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REGIONAL INDUSTRIAL ENERGY EFFICIENCY PROJECT

First Evaluation
Final Report

Prepared for:

The Central American Technical and Industrial Research Institute (ICAITI)

and

The Agency for International Development Regional Office of Central America and Panama (ROCAP)

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Contents

	PAGE	TITLE
LIST OF ACRONYMS		
ACKNOWLEDGEMENTS		
EXECUTIVE SUMMARY		
INTRODUCTION		
CHAPTER 1	1.1	DETAILED FINDINGS
	1.2	PROJECT ADMINISTRATION
	1.2	PARTICIPATING INSTITUTIONS
	1.3	ICAITI
	1.5	Role of ICAITI in the Project
	1.7	SIECA
	1.7	The National Committees
	1.7	PROJECT MANAGEMENT
	1.8	Authority and Responsibility of Key Staff
	1.9	Management Communications
	1.9	Energy Audit Management

PAGE	TITLE
1.9	Financial Reporting
1.10	Budgetary Controls
1.10	Other Management Issues
1.11	STAFFING
1.13	REGIONAL LINKS AND INFORMATION EXCHANGE
1.14	PROJECT COMPONENTS
1.14	INDUSTRY PROGRAMS
1.15	Energy Audits
1.16	Field and Pilot Demonstrations
1.18	Energy Efficiency Seminars
1.18	Exhibits
1.18	TRAINING
1.19	Status
1.21	PROMOTION AND FIELD EXTENSION
1.27	DATABASE
1.27	Status
1.28	FINANCING AND POLICY ISSUES
1.28	Status
1.30	Accomplishments
1.31	Quality and Effectiveness of Outputs
1.31	Problems

	PAGE	TITLE
	1.31	Financing Survey
	1.32	PROJECT OPERATION
	1.32	RELATIONSHIP OF PROJECT TO OTHER AID-FUNDED ENERGY PROJECTS
	1.35	PRIVATE-SECTOR ROLE
	1.35	Status
	1.36	Problems
	1.36	TECHNICAL ASSISTANCE
	1.37	Status
	1.39	Problems
	1.39	PROJECT EXPENDITURES
	1.40	LIKELY PROJECT IMPACT
CHAPTER 2	**2.1**	**CONCLUSIONS AND RECOMMENDATIONS**
	2.1	PROJECT ADMINISTRATION
	2.1	PARTICIPATING INSTITUTIONS
	2.1	Conclusions
	2.2	Recommendations
	2.2	MANAGEMENT
	2.2	Conclusions
	2.3	Recommendations
	2.8	STAFFING

PAGE	TITLE
2.8	Conclusions
2.8	PEEIR-ICAITI
2.10	PEEIR-SIECA
2.10	Recommendations
2.10	PEEIR-ICAITI
2.11	PEEIR-SIECA
2.11	REGIONAL LINKS AND INFORMATION EXCHANGE
2.11	Conclusions
2.11	Recommendations
2.12	PROJECT COMPONENTS
2.12	INDUSTRY PROGRAMS
2.12	Conclusions
2.13	Recommendations
2.13	TRAINING
2.13	Conclusions
2.14	Recommendations
2.14	PROMOTION AND FIELD EXTENSION
2.14	Conclusions
2.16	Recommendations
2.17	DATABASE
2.17	Conclusions
2.17	Recommendations

PAGE	TITLE
2.18	FINANCING AND POLICY ISSUES
2.18	Conclusions
2.18	Financing Studies
2.18	Data Bank
2.19	Policy-Related Studies
2.19	Recommendations
2.19	Financing Studies
2.20	Data Bank
2.20	Policy-Related Studies
2.21	PROJECT OPERATION
2.21	PRIVATE-SECTOR ROLE
2.21	Conclusions
2.21	Recommendations
2.22	PROJECT EXPENDITURES
2.22	Conclusions
2.22	Recommendations
2.22	TECHNICAL ASSISTANCE
2.22	Conclusions
2.23	Recommendations
2.23	LIKELY PROJECT IMPACT
2.23	Recommendations
2.24	COUNTRY-SPECIFIC ISSUES

	PAGE	TITLE
	2.24	Conclusions
	2.24	Recommendations
APPENDIX A		SCOPE OF WORK
APPENDIX B		LIST OF CONTACTS: CENTRAL AMERICA AND PANAMA
APPENDIX C		GUATEMALA
APPENDIX D		PANAMA
APPENDIX E		COSTA RICA
APPENDIX F		EL SALVADOR
APPENDIX G		HONDURAS

Exhibits

Exhibit A	Summary Financial Plan (Thousands of dollars)
Exhibit B	Summary Cost by Components and Years (U.S. dollars)
Exhibit 1	Summary of PEEIR Components
Exhibit 2	Schedule of Major Project Events (As envisioned in May 1982)
Exhibit 3	Summary Financial Plan (Thousands of dollars)
Exhibit 4	Summary Costs by Components and Years (U.S. dollars)
Exhibit 5	Expenses for U.S. Consultants (Thousands of dollars)
Exhibit 6	Industrial Program Outputs
Exhibit 1.a	ICAITI Organizational Chart
Exhibit 1.b	Staffing of Project and Related Institutions
Exhibit 1.c	Training Modules
Exhibit 1.d	PEEIR: 1985 Training Needs
Exhibit 1.e	Audit Procedure: Weston International
Exhibit 1.f	Short-Term Consulting: GIT
Exhibit 2.a	PEEIR: 1985 Proposed Organization

