

CLASSIFICATION
PROJECT EVALUATION SUMMARY (PES) - PART I

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Report Symbol U-447

1. PROJECT TITLE ENERGY CONSERVATION AND RESOURCE DEVELOPMENT INDUSTRIAL CONSERVATION COMPONENT			2. PROJECT NUMBER 517-0144	3. MISSION/AID/W OFFICE USAID/DR/CRD/EGY
5. KEY PROJECT IMPLEMENTATION DATES A. First PRO-AG or Equivalent FY <u>82</u> B. Final Obligation Expected FY <u>86</u> C. Final Input Delivery FY <u>87</u>			4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) <u>86-02-D</u> <input checked="" type="checkbox"/> REGULAR EVALUATION <input type="checkbox"/> SPECIAL EVALUATION	
6. ESTIMATED PROJECT FUNDING A. Total \$ <u>23,800,000</u> B. U.S. \$ <u>17,532,000</u>			7. PERIOD COVERED BY EVALUATION From (month/yr.) <u>October 15, 1984</u> To (month/yr.) <u>October 26, 1984</u> Date of Evaluation Review	

B. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. <u>Institutions</u> : The loss of the Commission's semi-autonomous status as an institution still remains in effect. Efforts should be made to return to autonomous status.	W. H. Smith	June 86
2. <u>Project Management</u> : Salary level of COENER field engineers are reported to be 50% of industry level, which has led to high attrition, entailing a loss of trained personnel and an inability of attract qualified, experienced engineers. Efforts should be made to encourage higher salaries and provide other benefits under the Project.	W. H. Smith	June 86
3. <u>Technical Assistance</u> : The Resident Advisor has not been able to provide the planned level of T.A. because he has often been diverted to administrative duties. Encourage COENER to properly utilize and supervise contractor.	W. H. Smith	Dec. 1985

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

<input checked="" type="checkbox"/> Project Paper	<input type="checkbox"/> Implementation Plan e.g., CPI Network	<input checked="" type="checkbox"/> Other (Specify) <u>TA Contract</u>
<input type="checkbox"/> Financial Plan	<input type="checkbox"/> PIO/T	<input type="checkbox"/> Other (Specify) _____
<input checked="" type="checkbox"/> Logical Framework	<input type="checkbox"/> PIO/C	
<input type="checkbox"/> Project Agreement	<input type="checkbox"/> PIO/P	

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

A. Continue Project Without Change

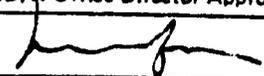
B. Change Project Design and/or Change Implementation Plan

C. Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

William H. Smith, CRD/Energy Officer
 Ing. Ramón Flores, Project Coordinator, COENER
 Gil Canario, Conservation Division Chief, CORNER

12. Mission/AID/W Office Director Approval

Signature: 

Typed Name: Henry H. Bassford, Director

Date: 4/25/80

PROJECT EVALUATION SUMMARY (PES) - PART II

13. SUMMARY: At the time of the evaluation (October 15, 1984), the institutional arrangement of COENER appeared to be adequate. COENER has been reasonably successful in raising an awareness of the need for energy conservation, attracting qualified staff, and developing a working environment inside COENER. Unfortunately, COENER has not succeeded in projecting an image of efficiency to its industrial audience. Since the time of writing this report (Oct. 1985), its image has been improving, as evidenced by the fact that 35 audits have been conducted, three pilot projects approved, three loans approved by the industrial credit fund for RD\$2.0 million, and several loan applications submitted.

14. EVALUATION METHODOLOGY: The evaluation was conducted by Robert Kowalski and Alain Streicher of Hagler, Bailly & Company, during the period October 15-26, 1984. It was based on interviews, examination of documents, and plant visits. Over 50 persons were contacted in the course of the information gathering activities.

15. EXTERNAL FACTORS: COENER, constrained by government austerity measures, was not able to provide the agreed to (and vital) personnel and logistic support. There were five energy audit engineers on board, compared to ten specified in the project paper. In February, 1985, twelve engineers were contracted.

All technical assistance contract funds were expended prematurely as a result of heavy unplanned expenditures for administrative and logistic support by the contractor's U.S. offices. In July, 1985, the T.A. was therefore extended for an additional 18 months (Dec., 1986) to provide T.A. until the PACD, April, 1987.

16. INPUT: In the evaluation of the pilot demonstration project, it was indicated that the consulting engineers required more technical detail than what was being provided in the audit reports. More complete information is needed to provide a firm basis for bids and performance commitments. At the time of this writing (Oct. 1985), the inputs have been increased as follows:

- a. Energy Audits: 35 audits by COENER and private sector consultant firms have been conducted. At least 50 audits are contemplated under the project.
- b. Pilot Demonstration Project: Three pilot projects have been approved to date. One is now being carried out. The private sector, with COENER's assistance, will carry out the remainder of this activity.

- c. Promotion: Seminars and workshops have been conducted throughout the Dominican Republic to disseminate manuals and reports on appropriate audit techniques, conservation measures, operation of metering equipment to the industrial private and public sector. A national, two-day energy conservation seminar was jointly sponsored by the Dominican Engineering Society and COENER during this reporting period. Several COENER personnel were among the main speakers.
- d. Training: This activity has been carried out through a combination of classroom lectures, practical, on-the-job training in the performance of actual energy audits and special training and workshops both in and out of the country. Two groups of five personnel, including private sector representatives, have been provided training in the U.S. and Costa Rica, respectively.
- e. Credit Fund: The \$1.6 million industrial conservation credit fund within the Investment Fund for Economic Development (FIDE) has been established in the Central Bank and is operating. The Central Bank approved two loans for capital energy conservation improvements for a total of RD\$1.5 million during this reporting period.

In the opinion of the evaluators, the resident advisor has performed his duties satisfactorily, and has provided the necessary flexibility and management capability where necessary. However, because he has often been diverted to administrative duties (e.g., procurement of instruments), he has not been able to provide the planned level of technical assistance. The short-term technical assistance has partly filled the resulting gap; however, this assistance has been of uneven quality.

- 17. OUTPUTS: At the time of the evaluation, little or any output was reached, since the credit fund had just been established.
- 18. PURPOSE: The time by which the project purposes can be achieved was not included in the scope of work of this interim evaluation.
- 19. GOAL/SUBGOAL: "Not pertinent at this time".
- 20. BENEFICIARIES: "Not pertinent at this time".
- 21. UNPLANNED EFFECT: "Not pertinent at this time".
- 22. LESSONS LEARNED:
 - a. It is more worthwhile to invest resources in the private sector than the public sector to develop the capacity to carry out energy plant audits and subsequent installations of audit recommendations.

- b. Special efforts must be made to avoid duplication of reviews when ICI's are part of project implementation.

23. RECOMMENDATIONS:

- a. Industrial conservation private practice consultants need additional training to be technically updated. Additional seminars. Done.
- b. COENER's staff need not to be involved in audit preparation. Their role should be to monitor and review audits. Done. Work handled by private sector.
- c. COENER must project an image of efficiency to its industrial audience and intensify the information visits to industries in the private sector. Done. Intensified promotional campaign by Project Coordinator.
- d. COENER's monthly report should include financial and manpower data. Done.
- e. The form of the audit reports should be expanded and restructured. Done. Includes design drawings and specifications for bid documents.
- f. Industrial plant personnel should be included in audit analyses work, and in developing recommendations. Done. Energy committees are established at the plants.

Doc. 2152F

Drafted by: CRD/EGY:Lepez-jf:04-02-86

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ACKNOWLEDGEMENTS

The evaluators were greatly assisted in their task by the kind cooperation of the staffs of the National Energy Policy Commission (COENER), the contractors (Fluor Engineers, Inc.), and the U.S. AID mission. Also, assistance was given by the Technical Secretariat of the Presidency, institutions related to the project, private consulting engineers, and industrialists. Sincere thanks are extended to all who contributed to the evaluation, and thus, it is hoped, to the projects' success.

At COENER, special thanks are due to Jose Ramon Acosta, Violeta Morobel, Bolivar Rosario, Elsa Esposito, and -- within the Energy Conservation Division (AyC) -- Carlos Rodriguez and his staff. Eduardo Maal of Fluor and his engineers were also very helpful.

At the AID mission, support was given by Larry Armstrong, William Smith, and Philip Schwab.

The evaluators are also grateful for the capable logistic support provided by the secretarial staffs of AyC and the AID mission.

LIST OF ACRONYMS

AIRD	Association of Industries of the Dominican Republic
AyC	Energy Conservation Division of COENER
COENER	National Energy Policy Commission
CORDE	Dominican Corporation of State Enterprises
DR	Dominican Republic
FIDE	Fund for Investment in Economic Development
IDEA	International Development & Energy Associates, Inc.
INDOTEC	Dominican Institution of Industrial Technology

The industrial energy conservation program sponsored by USAID in the Dominican Republic, which actually started activities in July 1983, is seriously handicapped by management, implementation, and resource problems, as well as a severe economic crisis. Technical problems are a secondary concern.

COENER, constrained by government austerity measures, is not able to provide the agreed (and vital) personnel and logistic support. There are five energy audit engineers on board, compared to ten specified in the project paper, and their number is being reduced by attrition.

All technical assistance contract funds will be expended within 6 months as a result of heavy unplanned expenditures for administrative and logistic support for the contractors' U.S. offices. Nevertheless, the state of the project's development indicates a need for the assistance of the resident advisor through December 1985.

The above problems must be dealt with in the short term to ensure reasonable project success.

EVALUATION OBJECTIVES

The evaluation objectives were to assess project soundness and achievements to date relative to the project paper, and to recommend changes to ensure the project's success.

The evaluators were asked to focus on the validity of the project design, the experience of the project to date, and the likely impact of the project.

EVALUATION APPROACH

- ① The evaluation was conducted by Robert Kowalski and Alain Streicher of Hagler, Bailly & Company during the period October 15-26, 1984. It was based on

interviews, examination of documents, and plant visits. Over 50 persons were contacted in the course of the information gathering activities.

FINDINGS

Institutions

COENER is the project coordinator. Based on experience gained in other countries, the institutional arrangement in the Dominican Republic appears to be adequate. COENER has been reasonably successful in raising awareness for energy conservation, attracting qualified staff, and developing a working environment similar to that of a private-sector enterprise.

Unfortunately, however, ¹COENER has not succeeded in projecting an image of efficiency to its industrial audience. Also, its activities are constrained by ²the loss of its semi-autonomous status and an apparent lack of support on the part of its president, the Technical Secretary of the Presidency.

Project Management

Responsibility for project management rests with the head of COENER's Energy Conservation Division (AyC);* however, services such as accounting, financial control, promotion and planning, and control are provided by COENER staff offices. ³Most project control documents are not available in the project manager's office.

⁴Project management (AyC) is not provided with the resources planned and required for successful conduct of the project. This is due to constraints on counterpart funds and manpower imposed across-the-board on the public sector by the government of the Dominican Republic (GODR).

⁵Communications between COENER and the AID mission are deficient, resulting in unnecessary work and delays. ⁶The COENER monthly progress report lacks financial and

*Abbreviation for the Spanish name Division de Ahorro y Conservacion.

manpower data, and does not compare results with the plan.

- ① Salary levels of AyC field engineers are reported to be at 50 percent of industry levels, which has led to high attrition, entailing a loss of trained personnel and an inability to attract qualified, experienced engineers.
- ② The project lacks adequate financial control reports and a budgetary control system. The financial reports produced by COENER are cash management reports rather than management control reports.

Staffing

The project is staffed by 13 persons (fully dedicated), and includes only 5 of the 10 field engineers called for in the project paper. New implementation activities programmed for 1985 will increase the field engineers' workload substantially, and will exacerbate the staffing problem.

Further staffing problems exist with respect to two key management positions that are critical to the project. The Executive Secretary of COENER, Inq. Jose Ramon Acosta, has announced that he will leave his post at year end, and at the AID mission, the energy project advisor position left by Leo Perez remains vacant.

Energy Audits

Energy audits are intended to identify opportunities for energy savings and to provide COENER with data for national energy planning purposes. About 20 walk-through audits have been completed, of which 7 have been followed by partial* instrumented audits. The project paper programmed two full audits in the first year, but none has been conducted. (Audit instruments were first received in April 1984.)

Three plants were visited to obtain the opinions of plant personnel concerning audits and seminars, and their views -- together with other information obtained -- is reflected in the comments below.

*Of limited scope.

The quality of the audit procedure and reports needs improvement, and the cycle time (from agreement to conduct an audit up to final report delivery) needs to be shortened to 4 months, from a current 4-12 months.

The audit reports need to be expanded and restructured. At present, they are oriented more toward technical personnel than toward plant management. They fail to provide an implementation plan and adequate information for development of implementation proposals. Also, they omit longer-term conservation opportunities.

