team make for future operation of the following activities: Library, Energy Information Center, Economic Planning Unit.

PHASE II ENERGY CREDIT FUND (ECF)

1. Background Material

Project Agreement, Project Paper
Energy Audit Report
Monthly and Quarterly Reports from NDB
Promotional material on ECF

2. Evaluate the Project taking into consideration the following issues:

- The low level of request for funding from the ECF.

- The impact of excise tax, customs duty, stamp duty, consumption tax, etc. as incentives/disincentives on utilization of ECF resources.

- The types of collateral sought by the AFIs. Do these deter small and medium sized firms from utilizing the ECF?

- The impact of the ECF interest rates on the number of loan applications to ECF.

- The time it has taken so far to (a) conduct an audit (b) prepare the report (c) complete application form and (d) process the application through AFIs and NDB, for applications which have come to ECF.

- The ECF promotional campaign by NDB.

- In those cases where energy audits were completed and the project seemed attractive but clients chose not to seek ECF loans, determine:

(i) whether the audit recommendations were carried out by the client;

(ii) if recommendations were carried out, how were the activities financed;

(iii) evaluate the qualitative as well as the quantitative aspects of the performance of the ECF.

3. Recommendations

In addition to the team's overall evaluation of the Project, we would like the team's comments on the following:

- What actions are needed to increase loan applications to and loan approvals by AFIs.

- The effect on the current interest rate on loan applications to AFI's. What changes in the interest rate would you propose to increase the number of applications?

- Should the US$ amount in the ECF be increased or decreased? Under what conditions would you recommend such a change?

PERSONS INTERVIEWED AND FACILITIES VISITED

Oct. 16, 1985

Samuel Skogstad, Acting Deputy Director, USAID

St. Clare Risden, Permanent Secretary, MMET

Pearl Derby, MMET

Nigel Grant, Economist, MMET

Winston Boyne, Project Director, Energy Sector Assistance Project, MMET

Frank Ahimaz, Energy Officer, USAID

Norman Dodd, Asst. Energy Officer, USAID

Noel Lyon, Managing Director, National Development Bank

Larry Bailey, Manager, Energy Credit Fund, NDB

Thomas Tuschak, Energy Planner, META Systems, Inc.

David Keith, Conservation Advisor, META Systems, Inc.

Frank Mathews, Alternative Energy Advisor, META Systems, Inc.

Oct. 17, 1985

Winston Haye, Roddy Ashby, Edward Alexander, Steven Marston, Petroleum Corporation of Jamaica

John Compter, Peat Project, Petroleum Corporation of Jamaica.

William Saunders, Managing Director, Petroleum Corporation of Jamaica.

Neville Spike, Russel Sowers, Energy Cane Project, AGRO 21.

George Thompson, Training Officer, Jamaica Public Service

Samuel Smith, Director, Human Resource Development and Industrial Relations, JPS

Hamid Khan, UNDP Economic Advisor, MMET

Oct. 18, 1985

Noel Gray, Managing Director, Graymille Engineering Co.

Oct. 19, 1985

Martin Brinn, Energy Conservation Auditor, (with Mr. Brinn visited Kingston Ice Ltd. and Seprod Ltd. to view audit results)
(Also visited National Chest Hospital to view installed solar water heating system and Kingston Public Hospital to view installed conservation devices.)

Oct. 22, 1985

Harold Clarke, Managing Director, Energy Management Limited.

Dwight Henriques, Managing Director, CAFCON Ltd.

John Keppeler, Manager, Energy Cane Project, RONCO Consulting Corp.

Nigel Grant, Director, Economic Planning Unit, MMET.

Oct. 23, 1985

Thomas Maxwell, Project Director for Comparative Analysis Study, Center for Development Technology, Inc.

Oct. 28, 1985

R. S. Page, Manager, West India Co. of Merchant Bankers, Ltd. (Scotia Bank Group)

R. B. Hall, Senior Asst. Manager, Bank of Nova Scotia Ltd.

Oct. 29, 1985

Paul Chen-Young, President, Eagle Merchant Bank, Ltd.

Oct. 30, 1985

(Re-visit Mr. Larry Bailey, NDB)

Alfred Sangster, Project Manager, Energy Center, CAST

Brian Silvera, Technical Director, Energy Center, CAST

Sharon Smith, Admin. Officer, Energy Center, CAST

(Toured Energy Center at CAST).

DOCUMENTS REVIEWED

1) Project Paper - Energy Sector Assistance (Phase I).

2) Project Paper - Energy Sector Assistance (Phase II).

3) Project Loan Agreement between Jamaica and the U.S. for Energy Sector Assistance.

4) Annex I - Revised Amplified Project Description of the Project Agreement U.S./GOJ Energy Sector Assistance.

5) Effectiveness of the Energy Credit Fund as an Incentive for Conservation - David K. Marsh (8/6/85) Univ. of Pennsylvania.

6) META Systems Inc. Quarterly Reports to USAID.

7) MMET Monthly and Quarterly Reports to USAID.

8) Cane Production for Sugar and Electric Power in Jamaica (Oct. 1984) - USAID Report.

9) Agreement between CAST Energy Center and MMET (9/27/85).

10) Renewable Energy Technology by John Arnold, META Systems, Inc. (8/83)

11) Jamaica Integrated National Energy Planning Model; Users Manual - Argonne National Laboratory (June 1985).

12) Concept Paper on Bagasse Drying Demonstration Project - Prepared for MMET by David Keith, META Inc. (1/84).

13) Various Memos and Papers prepared for Interministerial Steering Group on Energy.

14) MMET Project Paper on Production and Utilization of Biomass (Fuelwood) as a source of Boiler Fuel.

15) Energy Sector Assistance Project Evaluation (May 1983).

16) Jamaica: Issues and Options in the Energy Sector - World Bank (4/1985).

17) National Energy Outlook (1985-1989) PCJ (7/1985).

18) Economic and Social Survey Jamaica 1984 - PIOJ (1985).

19) Jamaica Private Sector Energy Credit Fund Project - First Washington Associates - (1983).

20) Least Cost Expansion Study - Montreal Engineering Co. Limited (8/1985)

21) Jamaica Tax Structure Examination Project - Syracuse University (8/84)