LIST OF ACRONYMS

CABEI	Central American Bank for Economic Integration
COMENER	Central American Energy Commission
EER	Engineering and Economics Research, Inc.
FECAICA	Regional Federation of Chambers of Industry
GIT	Georgia Institute of Technology
IBD/BID	Interamerican Development Bank
IBRD	International Bank for Reconstruction and Development
ICAITI	Central American Technical and Industrial Research Institute
INCAE	Central American Institute of Business Administration
PEEIR	Regional Industrial Energy Efficiency Project
SIECA	Secretariat for Central American Economic Integration
UNDP	United Nations Development Program

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The Regional Industrial Energy Efficiency Project (PEEIR) was developed under the leadership of ROCAP, Guatemala City, in 1982 to address the rising cost of energy, a major contributor to the economic crisis in Central America. The project initially covered Guatemala, Honduras, El Salvador, Costa Rica, Nicaragua, and Panama, but Nicaragua was subsequently excluded from the project after refusing to sign the Chamber of Industries-ICAITI agreement, and it focuses primarily on 2,500 medium to small companies (excluding Nicaragua) in the food, beverage, textile, and chemical industries. The PEEIR goal is to reduce the balance of payments deficit of Central America and Panama.

The purpose of PEEIR is to improve energy efficiency in industry and reduce industrial consumption of petroleum by (1) conducting energy audits, (2) implementing conservation measures, and (3) introducing energy-efficient equipment.

The project cost for ROCAP is U.S. $6 million, and the total project costs U.S. $8 million (see Exhibits A and B).

The planned outputs of the five PEEIR components are:

1. **Industry programs.** Adoption of energy efficiency measures and technologies by industries.

2. **Training.** Development of regional ability to provide industries with technical assistance in improving energy efficiency and development of regional capability to train national and private-sector technicians in energy auditing and other energy efficiency skills.

3. **Promotion activities.** Promotion of awareness and energy efficiency measures and technologies.

4. **Database and analysis.** Establishment of a regional database and energy library.

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ımmary Financial Plan
Thousands of dollars)

Project component	ROCAP	ICAITI	SIECA	Private-sector organizations	Total
. Industry program	$1,789	--	--	--	$1,789
. Training	279	--	--	$100	379
. Promotion	1,014	$404	--	500	1,918
. Data base and analysis	182	--	--	--	182
. Financing and policy issues	526	--	$260	--	786
. Management	498	736	--	--	1,234
. Evaluation	60	--	--	--	60
. Overhead	783	--	--	--	783
. Contingencies	869	--	--	--	869
	$6,000	$1,140	$260	$600	$8,000

OURCE: Project paper, page iii.

Exhibit B

Summary Cost by Components and Years
(U.S. dollars)

Component	Total	Year 1	Year 2	Year 3	Year 4	Year 5
1. Industry programs	$1,788,974	$ 230,910	$ 262,941	$ 556,111	$ 579,018	$159,994
2. Training	279,217	119,000	23,926	109,365	26,926	--
3. Promotion	1,014,186	226,809	281,239	234,122	210,875	61,141
4. Data base and analysis	181,694	104,500	22,218	17,214	18,295	19,467
Management	497,580	162,400	116,472	68,456	72,780	77,472
ICAITI overhead	708,547	71,118	133,907	226,482	188,480	88,560
Evaluation	60,000	--	10,000	--	30,000	20,000
Contingency and inflation	869,802	--	75,845	252,559	336,668	204,730
Total ICAITI	**$5,400,000**	**$ 914,737**	**$ 926,548**	**$1,464,309**	**$1,463,042**	**$631,364**
5. Financing and public policy (SIECA)	$ 525,007	$ 98,923	$ 101,807	$ 104,935	$ 108,329	$112,013
SIECA overhead and contingency	73,993	10,169	11,323	12,574	17,522	22,405
Total SIECA	**$ 600,000**	**$ 109,092**	**$ 113,130**	**$ 117,509**	**$ 125,851**	**$134,418**
Total project cost	**$6,000,000**	**$1,023,829**	**$1,039,678**	**$1,581,818**	**$1,588,893**	**$765,782**

SOURCE: Project paper, Annex A-9.

5. Financial and public policy. Strengthened relationship of energy efficiency activities to the financial and public sectors.

The Central American Technical and Industrial Research Institute (ICAITI) is the implementing regional agency for components 1-4. The Secretariat for Central American Economic Integration (SIECA) is responsible for component 5.

The impact of the program, expressed in tonnes of oil equivalent (tep)* saved, was estimated to reach 421,000 tep in 1992.

The objectives of this first PEEIR evaluation were to assess program soundness and achievement to date compared with the original project paper, and to propose recommendations for further program success.

The evaluation team was requested by ROCAP and LAC/DR to determine:

- Whether the project objectives are being addressed as planned and can be reached as scheduled
- The effectiveness of liaison between the institutions involved on the one hand, and national advisory committees and industry associations on the other
- The appropriateness of planned project activities, and the need for reorientation or renewed emphasis on certain aspects of the project.

In addition, LAC/DR requested that particular attention be paid to:

- The impact of the awareness campaign
- The financing issue, such as current or planned links to financing institutions.