Plant personnel are not included in audit analysis work, nor in developing recommendations.

The principal problems encountered in auditing activities are inadequate staffing, loss of time owing to non-availability of plant personnel on pre-arranged visit dates, and industrial safety as it relates to energy auditing.

Assistance to Industries

This subcomponent was designed to provide assistance in implementing the recommendations resulting from energy audits and in establishing plant level energy conservation programs. Since the limited technical resources available to AyC have been used mainly to advance auditing activities and demonstration projects, there has been relatively little field work in this subcomponent.

Promotion

Promotion and training services are provided by the COENER Division of Education and Communications, following a well-designed strategy. The promotional effort employs (or plans to employ) videotapes, brochures, events, posters, television appearances, lunch meetings, stickers, press releases, visits to companies, information meetings, meetings with leaders of key organizations, letters, telegrams, press advertisements, and newsletters. Target audiences are companies (industrial and commercial), government, engineers and engineering associations, consulting engineering firms, academic institutions, and the intermediary credit institutions of FIDE.

Promotional activities are planned and managed by one person, with implementation assistance from COENER management, the AyC staff, and private-sector services.

At the time of the evaluation, two 3-day seminars had been presented, and two further seminars were planned.

Several seminar participants were interviewed, and the consensus in regard to the seminar was positive. However, some participants suggested greater focus (specialization) and more technical content.

Pilot Demonstrations

The objective of this subsector is to encourage adoption of energy conservation technologies by demonstrating their effectiveness in working situations. The projects are being selected on the basis of (1) potential for application, (2) cost-effectiveness, (3) economic viability, (4) degree of risk, (5) potential stimulating effect on local businesses, and (6) experience value.

✕ There is an indication that the consulting engineers will require more technical detail than what had been thought necessary and provided in the audit reports. The more complete information is needed to provide a firm basis for bids and performance commitments.

The projects will be implemented by private consulting engineering firms, who are currently preparing bids for four projects.

With a view toward accelerating results, project management has selected projects comprising relatively simple measures that will not promote state-of-the-art technology. Two projects were ready for bids from consulting/engineering firms.

Private Audit Assistance

This subcomponent will provide grants covering up to 75 percent of the cost of audits conducted by private consulting engineering firms. The audits will first be paid for by the industrial firm, and subsequently be reimbursed by COENER.

The initial audit cost limit of RD \$2,500 was found to be unrealistic; therefore, project management has requested an increase of the limit to RD \$25,000 and is awaiting approval from AID.

Operating rules and application forms have been issued, and applications are being promoted through 23 private consulting engineering firms who are eligible to perform the audits. No financing has been granted yet; however, a request for a brewery audit is being prepared by the consultants PROSOL.

The operating rules as issued fail to define several conditions that should influence the amount of the grant. Also, the scope of the audit needs to be defined clearly, with precise terms of reference and a clear statement of what constitutes satisfactory performance of the work.

Industrial Conservation Credit Fund

This \$8 million fund will finance implementation of energy conservation measures on a medium- and long-term loan basis. The borrower will pay 12-percent interest. The mission has transferred \$200,000 out of the fund into the lignite project.

The fund was in a start-up situation at the time of the evaluation. Operating rules and application forms were to be available shortly, and counterpart funds had been requested.

The intermediary lenders to be employed by the fund are FIDE's existing institutions, which are mainly in the private sector. COENER is to furnish technical support to FIDE in the loan application review process. The procedure envisions two levels of review and approval, which will lengthen the approval period by several weeks.

The fund's policies are in agreement with the project paper; however, the operating rules lack a list of eligible conservation equipment and actions.

There was no current cash flow projection for the fund.

Technical Assistance

All Fluor contract funds will be expended by April 1985 (7 months ahead of plan) owing to heavy unplanned expenditures from contract review, changes in budget and payment procedures, accounting requirements, and other secondary activities. The original project proposal contemplated no administration nor project management support, yet these activities accounted for 54.2 percent of the man-hours used during the period August 12, 1983 to September 16, 1984.

Fluor has provided 16 man-months of resident program advisor support and 13 man-months of short-term technical support. The results were:

- Technical assistance and training to COENER professionals, assistance in seminars, and specialized technical support of energy audits.
- The transfer of computerized energy survey training/technology has been completed.
- The procurement of audit instruments and the training of AyC Division staff in their use has been completed. Consulting engineering firms were also trained in the use of audit instruments.
- AyC Division engineers have been trained in energy engineering at the contractor's U.S. offices.
- The contractors assisted in preparation and distribution of energy conservation manuals focusing on appropriate industries and topics (e.g., boilers, pumps). These manuals were made up to a large extent of photocopied material from other sources and were not particularly adapted to the Dominican Republic, or to LDCs in general.
- Forms were designed to aid in the determination of eligibility of private consulting engineering firms for energy audit financial assistance.
- Two seminars were presented. The first, in January 1984, presented the project to a broad audience. The second, in September 1984, was

for consulting engineering firms and focused on auditing.

- Four pilot projects have been selected, of which two have been submitted to local consulting engineering firms for bids.
- Assistance was given to AyC Division personnel in the preparation of bidding documents for pilot projects.

In the opinion of the evaluators, the resident advisor has performed his duties satisfactorily, and has provided the necessary flexibility and management capability where necessary. However, because he has often been diverted to administrative duties (e.g., procurement of instruments), he has not been able to provide the planned level of technical assistance. The short-term technical assistance has partly filled the resulting gap; however, this assistance has been of uneven quality.

In terms of image and human relations, the Fluor team, and particularly the resident advisor, have performed well. In contrast, the quality of some outputs leaves much to be desired; namely, audit activities and training manuals. While the Fluor contributions to seminars were satisfactory on the whole, some participants wanted a higher level of technical sophistication in the seminar papers.

To the credit of the contractor, the Dominican Republic has been provided with excellent audit instruments that are unequalled in any LDC known to the evaluators. Financial resources could have been saved by choosing simpler/cheaper instruments and in the procurement.

Inadequate logistic support and AyC staffing are the major problems faced by the contractor. Project management continues to be a problem as the management roles of the resident advisor, COENER executive secretary, and the AyC project manager have often been confused. In particular, the resident advisor has often had to make day-to-day decisions that were, in fact, the responsibility of the AyC project manager.

Private-Sector Role

Owing to the unforeseen constraints on resources provided by COENER, the project will need to rely on private-sector resources to a far greater extent than was originally envisioned. COENER-trained consulting engineering firms will serve as the principal implementation area of the project, with AyC engineers in a technical support role.

The consulting engineers are already actively seeking participants in the pilot demonstration projects, the audit assistance fund, and the Industrial Conservation Credit Fund, but most of them need extensive training prior to undertaking the implementation of such projects.

FIDE will use mainly private-sector intermediaries in the Industrial Conservation Credit Fund operations.

Also, Universidad APEC -- a private university -- is interested in establishing energy conservation seminars and courses for graduate students and plant engineers now and beyond project termination.

Linkage with National Energy Planning

The link between AyC and the National Energy Planning component is well established because the head of the National Planning/Economic Studies Division, Ing. Boli-var Rosario, had previously worked as part of the AyC team for 2-1/2 months. Also, he has worked closely with the AyC economist to establish the nature and extent of analysis and information to be furnished by the audits. However, because the principal national energy planning activities began only at the time of this evaluation (with the arrival of the IDEA consultants), it was too soon to assess the actual effectiveness of the relations between the two groups.

Project Expenditures

Project expenditures to September 30, 1984 were \$896,000, of which \$730,000 were AID funds and \$165,000 GODR funds. There have been no expenditures for demonstration projects, the audit assistance program, or the Industrial Conservation Credit Fund.

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Based on the budget total less the above three items and the contingency provisions (which together amount to \$7.12 million), the project has spent 49.9 percent of the total AID funds and 3.4 percent of the total GODR funds (Exhibit A). Of the \$896,000 spent, \$477 thousand -- or 53.2 percent -- was spent on technical assistance (AID funds) and \$165,000 -- or 18.4 percent -- was spent on salaries and local support (GODR funds) (see Exhibit B).

Based on current estimates of audit costs, it is likely that the fund for audit assistance will be depleted by the end of 1986. Assuming an average of RD \$100,000 per energy conservation demonstration project, the fund for pilot projects appears to be adequate through 1987.

With respect to the Industrial Conservation Credit Fund, loan disbursements are forecast as follows:

- 1984: \$0-0.2 million
- 1985: \$1-\$1.5 million
- 1986: \$2.5-\$3.5 million
- 1987: \$2.5-\$3.5 million.

After 1987, it is likely that demand will stabilize at \$2-\$3 million annually. Based on this projected demand, it appears that the \$8 million allocated to the fund is adequate.

Likely Project Impact

Impact on the public industries sector (CORDE companies) will be limited by a lack of implementation funds. Based on an estimated consumption of 750,000 boe per year in the public industrial sector, and assuming that largely low-cost, short-term projects will be implemented, savings of up to \$75,000 boe per year, valued at about \$2 million per year, are possible by 1990.

Prospects for savings in private industry are brighter because the strong interest in energy conservation will be supported by technical and financial assistance for implementation. Assuming that private industry consumes about 2.2 million boe annually, and a potential reduction of 15 percent, savings could reach 330,000 boe per year by 1990, or approximately U.S. \$10 million annually.

Exhibit A

Project Expenditures Versus Budget

	<u>Expenditures to September 30, 1984</u>			<u>Total component budget (\$000)</u>
	<u>(\$000)</u>	<u>Percent of adjusted budget</u>	<u>Adjusted budget* (\$000)</u>	
AID: Loan	201			
Grant	530			
Total	730	49.9	1,464	7,464
GODR	165	3.4	4,852	4,852
Subtotal	895	14.2	6,316	12,316
Contingency				1,120
Total				13,436

*Budget less demonstrations, audit assistance, and conservation credit fund.

SOURCE: Hagler, Bailly & Company.

Exhibit B

Project Expenditures to Date

	<u>(\$000)</u>	<u>Percent</u>
Salaries and local support	165	18.4
Publications and materials	53	5.9
Technical assistance	477	53.2
Vehicle rental	18	2.0
Portable instruments	100	11.2
Vehicles	48	5.4
Training	<u>35</u>	<u>3.9</u>
TOTAL	896	100.0

SOURCE: Hagler, Bailly & Company, from quarterly reports.

In addition, over the period 1985-1990, the project is likely to provide U.S. \$2-\$3 million in business to consulting engineering firms, and U.S. \$3-\$5 million to Dominican equipment suppliers for industry alone.

RECOMMENDATIONS**Major Recommendations**

- Extend the technical assistance contract (Fluor) in two phases, with an evaluation and decision point following the first phase.

Phase I: Extend the contract of the resident advisor for the period April-December 1985. Also provide 12-15 man-months of short-term technical advisor support. Estimated funding required: U.S. \$500,000-\$550,000. Perform an interim evaluation in the fourth quarter of 1985.

Phase II: If the evaluation recommends continuing the technical assistance, contract for support by short-term advisors only for the period January-December 1986. Estimated funding required: U.S. \$200,000.

- Press for restoration of the semi-autonomous status enjoyed by COENER until April 1984. Support the effort by adequate documentation of the unfavorable impact on project results.
- Provide intensive training of private consulting engineering firms and actively promote their involvement in implementing the project. Further details are provided below, under the corresponding subjects.
- Attract and retain qualified professionals through non-financial incentives, such as advanced training in the Dominican Republic and the United States. This training should be programmed in an integrated series of modules over a period of several years.
- Improve the quality of the reports generated by the project (e.g., audit reports, progress reports) to increase their effectiveness as

working documents that provide a basis for management actions.

FURTHER RECOMMENDATIONS

- Perform a project evaluation in the fourth quarter of 1985.
- Investigate the application of services available under ECSP (feasibility studies, etc.).
- Expand the program scope to include the private sugar industry.

Participating Institutions

- Make greater use of CORDE, INDOTEC, and private-sector resources to provide further support to the industrial energy conservation activities.
- Provide training, using other AID funds, to improve management skills and performance.

Project Management**Authority and responsibility of key staff**

- Assign full responsibility and authority for all aspects of the project component management to the AyC division head. He should also be given all information necessary to manage the project.

Communications and management information

- Improve project administration by a redesign of reporting and control systems and procedures as follows:
 - Reach agreement with users of all reports and other documents on content and schedule.
 - Eliminate unnecessary reports and develop forms to replace letters and reports to the greatest extent possible.

- Use a word processor for all documents issued periodically that require updating of information. Contract an outside service if necessary.
- Redesign the COENER progress report to include all aspects of the project, including manpower and financial data.
- COENER should appoint a project liaison officer responsible for all liaison with AID.