A team of three people -- Robert Archer, LAC/DR, Washington, and Robert Kowalski and Alain Streicher, consultants from Hagler, Bailly & Company, Washington, D.C.

*Ton-equivalent of petroleum.

14

-- spent 3 weeks in ROCAP countries (from October 28 to November 17, 1984) to conduct interviews and review materials. (Mr. Archer participated during the first 2 weeks.) More than 100 individuals were interviewed during this evaluation.

SUMMARY OF FINDINGS

Detailed findings and recommendations of the PEEIR evaluation are presented in terms of the following aspects:

- Project Administration
- Project Components
- Project Operation
- Other.

The major finding of this evaluation is that the project is one of the most interesting energy conservation projects currently being conducted in developing countries and has the potential of becoming one of the most successful.

First, this project is the only really regional energy conservation effort in the world, including integrated day-to-day operation, in addition to common policies and objectives.

Second, **the private sector**, through the remarkably strong and enthusiastic involvement of the national Chambers/Association of Industries is very active in the project and **is the actual project beneficiary**.

Third -- and this is really unique in the developing world -- the **project is receiving revenues from the private-sector participation in seminars** (about U.S. $75 per person) and for audits (U.S. $500 to $2,500 per audit).

Finally, this project has been able to attract and retain a number of experienced, qualified engineers to conduct energy audits on a continuous basis.

Because the major objective of the evaluation is to recommend changes, if any, to increase the project efficiency, most of the report deals with those aspects that can be improved and does not describe at length all of the numerous good features of the project.

15

PROJECT ADMINISTRATION

PARTICIPATING INSTITUTIONS

The key institutions involved in PEEIR are ICAITI, SIECA, and the national advisory committees. The interviews conducted and materials reviewed have confirmed that ICAITI is the single most appropriate and qualified organization to have implementation responsibility for the project. Moreover, the project will do as much to benefit ICAITI by enhancing its image in the region as ICAITI will do for the project by providing facilities, access to its regional network of delegates, and regional experience.

Other institutions participating in PEEIR are the Regional Federation of Chambers of Commerce (FECAICA), the Central American Business Institute (INCAE), and the Central American Bank for Economic Integration (CABEI).

According to the project paper, ICAITI has primary responsibility for project implementation. Administratively, ICAITI's duties encompass a range of functions, including the technical management of work performed and the orchestration of a communications network with industries and institutions throughout the region.

To facilitate project implementation, ICAITI has created an Executive Committee, which is composed of the director and deputy director of ICAITI and the project director. In general, the committee provides a mechanism for senior-level control of project activities by establishing policies that govern the conduct of each of the project components, as well as procedures for the review of activities, the evaluation of work progress, and the application of quality control. In addition to being a member of the committee, the project director has direct responsibility for project implementation.

The project has two component managers who report directly to, and operate under the guidance of, the project director. The component managers supervise the two largest project areas (the industry program and the promotion and field extension).

SIECA is based in Guatemala and serves as staff for the Cental American Common Market. PEEIR-SIECA is staffed

by four professionals: a director and three others with primary responsibility for policy studies, finance studies, and data bank development and management.

The current work plan (October 1983 to December 1984) states that PEEIR-SIECA is responsible for (1) identifying public policies that act as disincentives to efficient energy use and to the adoption of alternative energy sources, (2) recommending policy changes and encouraging their adoption, and (3) promoting the development of private- and public-sector financial and other support services that will promote the adoption of more energy-efficient production techniques by industry.

PROJECT MANAGEMENT

ICAITI's director and deputy director are responsible for administrative project management within the organization and communication with regional delegates. Based on a review of personnel profile descriptions in the project paper, the project director and subordinates appear to be qualified for their jobs. However, based on the numerous interviews conducted during this evaluation, actual project management appears to have been the poorest aspect of PEEIR, particularly prior to July 1984, when a revised work plan was implemented. The roles and responsibilities of the project director and the ICAITI directors are not clearly defined.

Communications among central project staff are inadequate. At present, no regular staff meeting is held to review work progress, discuss problems, and inform personnel about general issues related to the project.

While audit management is the direct responsibility of the industry program, in practice, four people participate in the audit review, compared with one or two engineers who actually conduct the audit.

Financial reports relating to PEEIR-ICAITI are prepared by the ICAITI accounting staff, employing an account structure and format that are common to all ICAITI projects. Distribution of financial reports is restricted to the director level of ICAITI and ROCAP, and to the PEEIR director. Project component managers and delegates receive no financial reports at all.

The financial reports do not facilitate adequate management control, as the budget data cover a 1-year span

(or total funds allowed to date), and no forecasts are provided. Also, there is no reporting by country.

The SIECA financial report also lacks short-interval budget comparisons and forecasts which are essential to a financial control document.

It is currently very difficult to produce reports (e.g., plant visits and audits) within an acceptable time frame because of excessive report review and inadequate secretarial support. In addition, communications between PEEIR and national delegates and committees seemed to be too much of a "one-way street," and evaluators heard requests in all countries for better communication between the countries and the central project.

The central PEEIR staff currently consists of a project director, an industry component manager, a promotion component manager, and eight field engineers. One engineer is supposed to be the training coordinator, and another engineer had been hired to manage the database, but both are currently working as field engineers. In addition, there are a database assistant and a promotion assistant, for a total of 13 professionals, far below the 19 professionals called for in the original 1984 work plan.

These staffing/management deficiencies have resulted in many program delays and difficulties, including a long waiting list for plant visits (e.g., level 1 audits) after promotional visits, an excessive backlog of audit reports awaiting preparation and delivery, delays in start-up of database and demonstration activities, and a significant lag in training. While a strengthening of management skills will greatly improve the situation, it is clear that not all projected 1985 activities (which include numerous new activities, such as demonstrations, "hotline" service, training of private-sector engineers) can be carried out without staff additions. Moreover, the extensive training recommended for 1985 will require a substantial share of staff time, and the recommended initial decentralization effort will aggravate the situation.

Although the needs cannot be identified with precision without a final work plan for 1985, it is likely that at least two more field engineers and one promotion assistant will be needed.

The PEEIR-ICAITI staff is supplemented by two major contractors, the Georgia Institute of Technology (GIT) and Siboney. GIT is responsible for technology transfer and training, currently provides a chief of party and a resident trainer. GIT's contractual arrangements also allow for specialized short-term assistance.

REGIONAL LINKS AND INFORMATION EXCHANGE

The primary link of PEEIR-ICAITI with the regions is through the delegations, the national advisory committees, and the national industry associations. The industry associations have been the major vehicles for extending PEEIR to local industries by endorsing activities, establishing industry contacts, and providing logistic support.

There is a serious lack of communication between the project team of SIECA and that of ICAITI, as indicated by the fact that the work plans of the two groups are not coordinated. The PEEIR-ICAITI project is reaching an implementation stage and requires support from SIECA in the form of country-by-country recommendations on financial assistance and government support through policies and regulations. In reality, SIECA's activities are not focusing on these issues.

PROJECT COMPONENTS

INDUSTRY PROGRAMS

Two types of "energy audits" are being considered: plant visits (previously referred to as level 1 audits) are the subject of a half-day on-site visit followed by a mainly qualitative diagnosis of plant energy efficiency; and audits (previously referred to as level 2 audits) which are detailed, instrumented energy audits.

As of mid-November 1984, it seemed likely that about 65-70 plant visits and 10-15 audits will be completed (that is, with reports delivered to companies), compared with a 1984 goal of 75 and 25, respectively. Because of the current priority to develop the 1985 work plan, these achievements are satisfactory.

The plant visit reports are somewhat uneven. While most of the reports appeared to be of good quality for the purpose they are intended to serve (promote the

concept of instrumented audits), some of them were not good enough to be presented to the companies or not acceptable to the delegates.

The few audit reports reviewed by the evaluators were of good quality; the technical analyses, as well as the cost estimates, were sound.

In terms of cost and performance, a plant visit report requires slightly less than 1 person-week on average, and an audit requires about 7 to 8 person-weeks. In 1985, these durations are likely to fall to about 3-4 days for plant visits, of which 1/2 day to 1 day is on-site, depending on the plant complexity and the data availability, and to 6-7 person-weeks for audits. These figures, which are well within standards, correspond to about U.S. $500 for plant visits and about U.S. $5,000 for audits in direct costs.

The project paper called for about 85 minor and major demonstration projects and a limited number (2) of pilot projects. While the first demonstration projects were originally planned to start 1 year after PEEIR initiation, or by July 1984, there is still no firm decision about the final strategy to follow.

Because of the current workload and the limited number of completed audits, it is not likely that a large number of demonstration projects will be completed in 1985, nor is it desirable because of the relative importance of other project activities, such as training, ongoing audit work, and follow-up.

With respect to the two projected pilot projects, both the project paper and the preliminary PEEIR documents focus on the use of biomass and biogas as substitutes for fuel oil. Only some very preliminary work has been done.

The project paper calls for approximately four seminars in each of the five countries every year of the project. This objective will be exceeded, as the 1984 work plan had set a goal of 29, which is likely to be met. This activity is undoubtedly one of the most successful components of the project. In some countries like Panama, however, special care should be given in scheduling and selecting topics, as there is a high degree of competition with other organizations and some topics, such as boilers, are overcovered.

TRAINING

According to the project paper, the training component has two functions: developing the technical capability of ICAITI staff to carry out project activities, and using ICAITI staff to transfer that capability to national level counterparts. Ten topics were identified as priorities, including audits, energy sources, specific technical subjects, and energy economics.

Georgia Institute of Technology (GIT) was selected to assist the training in early 1983; training started in July 1983 with a 2- to 3-week training course for ICAITI engineers and national delegates, according to the project paper, followed by a 4-day seminar on controls in January 1984. No training has been given outside the project headquarters, and no training on the ten modules has been carried out during 1984 owing to the various problems encountered by the project in early 1984 and the absence of a dedicated ICAITI training coordinator.

The capabilities of ICAITI's engineers appear to be uneven, based on extensive discussions with project management and national delegates.*

National delegates were uncomfortable with their current capabilities in carrying out PEEIR and would welcome more technical training and some training in management and marketing to improve their skills in persuading people and promoting products (plant visits and audits). Project management could also be improved by providing specific training in communications, planning, and cost control to the project manager, the ICAITI subdirector, and the two component managers.

Other specific training needs will occur because of the new activities starting in 1985, such as the data bank, the hotline service, and the demonstrations. Besides the project staff internal needs, training will also be needed in 1985 for private consulting and engineering firms, plant engineers, and technical staff.