Personnel management

- A salary survey should be conducted by a professional service to support claims that the salary level of the project is not competitive and not suitable to attract required personnel. This information should be used by COENER management to press for special concessions to attract and retain personnel.

Financial reporting and controls

- Provide a budgetary control system to permit adequate control of expenditures. Budgets and reports should be on a month-to-month basis, and accounts should be in sufficient detail to permit analysis by management. Also, year-end forecasts should be provided and compared with the budget to identify expected problems.

Staffing

- To improve productivity of the present staff engineers, they should be tested to determine their need for training. The necessary training should then be provided locally or abroad. Consider sending one or two engineers to the TVA Energy Conservation Training Course of 1985.
- Tap other sources of manpower, such as retired engineers, university faculty members, INDOTEC, and CORDE. INDOTEC and CORDE could provide engineers on loan. Another option to investigate is to make far greater use of private-sector consulting engineers, providing further training as necessary.

Energy Audits

- Employ a more collaborative approach in plant audits to benefit from the experience and ideas of plant personnel.
- Improve audit reports by arranging them to stress and facilitate implementation.
- Obtain formal commitments from the firms to be audited for availability and support on the part of their personnel.

Assistance to Industry

- Offer a telephone advisory service ("hot line") to private-sector companies, providing support in design and implementation of energy conservation programs.
- Determine the market for industrial energy conservation services and provide the information to private consulting firms in a suitable brochure.
- Prepare and disseminate a directory of energy conservation services and products available in the Dominican Republic as a means of strengthening the energy conservation capability of industries.

Promotion and Training

- Conduct more specialized seminars on the technical and financial aspects of energy conservation, increasing the depth and practical orientation.
- Use university contractors to provide long-term, continuing training.
- The strategy papers prepared by Elsa Esposito should be converted into an action plan, and resources and support should be provided to ensure its implementation.

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Pilot Demonstrations

- Provide a more complete bidding package (request for proposal) to the consultants to avoid delays and encourage participation.
- Develop a short list of potential bidders, based on the particular expertise and services needed for each project.

Private Audit Assistance

- Develop rules governing audit scope (terms of reference) and relationship of funding to scope and savings.
- A full audit should be funded as soon as possible to establish the credibility of COENER in industry circles and to comply with contract requirements. Commitment for implementing viable conservation measures should be obtained from the selected firm prior to initiating work.

Industrial Conservation Credit Fund

- COENER should assist the loan review process at the intermediary institution level instead of providing input to FIDE.
- A list of eligible energy conservation equipment and actions should be added to the operating rules.

Technical Assistance

- As stated in the first recommendation, technical assistance should be extended on a flexible basis, with an interim review (fourth-quarter 1985) to determine the need to continue services and the most cost-effective type of service to contract.
- Monitor and control use of Fluor contract resources carefully, and take action to prevent further diversion of these resources to secondary activities.

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- Contract outside short-term consultants as required to supplement assistance from Fluor.
- As mentioned above, authority and responsibility for project management should reside at AyC division management level (see project management recommendations).

Private-Sector Role

- Increase the subcontracting of project services to private firms to the greatest extent possible (e.g., awareness raising, information, training).
- Consider establishing a private-sector advisory committee that would meet monthly to provide guidance and support to the project and a strong link with the private sector.
- Consider furnishing other AID funds to assist Universidad APEC in establishing energy conservation seminars and courses.

An implementation plan for the above recommendations is set forth in Exhibit C.

Exhibit C

Implementation Action Plan for Recommendations
Industrial Energy Conservation Program (Dominican Republic)

	Responsible	Completion date		Comments
		Planned	Actual	
Major recommendations				
Extend contract for technical assistance	J. R. Acosta	3/84		
Press for restoration of COENER's previous semi-autonomous status	J. R. Acosta	--		
Provide intensive training of private consulting firms	E. Maal	4/84		Plan 1/84, complete 4/84
Provide aggressive incentive program for AyC engineers	C. Rodriguez	2/84		
Improve quality control for reports, audits, etc.	C. Rodriguez	3/84		
Further recommendations				
Perform evaluation in fourth quarter 1985	AID	6/84		Decision 6/84
Investigate application of services available under ECSP	C. Rodriguez	2/84		Plan 2/84
Expand program scope to include private sugar industry	AID	1/84		
Participating institutions				
Make greater use of outside resources	C. Rodriguez	3/84		
Provide training to improve management skills and performance	J. R. Acosta	2/84		Plan 2/84
Project management				
Assign full responsibility and authority to AyC division head	J. R. Acosta	1/84		
Redesign reporting, control systems, procedures	AID/ J. R. Acosta	3/84		
Redesign COENER progress report	C. Rodriguez	1/84		
Appoint a project liaison officer	J. R. Acosta	1/84		
Conduct a salary survey	J. R. Acosta	4/84		
Provide a budgetary control system	J. R. Acosta	4/84		
Staffing				
Test and train staff engineers	E. Maal	1/84		Submit plan 1/84
Tap other sources of manpower	C. Rodriguez	2/84		
Energy audits				
Employ a collaborative approach	C. Rodriguez	1/84		
Improve audit reports	C. Rodriguez	1/84		
Obtain commitments for plant personnel availability	C. Rodriguez	1/84		

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Exhibit C (continued)

Action Plan for Recommendations

Further recommendations (continued)	Responsible	Completion date		Comments
		Planned	Actual	
<u>Assistance to industry</u>				
Offer telephone advisory service	C. Rodriguez	2/84		
Determine market for energy conservation services	J. R. Acosta	4/84		
Prepare directory of energy conservation services and products	C. Rodriguez	6/84		
<u>Promotion and training</u>				
Conduct specialized seminars	E. Maal	1/84		Submit plan by 1/84
Use university contractors for long-term training	J. R. Acosta	9/84		
Prepare action plan based on promotion strategy paper	C. Rodriguez	1/84		
<u>Pilot demonstrations</u>				
Provide complete bidding package	C. Rodriguez	1/84		
Develop short list of bidders	C. Rodriguez	1/84		
<u>Private audit assistance</u>				
Improve operating rules	C. Rodriguez	1/84		
Fund full audit	C. Rodriguez	2/84		
<u>Conservation credit fund</u>				
Revise loan review process	C. Rodriguez	3/84		
Add eligible equipment/services list	C. Rodriguez	1/84		
<u>Technical assistance</u>				
Monitor/control use of Fluor contract resources	C. Rodriguez	Continuing		Start 12/84
Contract outside short-term consultants	C. Rodriguez	--		As required
<u>Private-sector role</u>				
Increase subcontracting of project services to private sector	C. Rodriguez	6/84		
Consider establishing private-sector advisory committee	J. R. Acosta	2/84		Decision 2/84
Consider assisting Universidad APCC to establish training	J. R. Acosta	2/84		Decision 2/84

SOURCE: Hagler, Bailly & Company.

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Introduction

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The original objectives of the project were (1) to establish an institutional capability in industrial energy conservation to carry out audits, recommend appropriate conservation measures, assist industries in the implementation of those recommendations, and encourage a broader effort on the part of the private sector in industrial conservation; (2) to implement five pilot projects in industrial conservation to demonstrate the feasibility of energy-saving measures that could be replicated on a large scale; and (3) to establish a credit mechanism for assisting industries of all sizes (primarily other than power generation, petroleum refining, mining, and sugar processing) in financing energy conservation measures.*

Subsequent to the approval of the project paper, there have been significant changes in several factors that affect project implementation.

Higher energy prices and stronger private-sector involvement have had a positive impact on the conduct of the project. Private-sector consulting engineers have been attracted by the project and have received training in a technical seminar. Thirty-two firms have registered with COENER, indicating their interest in performing energy conservation work. Applications for energy audits received from industry are now being referred to the private-sector consulting engineering firms for bidding. Project management plans to use them extensively in auditing, design, and implementation activities. The role of the project staff engineers will be largely one of providing technical support to the consulting engineers.

Administrative delays, austerity measures, and logistic problems have impacted project implementation negatively. Complex purchasing procedures slowed the procurement of audit instrumentation significantly, and in the end required intervention by Fluor and unplanned use of

*Project paper, paragraph II-A, p. 18.

their resources. The bulk of the instruments were finally received in July 1984. Consequently, audit work started in the second half only of 1984.

A national economic crisis entailing deficit and foreign exchange problems obliged the GODR to apply strong austerity measures to the public sector, including salary cuts, wage freezes, and hiring freezes. These measures were applied to COENER and the project personnel as well, despite the separate project funding arrangements. As a result, the salary levels of project professionals -- originally higher than those in the private sector -- are now a fraction of the private-sector levels. The non-competitive salaries offered by the project have led to a serious understaffing of AyC, and the resulting attrition of trained engineers is a serious problem that must be addressed.

A change in the Dominican government in early 1984 produced a further setback for the project in the form of a certain loss of autonomy. Until May 1984, COENER had authority to expend project funds within the allowed amounts, subject to subsequent auditing. As of May 1984, however, all expenditures became subject to the approval of other organisms of the Technical Secretary of the Presidency (who is, in fact, President of COENER). This arrangement entails multiple approvals and rejustifications, and onerous paperwork.

The result was initially a virtual paralysis of the flow of counterpart funds to the project (except for payroll), and a continuing shortage of funds to provide basic logistic support, such as office supplies, photocopies, and telephone service.

The net result of the above-mentioned positive and negative developments is that the overall project concept and organization have remained unchanged, and still appear to be the most suitable for the situation, but the loss of COENER's semi-autonomous status is having a very negative impact on project operation.

Evaluation Objectives

The objectives of the first evaluations of the Industrial Energy Conservation Component of the project were to assess program soundness and achievement to date relative to the project paper, and to propose recommendations to ensure success of the component.

The evaluators were requested by USAID/Santo Domingo to focus on the:

- Validity of the original project design in the light of experience to date
- Experience of the project to date, including accomplishments, quality of outputs, and problems and obstacles encountered
- Likely impact of the project on establishing a continuing local energy conservation program and on actual energy consumption.

The mission further suggested that the evaluation center particularly on project design, management, and institutional aspects rather than on technical aspects.

The complete scope of work as set forth by the mission is provided in Appendix A. The mission director further requested that the evaluators address the following questions:

- Has the project achieved results with the resources available?
- Could it obtain more results with more resources?
- Is the project being constrained?

In addition, AID/LAC/DR requested that the evaluators address the financing issue, including the plan mechanism and policies governing the Industrial Conservation Credit Fund to be established under the project.

Evaluation Approach

The evaluation was conducted by Robert Kowalski and Alain Streicher of Hagler, Bailly & Company (ECSP contractors) from October 15 to October 26, 1984. (Mr. Streicher participated during the second week.) The evaluators were based in the offices of AyC in a COENER annex.

Over 50 persons were interviewed in the course of the evaluation, as indicated in the list of contacts in Appendix B.

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The evaluations were based on interviews, examination of documents, and plant visits. Interviews were conducted with USAID/DR, COENER, the Technical Secretariat of the Presidency, CORDE, INDOTEC, the Association of Industries of the Dominican Republic, the Central Bank, the Technical Assistance Contractor, private and public companies involved in the energy audit program, private consulting engineering firms, and participants in seminars sponsored by COENER.

Plant visits were made to gather impressions of the industrial sector in regard to the overall program, audit work, and reports and promotional activities.

Telephone interviews were also conducted with seminar participants and consulting engineers when it was not possible to arrange meetings.

Final debriefings were given to COENER (Director and AyC staff) and to the AID mission on October 25-26. Also, a preliminary draft report was delivered to the AID mission on October 27 prior to the departure of the evaluators for Guatemala.

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1

DETAILED FINDINGS

1.1

In this section, the detailed findings of this evaluation are arranged as follows:

- Institutions
- Project management
- Staffing
- Energy audits
- Assistance to industry
- Promotion and training
- Pilot demonstrations
- Financial assistance
 - private audit assistance
 - Industrial Conservation Credit Fund
- Technical assistance
- Private-sector role
- Linkage with national energy planning component
- Project expenditures
- Likely impact of project.

INSTITUTIONS

The key institution in the project is COENER, which is the overall project coordinator. Other institutions involved are FIDE, AIRD, and CORDE. FIDE is administering the Industrial Conservation Credit Fund established by the project under operating rules established jointly with project management. AIRD has co-sponsored promotional seminars with COENER, and publishes articles in the energy conservation program in its monthly

magazine. CORDE has assigned an engineer to AyC, and has provided access to some of its plants for energy audits and pilot projects.

COENER

COENER, as overall project coordinator, is directly involved in implementation of the National Energy Planning component, the Industrial Conservation, Mini-Hydro and Wood Fuel programs and Long-Term Training.