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*A more objective evaluation of PEEIR's capabilities would require a formal test. Unfortunately, no test was given at program start to serve as a reference for later tests.

PROMOTION AND FIELD EXTENSION

The purpose of the promotion and field extension component of the project is to generate a great number of activities and products, all focused on increasing awareness of the opportunities, measures, and technologies for conserving energy, and to stimulate demand for the auditing and demonstration services offered by the other project components.

PEEIR has produced a variety of publications, including newsletters, pamphlets, brochures, energygrams, seminar manuals, and a case study. Three seminars have been presented a total of 23 times to an audience of 1,280 people. Exhibits have been displayed on 30 occasions, and a major exhibit stand was shown at the International Fair in El Salvador in November. Audit follow-up calls are being made by the delegates to monitor implementation of audit recommendations and to promote demand for PEEIR's technical assistance services.

In November 1983, the advertising agency Publicidad Siboney was contracted to provide artwork for the project publications and to have them printed. This artwork is of very good quality.

Promotion was initiated throughout the region during the June 1983-February 1984 period by means of promotional conferences aimed at a broad group comprising industry, consultants, government, and the academic community. These general awareness-raising events were followed by technical seminars intended for industrial managers and technical professionals.

The project has produced three of the four technical seminars planned for 1984. They were presented in all countries of the region, and -- with the exception of Panama -- attendance was essentially as planned. The seminars were titled:

1. How to Improve Boiler Efficiency
2. Efficient Use of Electrical Energy in Industry
3. An Energy Conservation Plan in Your Industry.

The evaluation of the boiler seminar by participants indicates that:

- Virtually all participants considered their time in the seminar well spent, and would

22

recommend the program to other industrial managers and professionals

- Over 80 percent of the participants plan to implement the efficiency improvement measures suggested
- More stress should be placed on water treatment, instrumentation and controls, and practical applications
- The seminars should be longer than 1 day
- Most participants learned about the seminar through mailings or newspapers.

A further impression of the effectiveness of promotional activities was gained from a telephone survey of 10 names selected at random from the delegates' mailing lists in Panama and Costa Rica. The survey revealed that:

- The quality of the seminars and manuals was judged satisfactory to excellent
- The attitude toward PEEIR was positive
- Most respondents learned of PEEIR through mailings; the industry association was often mentioned as the source of the information.

Owing to a lack of detailed promotion cost data, and to the limited seminar evaluation analysis results available at this time, it was not possible to reach conclusions on the cost-effectiveness of the various promotional activities employed. Neither the promotion managers nor the delegates are provided with a budget or cost reports. Their management of promotion and field extension activities would certainly be more effective if they were aware of the financial resources available to them and the status of their expenditures.

The promotion program to date has been effective in raising awareness of energy conservation and in stimulating a demand for audits. However, the project is now entering a new phase that stresses implementation of energy conservation measures and achieving savings.

DATABASE

The original objective of this project component was to provide access to comprehensive (and periodically updated) information from international sources in addition to information generated by the project. Some of the information -- such as books, magazines, studies, and other hard-copy documents -- were to reside at the ICAITI library and be made available to a broad audience. Project-specific information, such as information available from promotional activities and audits (e.g., OCEs, specific energy consumption ratios) will be gathered and progressively input into a dedicated microcomputer. There are plans for a U.S. consulting firm to assist in this project component start-up. As of November 1984, little had been done on the database project component, and work seemed to be on hold. A computer was delivered in November and is currently undergoing tests at PEEIR.

The need in 1985 will be to have an operational system that can store, organize, process, and make available information from (1) audits (e.g., OCEs characteristics), (2) promotional activities (e.g., evaluation forms, company energy profiles), and (3) costs and sources of energy efficiency equipment, materials, and services.

FINANCING AND POLICY ISSUES

The financing and public policy issues component is designed to encourage public and private financial institutions to provide investment funds for industrial energy conservation projects and to increase the understanding by each country's officials of the interaction between public policy issues and energy matters. This part of the project actively involves the Secretariat for Central American Economic Integration (SIECA).

The project status reflects a late start in activities (April 1983) and inefficient coordination of work planning with PEEIR-ICAITI and ROCAP. Project expenditures of AID funds for this component to September 30, 1984 were $83,462, or 14 percent of planned expenditures of $600,000 over the project life.

The primary work plan activities for PEEIR-SIECA are: Central American country energy analysis, preliminary

financial study, related studies, including policy-related studies, and data bank development.

A draft preliminary study of financial options in Guatemala was published for discussion in February 1984. Nothing has been developed on other countries. The Guatemala paper is intended to serve as a model to be applied to other countries.

There are 14 related studies divided into 8 first-priority studies (related to the project) and 6 second-priority studies dealing with general energy conservation issues that were not scheduled for 1984. The first-priority studies are:

1. Policy and Regulatory Analysis for Energy Conservation

2. Analysis of Central American Electrical Tariffs

3. Petroleum Product Prices

4. Use of Surplus Bunker Oil

5. Petroleum Product Pipeline

6. Urban Mass Transit

7. Commercial-Sector Transport Cost Impact

8. Agricultural-Sector Transport Cost Impact.

Only studies number 2 and 4 have been completed.

Development of the PEEIR-SIECA 1985 work plan is now in progress. PEEIR-SIECA management intends to orient the plan strongly toward meeting industry needs for financing and toward public policy support of the energy conservation measures being developed by the industry program component. To this end, SIECA and ROCAP are seeking specialized planning assistance. Also, an energy data bank has been established, with historical data on Central America and Panama.