COENER was established by Presidential Decree No. 584, January 19, 1979. It is chaired by the Technical Secretary of the Presidency and includes as members:

- Secretary of Industry and Commerce
- Administrator General of CDE
- President of the Petroleum Refinery
- Executive Director of INDRHI
- Executive Director of INDOTEC
- President of CODIA
- Representative of the universities
- Representative of the private industrial sector
- Representative of the private transportation sector
- Executive secretary of COENER.

The principal objective of COENER is the formulation of national energy policies and programs to achieve a reduction in dependence on foreign energy sources. The specific function of COENER are to coordinate the energy-related activities of different public- and private-sector agencies, analyze the national energy situation and develop national energy plans, identify appropriate areas for public and private investment, and recommend to the President specific energy policies and programs. COENER's authority includes the preparation of specific legislation or regulatory measures for submission to the executive power. This also includes "suggestions" regarding gasoline prices, electricity rates, and other

energy price structures. COENER is furthermore designated as the coordinating and recipient body for all external financial and technical assistance in the area of energy.

COENER is organized as indicated in Exhibit 1.a.

The Secretariat of COENER, which has full responsibility for the day-to-day activities of COENER, is headed by an Executive Secretary and divided into Departments of Energy Conservation, Energy Research and Development, and Economic Affairs.

The Energy Conservation Division (AyC), which has basic responsibility for the Industrial Conservation Program, is divided into departments for industry, buildings, and energy incentives. The functions of the AyC include programs to increase public awareness of the energy problem and conservation possibilities, and individual conservation programs focused on the industrial, and commercial sectors. The Division is staffed by 13 persons.

FIDE

FIDE was established within the Central Bank in 1966 for the purpose of channeling resources, through intermediary lending institutions, to the agricultural, livestock, and industrial sectors. FIDE funds are provided both from GODR (Central Bank) resources and from foreign private and public financial institutions. FIDE's funds are apportioned among agricultural production, livestock production, and industrial activity. FIDE's staff comprises 45 professionals plus support personnel.

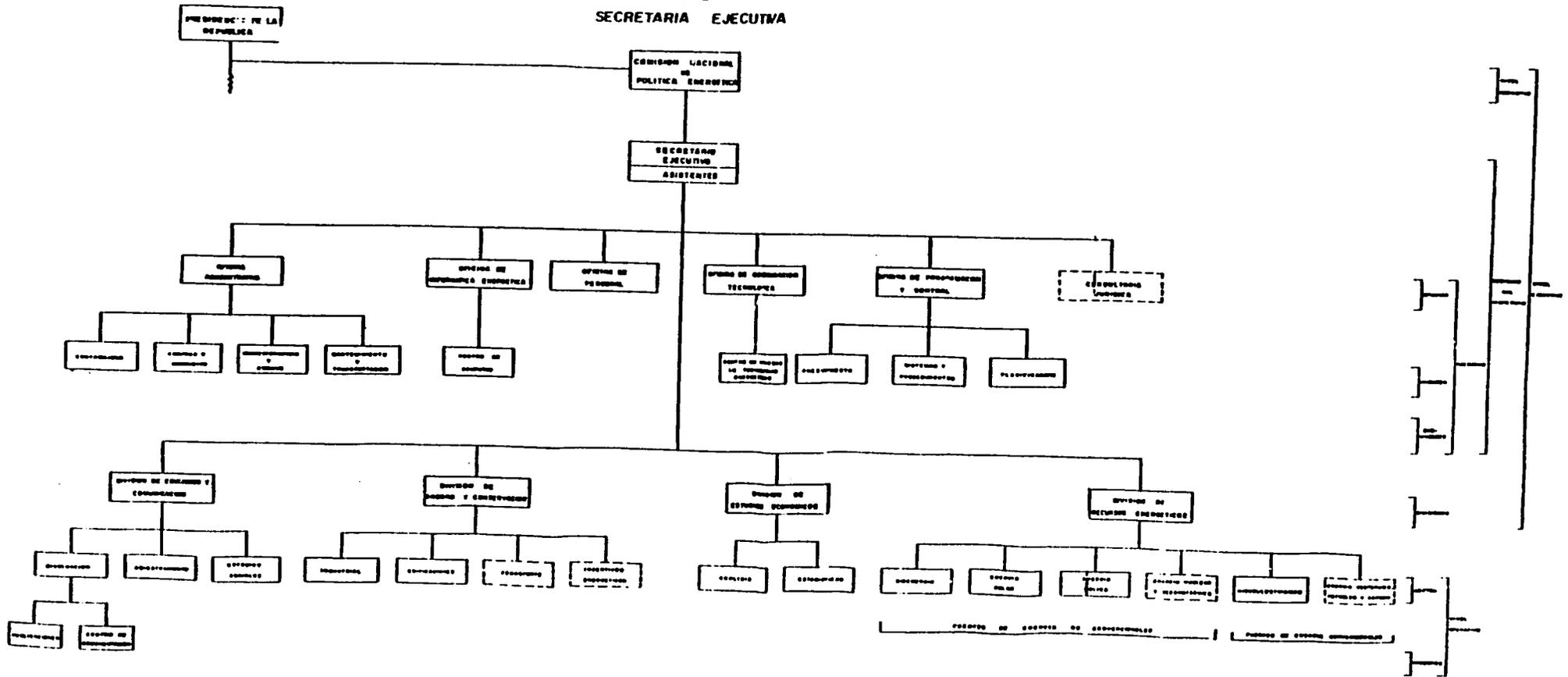
Based on the experience gained in other countries, the institutional arrangement in the Dominican Republic appears to be adequate. COENER has been reasonably successful in raising awareness for energy conservation, attracting qualified staff, and developing a working environment similar to that of a private-sector enterprise. (Working hours are 8:00 a.m. to 4:00 p.m. compared to 7:30 a.m. to 2:00 p.m. in the government offices.)

Unfortunately, COENER has not succeeded in projecting an image of efficiency to its industrial audience. Also, its activities are constrained by the loss of its

Exhibit 1.a



ORGANIGRAMA
DE LA
SECRETARIA EJECUTIVA



SOURCE: COENER.

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semi-autonomous status (described in the Introduction) and an apparent lack of attention from its president, the Technical Secretary of the Presidency.

PROJECT MANAGEMENT

This section reviews the following aspects of project management: authority and responsibility of key staff, management communications, personnel management, and financial management.

Authority and Responsibility of Key Staff

Although the AyC Manager (Ing. Carlos Rodriguez) is nominally project component manager, planning and control, budgeting, accounting, public relations, and logistics services are provided by COENER central staff units. While Ing. Rodriguez appears to be involved in all aspects of project management through frequent meetings with the Executive Secretary, he is not provided with project control documents such as current manpower, planning and control reports, financial reports, and current activity progress charts. These evaluations were referred to the Executive Secretary's staff when such documents were requested. Thus, it appears to the evaluators that the project is actually controlled by the Executive Secretary of COENER (Ing. Acosta) and that the role of Ing. Rodriguez is primarily day-to-day management of activities.

The resident advisor (Eduardo Maal) provided by the contractor (Fluor Engineers) is intended to have a technical advisory role, but owing to necessity, he has had to assume management authority at times.

The fact is that the project management is not provided with the resources planned and required for successful conduct of the project. This is due to constraints in counterpart funds and manpower imposed by higher authority (at the government level).

Management Communications

Communications within the COENER organization appear to be adequate, owing to frequent formal and informal contacts between key staff; however, communications with AID is minimum and deficient. Examination of several

documents and the comments of William Smith (project administrator at AID) indicated that reporting is fragmented, information is often inadequate for the purpose, and document originators are often not identified. For example, the quarterly progress report issued by COENER to AID is primarily a narrative document with very little data. There are no financial or management data at all, and there is no comparison of results with the plan. Some of the audits reported date back to 1982.

Personnel Management

Salary levels of the AyC Division engineers were reported to be at 50 percent (or less) of industry levels. This disparity results in high attrition, with loss of trained personnel, and an inability to attract personnel of adequate qualifications.

According to Ing. Acosta, the engineers' salaries were originally at a premium level, and personnel were carefully selected. Inflation and a general salary cut have now reduced salaries to a non-competitive level.

Financial Reporting

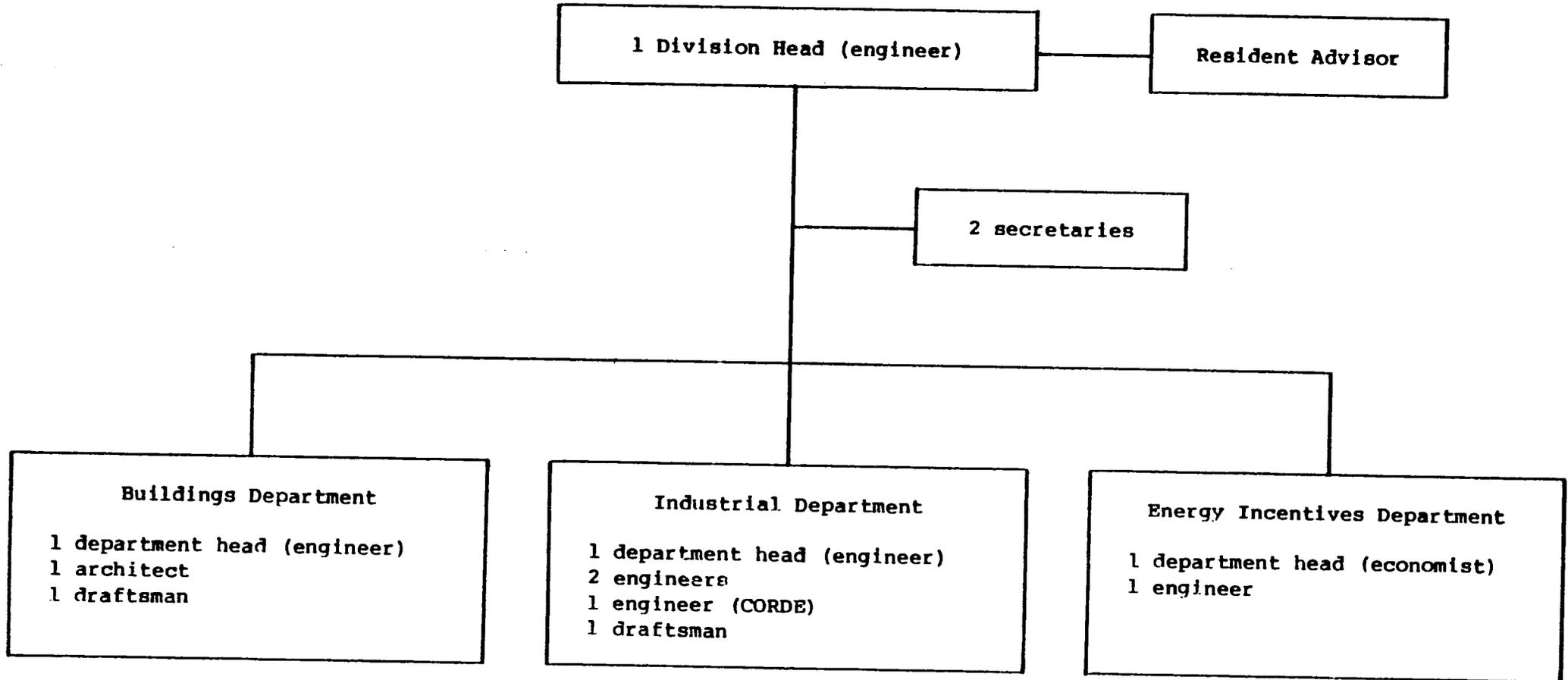
The two financial reports provided to the evaluators by COENER were cash management and accounting reports rather than management control reports. One report, called "Status of Origin and Application of Funds," shows receipts, disbursements, and bank balance by project component. The second report, called a "General Balance" appears to be a trial balance. The project lacks financial control reports and a budgetary control system.

STAFFING

At the time of the evaluation, the COENER staff totaled 89, of whom 13 were in AyC. The AyC staff included the division head, six engineers, one architect, and one economist. (One engineer was a CORDE employee on loan.) The balance of the staff comprised two draftsmen and two secretaries. The Division organization is shown in Exhibit 1.b. The engineers are mainly recent graduates, with 1 to 3 years' experience.

Exhibit 1.b

Organization of Energy Conservation Division, COENER



Total staff: 13 persons.

October 1984

SOURCE: Hagler, Bailly & Company.

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To alleviate current project staff shortages, COENER is considering transferring engineers from other activities (e.g., renewable energy) to the Energy Conservation Division; however, the need for specific skills must be taken into account. Additional personnel alone will not solve the problem; specific skills are equally important. For example, experience in designing small hydro systems will not be suitable for analyzing boiler efficiency. It is essential that adequate human resources be provided, as several new additions activities will add to the workload in 1985. They are: (1) supervision of pilot projects; (2) evaluation of audit proposals from private-sector companies and consulting engineers; and (3) evaluation of funding requests in connection with the Industrial Conservation Credit Fund.

There are further staffing problems in two key management positions that are critical to project performance. The Executive Secretary of COENER -- Ing. Acosta -- has announced that he will leave his post at year end. This will be a serious loss, as he has been with COENER from its start, and had previously formed an energy unit within INDOTEC.

Also, AID/DR has not been able to fill the vacant position of project administrator left by Leo Perez. The acting administrator has not had suitable training for the position, and cannot devote sufficient time to overseeing the project.

ENERGY AUDITS

The purpose of the energy audits is to provide plants with a means of recording energy consumption and costs, to identify opportunities for energy savings, and to provide COENER with data for national energy planning purposes. Two types of audits are being conducted: short audits and extended audits. Short audits take from 2 to 3 days, and are essentially walk-through surveys to determine if an extended audit is justified. Extended audits take from 5 to 11 weeks, and employ sophisticated instruments and an engineering approach to develop energy conservation recommendations. The project calls for the completion of approximately 50 short audits and 10-12 extended audits.

As of October 1984, about 20 walk-through audits had been conducted, and 7 of them had been followed by

partial instrumented audits (detailed audits covering only specific energy systems):

- Ingenio Porvenir (sugar): report available
- Inasca (plastics): report available
- Tejanca (textiles): report available
- San Rafael (building): report available
- Ambar (vegetable oil): report in preparation
- Induspapel (paper): work in progress
- Hache (building): report in preparation.

No full audits had been completed, although the original program called for completion of two full audits during the first year. It was clearly impossible to do so, as instruments were not received before April 1984; that is, 9 months after project work started.

In terms of quality, procedures followed in both planning and conducting the audits and the report preparation need improvement. The time span between formal agreement to proceed and final report presentation has varied between 4 and 12 months, compared to an anticipated maximum of 4 months. The reports need restructuring (e.g., all computations should be relocated to appendices) and an enlarged outline, including: (1) details of existing fixed instrumentation in-plant, (2) practical recommendations for implementation of proposed measures, and (3) a time-phased implementation plan (bar chart).

The reports examined were directed more toward technical people than toward company management. In addition, they focused on short-term recommendations and seemed reluctant to mention projects with more than 1-year payback.

The reports did not explain how project costs are estimated (e.g., sources of information, duty, taxes). More importantly, they failed to provide key information on project implementation (e.g., drawings and specifications) that are critical to obtaining project tenders from the engineering/consulting firms. This has proven to be a source of disputes over guarantees and responsibilities in other countries, as potential bidders on implementation contracts will not commit themselves on the basis of inadequate information.

A major criticism heard from plant personnel has been a lack of involvement in the data analysis and development of recommendations. The audit engineers do not

maintain contact with plant personnel between completion of the data gathering phase and delivery of the final audit report.

The subject of industrial safety is closely related to energy conservation. Audit activities have revealed many dangerous situations in the electrical, mechanical, and steam systems of plants visited. Also, two audit engineers were injured in the course of taking electrical measurements, and were hospitalized. This area needs attention.

The major problems encountered by COENER/Fluor are the inadequate staffing for the planned level of audit activity and lost time owing to non-availability of plant personnel on agreed visit dates.

The present staff of five audit engineers is inadequate to complete four to five audits in 1985, as well as undertake the new activities described above under "staffing." The manpower plan called for ten engineers, but blanket hiring restrictions in the public sector, low salaries, and attrition have prevented and will continue to prevent adequate staffing. The Division is unable to retain its best staff, as salaries are low, and incentives and rewards (non-monetary compensation) are very limited.

ASSISTANCE TO INDUSTRIES IN THE DEVELOPMENT OF CONSERVATION PROGRAMS

This activity focuses primarily on the plants that have received walk-through energy audits, and consists of providing them with informed technical and management assistance in implementing the audit recommendations (i.e., developing their own conservation housekeeping and investment programs). Beyond this, AyC is providing advice on establishing overall energy conservation programs in the plants.

Informal assistance is being provided to the companies that have been audited, including some engineering design services provided with the support of Fluor short-term specialists.

Also, progress in implementation of recommendations in various plants is being monitored on an informal basis, but results are not being documented.

The fact that the limited technical resources available to AyC are being used mainly to further auditing and demonstration projects imposes a constraint in providing the required field work in this sub-component.

PROMOTION AND TRAINING

These activities are intended to encourage and prepare private-sector industries to conduct audits and implement their own conservation programs. This involves promoting the appointment of Energy Coordinators in all plants, training private-sector personnel, promoting the use of private-sector audit services, and establishing a Technical Information Center.

Promotion and training services are coordinated by Elsa Esposito, who reports to the head of the COENER Division of Education and Communication. She has no staff and makes use of outside services to carry out her program (graphics, printing, photography, and equipment rental). Her approach is professional, and the outputs are of a good standard. According to her detailed strategy paper, the target audiences are the industrial and commercial sectors, universities, engineers and associations of engineers, consulting engineering firms, and the intermediary institutions of FIDE, and the government. Actions are listed to achieve each of the following objectives:

- Industrial, commercial, and government sectors
 - Motivate companies to carry out energy audits of their plants
 - Form energy committees in 50 industrial plants
 - Motivate companies to make use of the audit assistance fund
 - Promote the formation of an association of energy coordinators
- Engineers and engineering associations
 - Obtain their participation in courses and/or seminars on energy audits and energy conservation

- Inform engineers and their associations on audit techniques and new developments in the techniques
- Motivate engineers to form energy auditing service firms
- Consulting engineering firms
 - Obtain registration of consulting engineers with COENER as energy consultants
- Academic sector
 - Obtain the inclusion of courses on energy audits and energy conservation in engineering and architectural curricula
 - Persuade universities to offer extracurricular courses and seminars on energy auditing and energy conservation
- Intermediary institutions of FIDE
 - Obtain their participation in the Industrial Conservation Credit Fund.

Media being employed (or planned) for achieving the objectives are videotapes, brochures, events, posters, television appearances, lunch meetings, stickers, press releases, visits to companies, information meetings, meetings with leaders of key organizations, letters, telegrams, press advertisements, and newsletters.

The above strategy has not been translated into an implementation plan, because there are insufficient resources; consequently, the activities are not coherent, and services are provided as the need arises. A wide range of promotional and training activities has been carried out, including two seminars, pamphlets in audit methodology and energy conservation programs, newsletters, press releases, magazine articles, a television panel discussion, and dissemination of audit reports, seminar papers, and various other reports.

The most visible events were the two 3-day seminars, both of which covered most aspects of energy conservation. The first seminar (January 31-February 2, 1984) was presented with strong support from Fluor personnel

to an audience of over 100 members of private- and public-sector industry.

The second seminar (September 19-21, 1984) was presented to an audience of 38 engineers from consulting engineering firms registered with COENER. This seminar also included a session on the Audit Assistance Fund and the Industrial Conservation Credit Fund. A repetition of this seminar was to be given in Santiago October 31-November 2, 1984. Also, a seminar to promote the use of the financial assistance funds was planned for December, aimed at an audience of bankers.

Several seminar participants were interviewed in person and by telephone, and their opinion of the seminars was favorable. Some suggested greater focus (specialization) and more technical content.

PILOT DEMONSTRATIONS

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

Selection of pilot projects is based on the results of energy audits performed to date. The selection criteria being applied are: (1) potential for replication on a national scale, (2) cost effectiveness on a national scale, (3) economic viability, (4) degree of risk, (5) potential stimulating effect on local equipment suppliers or construction contractors, and (6) experience value.

It is intended that implementation of pilot demonstration projects will be performed by private-sector consulting engineering firms. To this end, COENER/Fluor has prepared a formal selection procedure for firms associated with design, construction, and procurement

of equipment for pilot demonstrations. Under this procedure, each candidate firm must demonstrate that it:

- Is duly registered with the Secretariat of State for Industry and Commerce
- Is a legal entity, reportable, and financially solvent
- Has adequate professional staff for the task
- Has experience in carrying out projects of sufficient magnitude
- Can provide satisfactory references concerning work performed by the firm
- Can demonstrate a satisfactory financial situation.

COENER/Fluor have preselected 23 of 45 consulting firms that responded to a solicitation of bids on two projects: Tejanca, a textile plant, and Edificio San Rafael, a commercial building housing an insurance company. Two further projects will be submitted for tender in the near future -- Ingenio Porvenir, a sugar mill, and Aceite Ambar, an edible oils plant. In addition, a bank of eight potential projects has been developed.

It would be desirable for this subcomponent to demonstrate advanced conservation techniques of unusual interest to attract a large audience. But with a view toward accelerating results, project management has selected projects comprising relatively simple measures that will not promote state-of-the-art technology.

The brief experience in soliciting bids has already indicated that the consulting engineering firms require more technical detail than was initially thought necessary. This information is needed to provide a sound basis for preparation of bids and for subsequent performance commitments.

FINANCIAL ASSISTANCE

The financial program is applicable to (1) audits conducted by private consulting engineering firms, and (2) implementation of energy conservation measures.

Private Audit Assistance

The limited number of energy audits carried out by COENER are being provided at no cost to the companies audited. Subsequently, audits initiated using private-sector consulting engineering firms will be partially financed by the audit assistance fund.

Operating rules and application forms for the fund were issued to registered consulting firms on the occasion of the September seminar, and they have been promoting the fund to prospective client companies. No financing has been granted yet; however, two applications had been received at the date of this evaluation, and the consulting firm PROSOL was preparing another application for a brewery audit.

The audit limits established by the project paper were RD \$500 for short audits and RD \$2,500 for extended audits. These limits were found to be unrealistic; therefore, project management had requested an increase of the audit limit to RD \$25,000 and was awaiting approval from the AID mission.

The operating rules do not define several conditions that should influence the amount of the grant (e.g., partial audits, deficient audits, or audits rejected by clients). The scope of the audit needs to be defined clearly, with precise terms of reference and a clear statement of what constitutes satisfactory performance of the work.

Industrial Conservation Credit Fund

The fund was in a start-up phase at the time of the evaluation. Operating rules had been issued in June 1984, and application forms were being printed. Counterpart funds had been requested from the Fondo Nacional de Contrapartida, and FIDE expected that they would be made available shortly. Meanwhile, the mission has transferred \$200,000 from the fund to the lignite project.

The intermediary lenders to be used in the Industrial Conservation Credit Fund operations are FIDE's existing intermediary institutions, which are commercial banks, development banks, and finance companies. All but three of the institutions are in the private sector.

COENER's role is to promote the fund and to provide FIDE with technical support in the loan application review process. The process envisions two levels of review and approval (intermediary lender and FIDE) that will probably lengthen the approval period by several weeks.

The fund's policies are in agreement with the project paper. The interest rate is 2 percent below the maximum level set by the project paper, resulting in a 12-percent rate to the borrower. The operating rules lack a list of specific equipment and actions to which the fund is applicable. Such a screening list would tighten control over use of funds and would assist the review of applications. An example of a list of candidate energy conservation investments is provided in Appendix A.

No loan applications had been received at the date of the evaluation; however, a projected schedule of loan commitments and/or disbursements listing specific borrowers had been provided by COENER/Fluor. This schedule identified 16 potential credit candidates with total loans roughly estimated at RD \$6.8 million (assuming exoneration of import duties). Disbursements to the potential borrowers would commence in March 1985 and continue through 1987.

The project paper* showed a cash flow projection for the fund in which loan disbursements began in 1983. This projection had not been updated at the time of the visit to FIDE.

TECHNICAL ASSISTANCE

As of early December 1984, Fluor will have spent 75 percent of its budget and achieved 55 percent of original program objectives, and all contract funds will be exhausted by April 1985. The major reason for this gap between expenditures and achievements is considerable unplanned expenditures of resources (United States, Puerto Rico, Dominican Republic) in the early stages of the project, a delay in procurement of audit instruments, and persistent understaffing of the AyC.

*Table V.8, page 183.

Exhibit 1.c shows the distribution of Fluor man-hours expended in the project from August 12, 1983 to September 16, 1984.

The unplanned administrative expenditures consisted of work such as contract review, changes in budget and payment procedures, accounting requirements, and other secondary activities. The unplanned use of man-hours (including procurement of instruments) reduced the number of man-hours available for technical assistance. The original proposal contemplated no administrative or project management support.