The evaluators interviewed bankers in all countries of the region to determine the availability of financing for energy projects. Also, industry representatives were asked to give their perceptions of the availability of financing. The picture that emerged is one of a foreign exchange crisis in most of the region, except

for Panama, where the U.S. dollar serves as the de facto national currency.

In no case are funds specifically designated to support energy conservation. Throughout the region, various funds are provided by international institutions and lenders such as AID, IDB, IBRD, CABEI, the World Bank, and foreign central and export-import banks. These funds are generally limited to specific applications, such as industrial revival, raw material imports, promotion of exports, and imports of goods from the sponsoring countries.

To the extent that energy project implementation requires imported equipment, availability of financing is generally seen by industrialists as a problem. International companies, of course, have greater access to the necessary financing.

PROJECT OPERATION

RELATIONSHIP OF PROJECT TO OTHER AID-FUNDED ENERGY PROJECTS

Two AID-funded projects are currently in progress in the ROCAP region: the Fuelwood and Alternative Energy Sources Project and the Costa Rican industry auditing project. The Fuelwood and Alternative Energy Sources Project has financed both research on fast-growing trees, fuel-efficient stoves, and other alternative energy sources for firewood, and the dissemination of the technologies developed. The project is part of a rural energy program and does not overlap the PEEIR project.

In Costa Rica, Weston International, Inc. was contracted by AID to conduct detailed energy audits of 15 plants and to train a core group of engineers from DSE* in energy auditing. Work began on July 9, 1983, and will conclude on March 9, 1985.

Conservations with the Weston auditors indicated that they were quite competent to carry out their project, and that their approach to auditing was sound.

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*Direccion Sectorial de Energia. Ministry of Energy and Mines.

PRIVATE-SECTOR ROLE

As of November 1984 (i.e., 17 months after project start), several hundred firms had been reached by the seminars, and more than 1,000 by promotional activities. Each country's national committee was fully operational by spring 1984, and all committees have been very active in the project.

With the exception of Honduras and Panama, national committee and delegate activities have been very successful.

On the other hand, the involvement of the private consultants and consulting engineering firms is minimal. There has been no participation thus far in the audits, and no demonstration/implementation activities have taken place yet.

There are three major problems associated with the private-sector role. First, the project is still highly centralized, as most decisions are made directly by central project staff and little has been done to identify and involve local consulting and engineering firms. Second, PEEIR and ICAITI staff members have felt, at least until now, that they were capable of carrying out all the tasks of the program, including audits. Third, based on brief surveys conducted during the evaluation, it was clear that countries like Panama, Honduras, and El Salvador had too small a market and too few private specialized firms to warrant a specific private-sector effort.

TECHNICAL ASSISTANCE

There have been problems with the GIT assistance, mostly because the original chief of party (COP) was not the right person for the job (poor relations with other project staff members). He was replaced in March 1984 by the then-technical training advisor, who has acted as official COP since that time. This replacement contributed to the project slowdown between November 1983 and April 1984. A new permanent technical training advisor has recently been provided.

As of the end of October 1984, GIT's expenditures totaled $273,000, or 56 percent of contracted budget. This level of expenditures is below original projections, primarily because short-term assistance

21

requirements have been less than expected with a total of 6 man-months spent, compared with a total of 13 man-months as stipulated in the contract. (Short-term technical assistance is provided when a request is made by ICAITI.)

Budgeted funds for the chief of party and training advisor will be exhausted by late spring 1985, but substantial funds for short-term assistance may remain available -- about $70,000 -- at the end of the current GIT contract if ICAITI decides not to use them.

In terms of results, GIT has now been able to make a substantial contribution to the industry program. Most PEEIR engineers are able to do audits on their own, conduct seminars on boilers and electricity on their own, and initiate assistance in such areas as demonstrations.

There is a consensus among ICAITI, ROCAP, and the evaluators that the new COP has been the unifying element of the project and deserves much of the credit for the "new beginning," and the current program success.

LIKELY PROJECT IMPACT

With respect to the major project objective of improving the balance of payments by reducing oil imports, foreign exchange benefits are unlikely to be achieved for a variety of reasons, mainly resulting from (1) the current economic situation of the project countries and (2) optimistic assumptions from the cost/benefit analysis.

All these factors indicate that only one-third to one-half of the project's expected benefits are likely to be achieved. However, the cost to the private sector will also be proportionally much less than anticipated because of the priority on non-capital-intensive measures, and the benefit/cost ratio for the private sector will be better than expected. The benefit/cost ratio for ROCAP, however, will be lower than expected.

With respect to the secondary objective of developing a regional institutional capability in industrial energy efficiency, the project is likely to succeed in all countries but Nicaragua, mainly because of the enthusiasm, commitment, and effective work done by the national delegates and the chambers and industries.

RECOMMENDATIONS

Participating Institutions

- ICAITI should attempt to provide PEEIR with the flexibility needed for work in the private sector. Specifically, ICAITI should give more autonomy to the project director in running day-to-day activities, including hiring people and providing incentives.

- It is time to plan and initiate some decentralization of project activity. One, two, or more project field engineers should move to the national program level to work alongside the delegate and assistants. The effort should be phased, with one engineer relocating to another member country (such as Costa Rica). This initiative would be monitored for 6 months before deciding on subsequent decentralization.