Fluor has provided 16 man-months of resident program advisor support and 13 man-months of short-term technical expert support with the following results:

- Technical assistance and training to COENER professionals.
- Assistance in seminars and specialized technical support of energy audits.
- The transfer of computerized energy survey training/technology has been completed.
- The procurement of audit instruments and the training of AyC Division staff in their use has been completed. Consulting engineering firms were also trained in the use of audit instruments.
- AyC Division engineers have been trained in energy engineering at the contractor's U.S. offices.
- The contractors assisted in preparation and distribution of energy conservation manuals focusing on appropriate industries and topics (e.g., boilers, pumps). These manuals were made up, to a large extent, of photocopied material from other sources, and were not particularly adapted to the Dominican Republic or to LDCs in general.
- Forms were designed to aid in the determination of eligibility of private consulting engineering firms for energy audits financial assistance.

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Exhibit 1.c

Distribution of Fluor Man-Hours Spent
(In United States and Dominican Republic)
From Project Start to September 16, 1984

	<u>8/12/83- 11/14/83</u>	<u>11/14/83- 2/12/84</u>	<u>2/12/84- 6/24/84</u>	<u>6/24/84- 9/16/84</u>	<u>Total</u>	<u>Percent</u>
Project management ¹	988	709	646	519	2,862	33.1
Assistance in calculation	122	275	222	--	619	7.2
Training	101	455	1,140	124	1,820	21.0
Purchasing ^{1,2}	13	435	353	49	850	9.8
Energy audits	--	--	400	80	480	5.5
Administration and control ¹	485	145	878	321	1,829	21.1
Subcontracts	<u>--</u>	<u>--</u>	<u>--</u>	<u>196</u>	<u>196</u>	<u>2.3</u>
	1,709	2,019	3,639	1,289	8,656	100.0

¹Unplanned.

²Mainly audit instruments.

SOURCE: Resident advisors' progress reports.

- Two seminars were presented. The first, in January 1984, presented the project to a broad audience. The second, in September 1984, was for consulting engineering firms, and focused on auditing.
- Four pilot projects have been selected, of which two have been submitted to local consulting engineering firms for bids.
- Assistance was given to AyC Division personnel in the preparation of bidding documents for pilot projects.

The short-term technical assistant (STTA) has partially filled the resulting gap. The STTA has, however, been uneven as, according to AyC staff and the resident advisor himself, while most consultants have done a good job in transferring their knowledge, others have not been fully successful.

In terms of image and human relations, the Fluor team -- and primarily the R.A. -- have performed well.

In contrast, with respect to quality of outputs, much has still to be done, especially in the audit preparation and conduct, report preparation, and follow-up (see section on energy audits above).

Seminars have been conducted in a professional manner, and most participants have felt that the Fluor consultants did a satisfactory job, although they could have increased the technical level of their papers, which have been judged as slightly "too simple" by some participants (see section on promotional and training activities above).

To the credit of the contractor, the Dominican Republic now has one of the finest sets of instruments in any LDC known to the evaluators. However, a simpler set of instruments would probably have been sufficient, and considerable financial savings could have been realized in the procurement.

As mentioned earlier, the major problems faced by the contractor have been logistics and AyC staffing. Program management has been, and still is, a problem. The respective management tasks of the resident advisor, COENER, director, and the AyC project manager have often been confused. In particular, the resident

advisor has often had to make many day-to-day decisions that were, in fact, the responsibility of the AyC project manager.

PRIVATE-SECTOR ROLE

Owing to the unforeseen constraint on resources available to the project staff, the project will need to make far greater use of private-sector resources than was originally envisioned. A list of 23 private consulting firms, registered with COENER, has been developed to serve as the principal implementation arm of the projects. These firms have been trained by COENER staff in a seminar designed especially for them. However, most firms will need considerably more training before being able to conduct audits and implement conservation programs.

Private consulting engineering firms will be selected to implement the industry program's pilot demonstration projects. Also, the services of consulting engineering firms will be used readily in the audit assistance program (auditing) and in the Industrial Conservation Credit Fund (auditing and implementation). COENER's role will be to provide the consulting engineers with instruments, technical support, and promotion.

The consulting firms are showing great interest and are actively promoting the audit assistance program and Industrial Conservation Credit Fund.

The private sector will also play a leading role in the operations of the Industrial Conservation Credit Fund. Of the 36 intermediary institutions to be used by FIDE in the fund's activities, all but 3 are private-sector institutions.

Also, Universidad APEC, a private university, is interested in establishing energy conservation curricula. University officials stated that they want to organize short and long energy conservation seminars and courses for graduate students and plant engineers.

LINKAGE WITH THE NATIONAL PLANNING/ECONOMIC STUDIES DIVISION

The effectiveness of the collaboration between AyC and the National Planning/Economic Studies Division of COENER was examined at the request of USAID/DR.

The link between the two divisions is well established, because the head of the National Planning/Economic Studies Division has spent a total of 2-1/2 months at AyC over the past 15 months to familiarize himself with the activities of the industrial conservation component. He has participated in all phases of AyC training, and has participated in the preparation, data gathering, and analysis phases of industrial and commercial building audits. He has worked closely with the AyC economist to concur on the nature and extent of analysis and information to be furnished by audits (including investment estimates) and has been consulted regarding a number of matters on an ad hoc basis, informal basis.

In view of the fact that the principal national planning component activities began only at the time of this evaluation (with the arrival of the IDEA consultants), it was too soon to evaluate the actual effectiveness of the relations between the two division.

PROJECT EXPENDITURES

Project expenditures to September 30, 1984 were \$896,000, of which \$730,000 were AID funds and \$165,000 GODR funds. There have been no expenditures for administrative projects, the audit assistance program, or the Industrial Conservation Credit Fund.

Based on the budget total less the above three items and the contingency provisions (which together amount to \$7.12 million), the project has spent 49.9 percent of the total AID funds and 3.4 percent of the total GODR funds (see Exhibit 1.d). Of the \$896,000 spent, \$477,000 -- or 53.2 percent -- was spent on technical assistance (AID funds) and \$165,000 -- or 18.4 percent -- was spent on salaries and local support (GODR funds) (see Exhibit 1.e).

Given the response of the private consulting engineering firms and their estimates of audit costs (from RD \$5,000 to \$60,000), it is likely that the \$1 million

Exhibit 1.d

Project Expenditures Versus Budget

	<u>Expenditures to September 30, 1984</u>		<u>Adjusted budget*</u>	<u>Total component budget</u>
	<u>(\$000)</u>	<u>Percent of adjusted budget</u>	<u>(\$000)</u>	<u>(\$000)</u>
AID: Loan	201			
Grant	530			
Total	730	49.9	1,464	7,464
GODR	165	3.4	4,852	4,852
Subtotal	895	14.2	6,316	12,316
Contingency				1,120
Total				13,436

*Budget less demonstrations, audit assistance, and conservation credit fund.

SOURCE: Hagler, Bailly & Company.

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Exhibit 1.e

Project Expenditures to Date

	<u>(\$000)</u>	<u>Percent</u>
Salaries and local support	165	18.4
Publications and materials	53	5.9
Technical assistance	477	53.2
Vehicle rental	18	2.0
Portable instruments	100	11.2
Vehicles	48	5.4
Training	<u>35</u>	<u>3.9</u>
TOTAL	896	100.0

SOURCE: Hagler, Bailly & Company.

fund for audit assistance will be fully used by the end of 1986. Provided that two full audits and six to eight additional partial audits are completed before the end of 1984, three to four full audits and an additional ten partial audits in 1985, and given the magnitude of the investment required to implement a typical conservation demonstration project (about RD \$100,000), the fund for pilot projects appears also adequate and likely to be fully used by 1987.

With respect to the Industrial Conservation Credit Fund, we expect not more than U.S. \$250,000 will be disbursed in 1984, about \$1-\$1.5 million in 1985, and \$2.5-\$3.5 million in 1986, which is likely to be the peak year. After 1987, it is likely that demand will stabilize at about \$2-\$3 million annually.

Taking into consideration the possible role of private banking to supplement the credit funds in case of great success, it appears that the amount allocated to the fund by AID and GODR is quite adequate, even if, as recommended in the next chapter, the scope of the industries covered by the program is broadened to include the private sugar industry.

LIKELY IMPACT OF THE PROJECT

Based on the interviews conducted and a brief analysis of the industrial energy consumption patterns, the project impact, measured in terms of likely energy and monetary savings, is likely to be very limited in the public corporation (e.g., CORDE) because funds for implementing projects are not available. As it is roughly estimated that the public industrial sector consumes about 750,000 boe/year and assuming that housekeeping measures only (i.e., requiring little or no investment) will be implemented at a maximum, likely savings at a 5-year horizon (1990) will not exceed 75,000 boe/year (about \$2 million/year).

Prospects in the private sector appear to be much brighter as there is a will to cut energy cost, and as T.A. and financial assistance is available. Assuming that the private industry consumes about 2.2 million boe annually, and considering results of first audits (about 15 percent of savings on the average), it can be expected that up to 330,000 boe could be saved annually by the end of the decade, for an approximate value of U.S. \$10 million. As the first audits indicate, the

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financial attractiveness of conservation projects is likely to be very high, with simple paybacks of about 1 year; therefore, it appears that the Industrial Conservation Credit Fund will be adequate (because of its revolving nature).

In addition, it is clear that the project will have a significant impact on the business of the registered consulting firms (up to about \$2-\$3 million over the period 1985-1990) and local equipment suppliers (U.S. \$3-\$5 million for industry alone).

The conclusions and recommendations presented in this chapter are based on the findings that appear in the previous chapter. This chapter is organized in sections that parallel those of the previous chapter.

MAJOR RECOMMENDATIONS

- Extend the technical assistance contract (Fluor) in two phases, with an evaluation and decision point following the first phase.

Phase I: Extend the contract of the resident advisor for the period April-December 1985. Also provide 12-15 man-months of short-term technical advisor support. Estimated funding required: U.S. \$500,000-\$550,000. Perform an interim evaluation in the fourth quarter of 1985.

Phase II: If the evaluation recommends continuing the technical assistance, contract for support by short-term advisors only for the period January-December 1986. Estimated funding required: U.S. \$200,000.

- Press for restoration of the semi-autonomous status enjoyed by COENER until April 1984. Support the effort by adequate documentation of the unfavorable impact on project results.
- Provide intensive training of private consulting engineering firms and actively promote their involvement in implementing the project. Further details are provided below, under the corresponding subjects.
- Attract and retain qualified professionals through non-financial incentives, such as advanced training in the Dominican Republic and the United States. This training should be programmed in an integrated series of modules over a period of several years.

- Improve the quality of the reports generated by the project (e.g., audit reports, progress reports) to increase their effectiveness as working documents that provide a basis for management actions.

FURTHER RECOMMENDATIONS

- Perform a project evaluation in the fourth quarter of 1985.
- Investigate the application of services available under ECSP (feasibility studies, etc.).
- Expand the program scope to include the private sugar industry.

Participating Institutions**Conclusions**

The institutional arrangements of the project appear to be adequate. The current deficiencies in support from COENER (logistics and manpower) are due to outside factors that are largely beyond the institutions' control. The mandate and structure of COENER are correct; moreover, there are no better alternatives.

The Technical Secretary of the Presidency, who is president of COENER, has great interest in the energy conservation project, but is obliged to impose budgetary restraints to support GODR's urgent need to improve the balance of payments and meet international debt obligations.

Recommendations

- Make greater use of CORDE, INDOTEC, and private-sector resources to provide further support to the industrial energy conservation activities.
- Provide training, using other AID funds, to improve management skills and performance.

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Project Management**Conclusions**

Authority and responsibility of key staff. Management of the component is divided between the overall COENER organization and AyC. Much of the information required for project management is shared between the Executive Secretary of COENER and the AyC division head. The picture is further confused because the Fluor resident advisor has occasionally had to exceed his authority and make management decisions to carry the project forward.

Communications and management information. Communications between the key staff are good because of frequent meetings, but progress reports are deficient in structure and content. They do not provide sufficient information in a format that permits their effective use as control documents. They do not relate expenditures to results, nor both expenditures and results to plan. Poor communications with the AID mission result in frequent delays in processing documents, as time is lost in identifying originators and obtaining additional information.

Personnel management. Personnel management is deficient in that salaries of professionals have declined to a non-competitive level, with the result that it is no longer possible to attract staff with adequate qualifications, nor to retain the present staff, which has unique training and experience. The constraints imposed by current government salary controls prevent an adequate salary administration program.

Financial reporting and controls. The financial reports provided by COENER are cash management reports, rather than management control reports.

Recommendations**Authority and responsibility of key staff**

- Assign full responsibility and authority for all aspects of the project component management to the AyC division head. He should also be given all information necessary to manage the project.

Communications and management information

- Improve project administration by a redesign of reporting and control systems and procedures as follows:
 - Reach agreement with users of all reports and other documents on content and schedule.
 - Eliminate unnecessary reports and develop forms to replace letters and reports to the greatest extent possible. Routine, repetitious-type communications with the AID mission should use standard forms to ensure complete information and eliminate cover letters. All communications with AID should indicate the originator.
 - Use a word processor for all documents issued periodically that require updating of information. Contract an outside service if necessary.
- Redesign the COENER progress report to include all aspects of the project, including manpower and financial data. The report should begin with a list of major problems and actions planned to overcome them, and a list of savings to date and other major accomplishments. The report should provide detailed data and should be built around standard forms, exhibits, and graphs supported by narrative. Expenditures of man-hours and funds should be shown in detail and related to results. Also, expenditure of resources and results obtained should be compared with the plan; updated progress charts and forecasts should be included.
- COENER should appoint a project liaison officer responsible for all liaison with AID.

Personnel management

- A salary survey should be conducted by a professional service to support claims that the salary level of the project is not competitive and not suitable to attract required personnel. This information should be used by COENER management to press for special concessions to attract and retain personnel.

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Financial reporting and controls

- Provide a budgetary control system to permit adequate control of expenditures. Budgets and reports should be on a month-to-month basis, and accounts should be in sufficient detail to permit analysis by management. Also, year-end forecasts should be provided and compared with the budget to identify expected problems.

Staffing**Conclusions**

The present project staff of 8 professionals (plus 1 CORDE engineer on loan) is well below the 15 specified in the project paper (page 30). This staff shortage is a serious handicap to the project.

Apart from this professional staffing problem, management is weakened by the AID energy project advisor vacancy left by Ing. Leo Perez and the imminent departure of the Executive Secretary of COENER, Ing. Acosta. On the positive side, the AyC head, Carlos Rodriguez, is on a 3-month management training program in the United States, arranged by Fluor.

Strong management and additional professional manpower will be required to support the new project activities for 1985, and the conversion of energy audit recommendations into results.

Recommendations

- To improve productivity of the present staff engineers, they should be tested to determine their need for training. The necessary training should then be provided locally or abroad. Consider sending one or two engineers to the TVA Energy Conservation Training Course of 1985.
- Tap other sources of manpower, such as retired engineers, university faculty members, INDOTEC, and CORDE. INDOTEC and CORDE could provide engineers on loan. Transfer of personnel from within other COENER activities to ECD is a limited possibility, owing to the special

qualifications required for industrial energy work. Another option is to make far greater use of private-sector consulting engineers, providing further training as necessary.

Energy Audits

Conclusions

Energy audit work is proceeding slowly and is far behind schedule. The present staff of five field engineers is half the planned staffing level and is inadequate for the work plan. In addition, the engineers are relatively inexperienced, with up to 3 years of work experience.

Plant personnel are not involved in the analysis phase of the audit, nor in developing recommendations. They would like to have a greater degree of participation in the audit process.

In addition, the quality, composition, and scope of the audit reports need improvement. The report should be designed to facilitate management decisions and to serve as a basis for implementation.

Several days have been lost by staff engineers and a Fluor short-term expert owing to non-availability of plant personnel on the agreed visit dates.

Industrial safety is a major issue that needs to be addressed. It relates closely to audit activities.

Recommendations

- Employ a more collaborative approach in plant audits to benefit from the experience and ideas of plant personnel. The audit engineers should involve plant personnel in the more creative phases of audit projects. They should work closely with them in analyzing data, identifying improvements, and developing implementation action plans.
- Improve audit reports by arranging them to stress and facilitate implementation. They should be restructured -- i.e., provide an executive summary directed toward management,

include a description of existing instrumentation, and relocate all computations to appendices. Their scope should be expanded to include longer-term measures as well as low-cost, short-term recommendations. They should also include sufficient specifications and engineering design to support implementation.

- Obtain formal commitments from the firms to be audited for availability and support on the part of their personnel. This commitment should be based on an agreed time plan and should be a condition for providing the audit service.

Assistance to Industry

Conclusions

Since the limited technical resources available to AyC have been used mainly to advance auditing activities and demonstration projects, there has been relatively little field work in this subcomponent.

Recommendations

- Offer a telephone advisory service ("hot line") to private-sector companies, providing support in design and implementation of energy conservation programs. Promote the service through distribution of a specially designed pamphlet.
- Determine the market for industrial energy conservation services and provide the information to private consulting firms in a suitable brochure. Resources available under ECSP can be used in this effort.
- Prepare and disseminate a directory of energy conservation services and products available in the Dominican Republic as a means of strengthening the energy conservation capability of industries.

Promotion and Training**Conclusions**

Promotional activities are planned and managed by a highly qualified professional in the COENER staff, with implementation assistance from COENER management, the AyC staff, and private-sector services. The output of printed promotional material was of a high standard, and the promotion has been successful in raising a high level of awareness, interest, and participation on the part of Dominican industry.

Several seminar participants were interviewed, and their opinion of the seminars was favorable. However, some participants suggested greater focus (specialization) and more technical content.

Recommendations

- Conduct more specialized seminars on the technical and financial aspects of energy conservation, increasing the depth and practical orientation. Fluor or other contractors could provide the specialized resources.
- Use university contractors to provide long-term, continuing training.
- The strategy papers prepared by Elsa Esposito should be converted into an action plan, and resources and support should be provided to ensure its implementation.

Pilot Demonstrations**Conclusions**

With a view toward accelerating results, project management has selected projects comprising relatively simple measures that will not promote state-of-the-art technology. The projects will be implemented by private consulting engineering firms, who are currently submitting bids for four projects.

There is an indication that the consulting engineers will require more technical detail than what had been thought necessary and provided in the audit reports.

The more complete information is needed to provide a firm basis for bids and performance commitments.

Recommendations

- Provide a more complete bidding package (request for proposal) to the consultants to avoid delays and encourage participation.
- Develop a short list of potential bidders, based on the particular expertise and services needed for each project.

Private Audit Assistance**Conclusions**

Operating rules and application forms have been issued, and applications are being promoted through 23 private consulting firms who are eligible to perform the audits. No financing has been granted yet; however, a request for a brewery audit is being prepared by the consultants PROSOL.

The operating rules as issued fail to define several conditions that should influence the amount of the grant. In addition, the scope of the audit needs to be defined clearly, with precise terms of reference and a clear statement of what constitutes satisfactory performance of the work.

Recommendations

- Develop rules governing audit scope (terms of reference) and relationship of funding to scope and savings.
- A full audit should be funded as soon as possible to establish the credibility of COENER in industry circles and to comply with contract requirements. Commitment for implementation of viable conservation measures should be obtained from the selected firm prior to initiation of work.

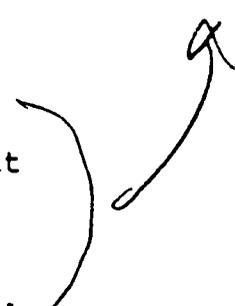
Industrial Conservation Credit Fund**Conclusions**

The fund was in a start-up situation at the time of the evaluation. Operating rules and application forms were to be available shortly, and counterpart funds had been requested.

The intermediary lenders to be employed by the fund are FIDE's existing institutions, which are mainly in the private sector. COENER is to furnish technical support to FIDE in the loan application review process. The procedure envisions two levels of review and approval, which will lengthen the approval period by several weeks.

The fund's policies are in agreement with the project paper; however, the operating rules lack a list of eligible energy conservation equipment and actions.

Recommendations

- COENER should assist the loan review process at the intermediary institution level instead of providing input to FIDE. The loan application processing procedure should be simplified by avoiding duplication of analysis at two levels.
 - A list of eligible energy conservation equipment and actions should be added to the operating rules. An example of such a list is provided in Appendix C.
- 

Technical Assistance**Conclusions**

All Fluor contract funds will be expended by April 1985 (7 months ahead of plan) owing to heavy unplanned expenditures. The original project proposal contemplated no administration or project management support from Fluor U.S. staff, yet these activities accounted for 54.2 percent of the man-hours used during the period August 12, 1983 to September 16, 1984.

The resident advisor has often been diverted to administrative duties; consequently, he has not been able to

provide the planned level of technical assistance. The short-term technical assistance has partly filled the resulting gap; however, this assistance has been of uneven quality. Fluor has not been able to furnish all skills needed for the project.

In terms of image and human relations, the Fluor team -- and particularly the resident advisor -- have performed well. In contrast, the quality of some outputs leaves much to be desired; namely, audit activities and training manuals. While the Fluor contributions to seminars were satisfactory on the whole, some participants wanted a higher level of technical sophistication in the seminar papers.

Inadequate logistic support and AyC staffing are serious problems faced by the contractor. Project management continues to be a problem as the management roles of the resident advisor, COENER executive secretary, and the AyC project manager have often been confused.

Recommendations

- As stated in the first recommendation, technical assistance should be extended on a flexible basis, with an interim review (fourth-quarter 1985) to determine the need to continue services and the most cost-effective type of service to contract.
- Monitor and control use of Fluor contract resources carefully, and take action to prevent further diversion of these resources to secondary activities.
- Contract outside short-term consultants as required to supplement assistance from Fluor.
- As mentioned above, authority and responsibility for project management should reside at AyC division management level (see project management recommendations). The division head is currently receiving management training in the United States.

Private-Sector Role**Conclusions**

Owing to the unforeseen constraints on resources provided by COENER, the project will employ private-sector resources to a far greater extent than was originally envisioned. COENER-trained consulting engineering firms will serve as the principal implementation area of the project, with AyC engineers in a technical support role.

The consulting engineers are already actively seeking participants in the pilot demonstration projects, the audit assistance fund, and the Industrial Conservation Credit Fund.

In addition, Universidad APEC (a private university) is interested in establishing energy conservation seminars and courses for graduate students and plant engineers.

Recommendations

- Increase the subcontracting of project services to private firms to the greatest extent possible (e.g., awareness raising, information, training).
- Consider establishing a private-sector advisory committee that would meet monthly to provide guidance and support to the project and a strong link with the private sector. The committee might be sponsored by an industry association (this has worked well in the ROCAP project), and would include representatives of industry, banking, and consulting engineering firms.
- Consider furnishing other AID funds to assist Universidad APEC in establishing energy conservation seminars and courses.

An implementation plan for the above proposals is set forth in Exhibit 2.a.

Exhibit 2.a

Implementation Action Plan for Recommendations
Industrial Energy Conservation Program (Dominican Republic)

	Responsible	Completion date		Comments
		Planned	Actual	
Major recommendations				
Extend contract for technical assistance	J. R. Acosta	3/84		
Press for restoration of COENER's previous semi-autonomous status	J. R. Acosta	--		
Provide intensive training of private consulting firms	E. Maal	4/84		Plan 1/84, complete 4/84
Provide aggressive incentive program for AyC engineers	C. Rodriguez	2/84		
Improve quality control for reports, audits, etc.	C. Rodriguez	3/84		
Further recommendations				
Perform evaluation in fourth quarter 1985	AID	6/84		Decision 6/84
Investigate application of services available under ECSP	C. Rodriguez	2/84		Plan 2/84
Expand program scope to include private sugar industry	AID	1/84		
Participating institutions				
Make greater use of outside resources	C. Rodriguez	3/84		
Provide training to improve management skills and performance	J. R. Acosta	2/84		Plan 2/84
Project management				
Assign full responsibility and authority to AyC division head	J. R. Acosta	1/84		
Redesign reporting, control systems, procedures	AID/ J. R. Acosta	3/84		
Redesign COENER progress report	C. Rodriguez	1/84		
Appoint a project liaison officer	J. R. Acosta	1/84		
Conduct a salary survey	J. R. Acosta	4/84		
Provide a budgetary control system	J. R. Acosta	4/84		
Staffing				
Test and train staff engineers	E. Maal	1/84		Submit plan 1/84
Tap other sources of manpower	C. Rodriguez	2/84		
Energy audits				
Employ a collaborative approach	C. Rodriguez	1/84		
Improve audit reports	C. Rodriguez	1/84		
Obtain commitments for plant personnel availability	C. Rodriguez	1/84		

Exhibit 2.a (continued)

Action Plan for Recommendations

Further recommendations (continued)	Responsible	Completion date		Comments
		Planned	Actual	
<u>Assistance to industry</u>				
Offer telephone advisory service	C. Rodriguez	2/84		
Determine market for energy conservation services	J. R. Acosta	4/84		
Prepare directory of energy conservation services and products	C. Rodriguez	6/84		
<u>Promotion and training</u>				
Conduct specialized seminars	E. Maal	1/84		Submit plan by 1/84
Use university contractors for long-term training	J. R. Acosta	9/84		
Prepare action plan based on promotion strategy paper	C. Rodriguez	1/84		
<u>Pilot demonstrations</u>				
Provide complete bidding package	C. Rodriguez	1/84		
Develop short list of bidders	C. Rodriguez	1/84		
<u>Private audit assistance</u>				
Improve operating rules	C. Rodriguez	1/84		
Fund full audit	C. Rodriguez	2/84		
<u>Conservation credit fund</u>				
Revise loan review process	C. Rodriguez	3/84		
Add eligible equipment/services list	C. Rodriguez	1/84		
<u>Technical assistance</u>				
Monitor/control use of Fluor contract resources	C. Rodriguez	Continuing		Start 12/84
Contract outside short-term consultants	C. Rodriguez	--		As required
<u>Private-sector role</u>				
Increase subcontracting of project services to private sector	C. Rodriguez	6/84		
Consider establishing private-sector advisory committee	J. R. Acosta	2/84		Decision 2/84
Consider assisting Universidad APEC to establish training	J. R. Acosta	2/84		Decision 2/84

SOURCE: Haqler, Bailly & Company.