- One economist from Hagler, Bailly & Company should spend about 10 days in early 1985 assisting SEICA in developing its 1985 work plan.

Management

- The ICAITI director must clarify the responsibility/authority of the ICAITI deputy director and the project director so that conflicts are reduced and clearer lines of responsibilty and authority are established.

- The ICAITI director and deputy should participate in the planning process, concur in the plan and methods to achieve it, and allow the project director greater latitude to achieve it. Day-to-day involvement is inappropriate at this stage.

- Senior staff meetings held Monday mornings should be preceded or followed by a staff meeting of the Industry Division and the Promotion Division.

- Project supervisors should receive training in management, supervision, and human relations.

- Supervisors should focus on incentive or "carrot" management, including awards, certificates, titles, and bonuses to increase staff productivity.

- A model plant visit and guide should be prepared so all staff clearly understands the context, effort, and format required by such a visit.

- Field engineers should, when possible, discuss preparation of their draft reports s with plant engineers.

- Field engineers should sign each report and be held responsible for their work and follow-up.

- There should be a formal audit certification process for PEEIR and private-sector engineers (through the creation of a chapter of the American Association of Energy Engineers).

- The audit program and follow-up should build on work done by others (Weston in Costa Rica, and TRANSENERG and Esso in Panama).

- The selection of plants for audits should be based on the potential for oil savings.

- A simple audit tracking system should be prepared immediately. It should show (1) date of plant visit, (2) date of draft report submitted for review, (3) date review completed, (4) date draft submitted/received from typing, (5) date of final typing, and (6) date mailed to delegate.

- Audit assignments must be spread out to avoid bunching in a short period such as occurred when 15 plant visits were done in one week in Panama. Quality will suffer, and delays are inevitable.

- A secretary should be taken out of the ICAITI pool to work full-time at PEEIR. A second secretary should be assigned to PEEIR 3 months later if the workload justifies it.

- The weekly project meetings between ROCAP and ICAITI should continue through March 1985 to

ensure implementation of evaluation recommendations; meetings should be bi-weekly from April through June 1985, and reassessed at that point.

- A 2-week project review should be carried out in late October 1985 using the AID/Washington Energy Conservation Services Program (ECSP). This review should be included in the 1985 work plan and budget.

- Financial reporting must be made available, broken down to correspond to project activities, particularly promotion activities.

- "Bottom-up" planning is essential in preparing of the 1985 work plan, to ensure that it is realistic, gains the support of **all** staff, and provides a basis for good, stable management in 1985.

Staffing

- Recruit several field engineers immediately and add an additional promotion assistant within 3-6 months. In addition, recruiting practices applying to PEEIR-ICAITI should be improved to ensure hiring of satisfactory personnel (testing and time period).

Regional Links and Information Exchange

- The dispute with the Honduras Industry Association should be resolved to gain its full support for PEEIR activities in Honduras.

- Regular meetings should be scheduled between PEEIR-ICAITI and the delegates -- some in Guatemala and some in the field.

- A suitable communication channel should be established between the delegates and PEEIR-SIECA. This could be accomplished through semi-annual visits to all delegations by the PEEIR-ICAITI project director.

Industry Programs

- Provide additional training to all engineers to ensure consistency, and improve capabilities on a continuous basis.

- Include sections on instrumentation and specific energy consumption in plant visit and audit reports. Detailed computation in audit reports should be moved to appendices.

- Priorities for 1985 are to reinforce project capabilities, make audit work routine and involve the private sector in PEEIR. The initiation of new activities must be planned very carefully and quantitative objectives must be realistic. Between five and ten demonstrations should be organized, financed in 1985, with about half of them in Costa Rica. The PEEIR demonstration specialist must be appointed soon (see proposed 1985 organization chart).

- 1985 work on pilot projects should be limited to feasibility studies (one in Costa Rica, based on MetaSystem/Weston work, see Appendix C). Implementation should occur in 1986.

Training

- The PEEIR director should ensure that one person is effectively coordinating training activities.

- A comprehensive and intensive training program is needed for 1985, directed toward almost all categories of project staff: engineers, delegates, managers, private-sector consultants, plant engineers, and project specialists (database, and follow-up).

- GIT should continue to go outside to contract necessary short-term assistance for PEEIR if resources are not available within their organization.

- Provide further technical training to the field engineers as required, and evaluate their performance regularly as a basis for future personnel actions. Also provide incentives to improve performance and morale.

Training needs are likely to require U.S. $250,00-300,000, or up to U.S. $200,000 more than previously projected. PEEIR should propose, and ICAITI and ROCAP accept, that this amount be taken from the fund set aside for demonstration and pilot projects.

Promotion and Field Extension

- Promotion activities should now shift their emphasis from creating demand for audits to supporting the generation of results (implementation).
- The level of audit promotion activity should be adjusted to match the project staff's auditing capacity in 1985.
- Seminar evaluation forms should be analyzed to provide guidance for the selection of the most effective media and activities.
- The results of the analysis of seminar evaluation forms should also be used to plan and design future seminars.