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Appendix A

SCOPE OF WORK FOR EVALUATION OF INDUSTRIAL ENERGY CONSERVATION COMPONENT, PROJECT 517-0144

A.1

- A. Validity of the original design in light of experience to date, especially:
 - 1. The focus of the project in which certain industries are included and others excluded
 - 2. The mix and sequence of activities
 - 3. The level and mix of output targets
 - 4. Institutional arrangements: within the GODR, the role, capacity, and activities of the national energy commission, technical expertise, quantity of personnel, support to subproject units; GODR -- private-sector relationships; role and content of technical assistance.
- B. Experience of the project so far:
 - 1. Accomplishments of the project to date, in terms of building the capacity to conduct energy audits, to develop energy conservation plans, to build public awareness, etc.
 - 2. Quality of outputs in terms of both technical adequacy and human resource development
 - 3. Problems and obstacles encountered, whether technical, institutional, procedural, or related to policy.
- C. Likely impact of the project as it is currently structured and funded:
 - 1. On Dominican capacity to carry on industrial energy conservation
 - 2. On actual energy savings from plant modifications.
- D. Alternative futures for the project and the consequences of each in terms of C.1 and C.2:

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1. Continue as is
2. Restructure, keeping same focus
3. Refocus
4. Adjust resource mix and levels, roles of participating organizations, procedures being followed, etc. What is realistic disbursement projection for conservation pilots and industrial conservation credit fund, given 15 months remaining for technical assistance contract.

Source: USAID/DR. Telex 07114.

Appendix B

LIST OF CONTACTS: DOMINICAN REPUBLIC

B.1

Exhibit B.1 gives the list of contacts in the Dominican Republic.

Exhibit B.1

List of Contacts: Dominican Republic

<u>Date</u>	<u>Office or plant</u>	<u>Persons contacted</u>
10/15/84	USAID/DR	William Smith, Chief of Engineering
		Larry Armstrong, Energy Officer and Project Development Officer
	COENER	Ing. Jose Ramon Acosta, Executive Secretary
	COENER (Programming & Control Office)	Ing. Violeta Morrobela, Head of Office
	AyC	Ing. Carlos Rodriguez, Division Head/Project Component Manager
10/16/84	AyC	Ing. Carlos Rodriguez*
		Lic. Ernesto Castillo, Manager of Industrial Incentives
		Ing. Anamaximandro D'Oleo, Manager of Industrial Department
	USAID/DR	William Smith*
10/17/84	Fluor/Daniel	Dr. Evelio Gonzalez, Short-term Advisor
	COENER	Ing. Violeta Morrobela*
	AyC	Ing. Julio Ascuasiati, Field Engineer
		Ing. Carlos Rodriguez*

*See above.

Exhibit B.1 (continued)

List of Contacts: Dominican Republic

<u>Date</u>	<u>Office or plant</u>	<u>Persons contacted</u>
10/18/84	COENER (Economic Studies Division)	Ing. Bolivar Rosario, Division Head
	IDEA (Washington, DC)	Dr. Peter Meier, Vice President Daniel Sanchez, Consultant Ing. Oscar Morales, Subcontractor to IDEA
	USAID/DR	Philip Schwab, Mission Director William Smith*
	FIDE	Roberto Liz, Director Ing. Ramon Jose Caro, Project Analyst
11/19/84	COENER (Programming & Control Office)	Ing. Bienvenido Medina, Head of Office (replaced Violeta Morabel)
	AyC	Ing. Carlos Rodriguez*
11/22/84	USAID/CR	William Smith* Larry Armstrong*
	COENER	Ing. Jose Ramon Acosta*
	AyC	Lic. Ernesto Castillo* Ing. Anamaximandro D'Oleo*
11/23/84	AyC	Eduardo Maal, Resident Advisor (Fluor)
	CORDE	Lic. Portenio Ortiz, General Director

*See above.

Exhibit B.1 (continued)

List of Contacts: Dominican Republic

<u>Date</u>	<u>Office or plant</u>	<u>Persons contacted</u>
	INASCA	Ramon Crouch, President Ruben Nunez, Financial Director N.A., Engineer
	AyC	Ing. Cecilia Rodriguez, Field Engineer
	PROSOL (consulting engineers)	Ing. Jose O. Servilla, President
	SERCITEC (consulting engineers)	Ing. Jose Atilio De Frias, Vice President
	Fluor/Daniel	Gary Quick, Short-term Advisor
	COENER (Division of Education/Communications)	Elsa Esposito, Promotion and Manager
	COENER	Ing. Jose Ramon Acosta*
	AyC	Ernesto Castillo* Anamaximandro D'Oleo*
11/24/84	INDOTEC	Ing. Rafael Jesus Maria Hernandez, Director
	INDOTEC (Energy Resources Division)	Ing. Bolivar Rodriguez, Division Head
	AyC	Eduardo Maal*
	COENER	Elsa Esposito*
	Tejanca	Ing. Juan Ibarra, General Administrator Ing. Antonio Jaquez Conception, Electrical Engineer

*See above.

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Exhibit B.1 (continued)

List of Contacts: Dominican Republic

<u>Date</u>	<u>Office or plant</u>	<u>Persons contacted</u>
	Cervezeria Nacional	N.A. N.A.
	Universidad APEC	Leonel Rodriguez, Rector
	COENER	Jose Ramon Acosta*
11/25/84	Technical Secretariat of the Presidency	Saran Almonte, Assistant to Technical Secretary
	COENER	Jose Ramon Acosta*
	Ingenio Porvenir (CEA) (sugar plant)	Ing. David Medina, Energy Resources Manager Ing. Carlos Santana, Project Analyst
	AyC	Eduardo Maal* Ing. Carlos Ascuasiati* Ing. Maximo Cabral, CORDE Engineer
	INALSA	N.A. N.A.
11/26/84	COENER	Ing. Jose Ramon Acosta*
	AyC	Eduardo Maal* Ing. Anamaximandro D'Oleo* Ing. Cecilia Rodriguez* Ing. Maximo Cabral* Lic. Ernesto Castillo* Ing. Carlos Ascuasiati*
	COENER	Elsa Esposito*
	AIRD	Ing. Jose Del Carmen Ariza, President

*See above.

Exhibit B.1 (continued)

List of Contacts: Dominican Republic

<u>Date</u>	<u>Office or plant</u>	<u>Persons contacted</u>
	USAID/DR	Philip Schwab* Larry Armstrong* William Smith*

*See above.

I. ENERGY AUDITS

Resulting in information regarding all of the following:

- Energy consumption data
- Energy usage and flow analysis
- Identification of energy conservation opportunities
- Economic analysis of energy conservation opportunities for commercial, industrial, and transportation systems.

II. ELECTRIC ENERGY SAVINGS**A. Electric motors**

1. High efficiency motors (25 hp or less)
2. Variable speed drives for AC motors
3. Power factor correction capacitors and controllers
4. Balance three-phase power sources to motors
5. Replacement of oversized motors (those always operating at 1/3 load or less) by smaller horsepower motors, preferably high efficiency models.

B. Air conditioning

1. Timers to switch off units
2. Thermostat repair or replacement
3. Duct insulation

4. Chilled water line insulation
5. Window shading or tinting
6. Higher efficiency (COP or EER) units
7. Heat recovery -- reciprocating compressor hot gas heat exchanger for water heating
8. Door closers
9. Weatherstripping and sealing of openings
10. System cleaning -- coils, registers, ducts, etc.
11. Filter changes at prescribed intervals and manometer installation to assist in determining need for changes
12. Energy management systems (computers)
13. Hotel room energy management systems
14. System test, balance, and charging
15. Condenser shading
16. Absorption cooling using waste heat sources
17. Outside air damper repair
18. Ceiling fans to reduce need for or replace air-conditioning
19. Instrument repair or replacement
20. Controls, such as modulating damper, repair, or replacement
21. Condenser and cooling tower water treatment systems
22. Ventilation modifications to reduce exhaust of cool air or intake of outside air.

C. Refrigeration

1. Cold room insulation
2. Strip curtains for cold room doors
3. Refrigerator gasket replacement
4. Ammonia leak inspection and repair
5. Cold line insulation
6. Roof spray cooling systems
7. Condensor shading
8. Higher COP units
9. Heat recovery -- reciprocating compressor hot gas heat exchanger for water heating.

D. Lighting

1. Selective manual light switches to allow use of daylighting only and to encourage switch-off
2. Fluorescent lighting -- to replace incandescent
3. Sodium outdoor lighting -- to replace existing
4. Photocells for outside lighting
5. Timers to switch off lights
6. Task lighting -- to replace area lighting
7. Relocation of lighting fixtures resulting in wattage reduction
8. Skylights to replace electric lights.

E. Metering and instrumentation

1. Electric demand (kW) and consumption (kWh) submetering for major cost centers

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2. Energy management systems to monitor and control electric power demand and consumption using computer technology.

F. Cogeneration

1. Total energy -- diesel or other units to simultaneously supply both electricity and process heat (not a standby plant)
2. Switchgear -- for distribution and control of generated power within the industrial plant
3. Metering and synchronization -- equipment to permit sale of excess power, produced by cogeneration, to JPS grid.

III. FUEL ENERGY SAVINGS**A. Boilers**

1. Boiler tune-up -- optimize air/fuel ratios at various firing rates, clean heat transfer surfaces, install stack thermometer
2. Boiler refractory or insulation repair
3. Boiler oxygen trim controller
4. Boiler economizer -- feedwater heater using waste heat from stack gas in heat exchanger
5. Boiler air heater -- combustion air heat exchanger using waste heat from stack gas
6. Boiler automatic stack damper and electric ignition -- to reduce standing losses
7. Boiler tube replacement
8. Blowdown heat recovery system -- for continuous blowdown boilers
9. Boiler water treatment system repair or replacement
10. Low excess air burners

11. Fuel preheating systems repair or replacement
12. Conversion from diesel or LP gas fuel to Bunker C
13. Air/fuel control systems repair and replacement
14. Bagasse fuel drying system using waste heat.

B. Steam systems

1. Steam leak repair
2. Steam valve repair or replacement
3. Steam trap repair or replacement
4. Condensate return system
5. Steam line insulation
6. Steam distribution rationalization, including lock-off of obsolete areas or relocation of equipment to reduce steam distribution losses.

C. Process heating

1. Tank, vessel, or heating device insulation
2. Waste heat recovery from liquid or gas streams
3. Control systems for steam, fuel, air, and product flow to reduce ratio of energy usage to production
4. Solar water heating
5. Solar air preheating
6. Seals for rotary dryer ends
7. Additional evaporator effect
8. Vapor recompression
9. Hot water or liquid line insulation

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10. Water treatment system for domestic hot water systems to prevent precipitation of solids in solar collectors and heat exchangers -- water treatment for cold water not included
11. Electric ignition systems to replace pilot lights in gas-fired equipment
12. Isolate obsolete or little-used heating devices
13. Flow restrictors and low-flow faucets and shower heads for hotel rooms and other hot water uses
14. Time switches to shut off pumps during periods when not required.

D. Transportation

1. Radio dispatching systems for fleet vehicle management
2. Speedometer and odometer repair or replacement
3. Insulated truck bodies for ice transport
4. Diesel engine fuel injector sytem repair or replacement to reduce smoking
5. Radial tires to replace bias-ply tires for trucks and buses.

E. Metering and instrumentation

1. Fuel meters and totalizers for boilers, burners, and transportation systems
2. Steam flow meters and totalizers for boiler output and submetering at major cost centers
3. Production meters totalizers and counters
4. Energy management systems to monitor and control steam and other energy usage using computer technology.

Source: USAID/Government of Jamaica Energy Sector
Assistance Project.