Database

- The project director and the head of database should prepare a draft work plan for 1985 with an associated budget to be submitted for approval.
- Initially, keep the database a simple tool designed to meet project and private industry needs. Later, give thought to its expansion to such indirect users as government agencies.
- Assign (W. Flores) full-time or almost full-time (i.e., a minimum of 60 percent of his time) to design and organize database activities.
- Contract with a specialized, experienced consultant to assist the head of the database activities.
- Assign the database assistants full-time to completing input forms from audit reports and

37

other sources and then inputting data into the computer (after program development and testing).

- Survey user needs (using delegates/assistants and national committees).

Financing and Policy Issues

Financing Studies

- A revised scope of work should be developed for the PEEIR-SIECA financial sub-component that reflects industry needs and incorporates information acquired to date.

- SIECA should clarify the applicability of the various sources of financing available throughout the region and sponsor seminars for the industrial and banking communities in each country to clarify the situation.

SIECA Data Bank

- Energy pricing data should be incorporated into the SIECA data bank as soon as possible.

- Development of the data bank that deals specifically with industrial energy data should be closely coordinated with ICAITI.

Policy-Related Studies

- Policy studies conducted by SIECA should be directly relevant to the main project activity of industrial energy conservation.

- A scope of work should be prepared for studies that identifies (1) the key policy issues and impediments affecting conservation and (2) financing needs, options, and impediments.

- Technical assistance available through the AID Energy Conservation Services Program (ECSP) should be used to develop the policy and financial scopes of work, and to determine staffing

and scheduling. This should be done in mid-January 1985, if possible.

- After these activities are completed, monthly meetings should be held between ROCAP and PEEIR SIECA management to review the progress of each item in the 1985 work plan.

Private-Sector Role

- Involve the private-sector consulting/engineering firms in training activities, including their on-the-job training with PEEIR engineers.

- Contract the services of private consulting/engineering firms to implement demonstrations (e.g., in Costa Rica).

Project Expenditures

- Assuming that the PEEIR-ICAITI 1985 work plan is in agreement with the aforementioned activity plan, ROCAP should plan and allow expenditures of approximately $1.3 million in 1985 for PEEIR-ICAITI.

- ROCAP should plan and allow expenditures of approximately $115,000 in 1985 for PEEIR-SIECA.

Technical Assistance

- ICAITI and ROCAP should extend GIT's contract to allow the COP to remain on his job until the end of 1985 and use second evaluation results (end of 1985) to decide on further steps.

- ICAITI and ROCAP should continue to encourage GIT to subcontract short-term technical assistance to consulting firms or individuals other than GIT. Investigate the merits of subcontracting through GIT versus contracting directly with specialized firms (e.g., in food technologies, chemicals).

Likely Project Impact

- PEEIR should focus audit work on large oil users
- SIECA should disseminate information on existing line of credits and other available financing mechanisms across industry.

Country-Specific Issues

- Organize a meeting with the Panama delegate to help him solve project problems (e.g., ensure that plant visit reports are of high quality).

Introduction

The Regional Industrial Energy Efficiency Project (PEEIR) was developed under the leadership of ROCAP, Guatemala City, in 1982 to address the rising cost of energy, a major contributor to the economic crisis in Central America. The project initially covered Guatemala, Honduras, El Salvador, Costa Rica, Nicaragua, and Panama, but Nicaragua was subsequently excluded from the project after refusing to sign the Chamber of Industries-ICAITI agreement. The focus of the project is primarily on medium to small enterprises in the food, beverage, textile, and chemical industries.

PROJECT BACKGROUND

Goal

The PEEIR goal is to reduce the balance of payments deficit of Central America and Panama. Reducing the region's dependence on costly petroleum imports will release a portion of the foreign exchange currently required to finance those imports, making it available for other investments. Also, to the extent that efficient energy use can be achieved in industry, the competitive position of the region's industries in export markets will be strengthened.

Purpose

The purpose of PEEIR is to improve energy efficiency in industry and reduce industrial consumption of petroleum by (1) conducting energy audits, (2) implementing conservation measures (audit recommendations), and (3) introducing energy-efficient equipment. Efficiency of petroleum consumption will be improved by reductions in the direct consumption of fuels, by improved use of equipment, and by the use of waste products as alternative energy sources. The project is compatible with Central American efforts to develop hydroelectric and other local energy sources.

Scope

The PEEIR plan focuses on 2,500 industries (Nicaragua excluded) that are generally small, medium, and medium-large companies. The following criteria govern selection of targets:

- Major users of energy
- Best opportunities for replication in terms of plant numbers and availability of relatively low-cost technologies
- Easily served by the Central American Technical and Industrial Research Institute (ICAITI).

Larger industries are excluded because they are assumed to have access to other sources of assistance in increasing energy efficiency. Small companies (fewer than five employees) are excluded because it was not judged to be cost-effective to include them.

Approach

PEEIR comprises five components -- industry programs, training, promotion activities, database and analysis, and financial and public policy (see Exhibit 1 for description). Implementation was initially planned according to the schedule shown in Exhibit 2.

Financial Analysis and Plan

The original summary financial plan for PEEIR is shown in Exhibit 3, and the summary, by year, of ROCAP fund expenditures is shown in Exhibit 4.

The high expenditures required in the early years for training, database and analysis, and administration were assuming intensive use of U.S. consultants, as shown in Exhibit 5. In the case of the industry program, high consulting expenses were to be offset by low salary, travel, and logistics expenses in the initial year of the project.

Exhibit 1

Summary of PEEIR Components

Project component	Description	Major participants	Specific outcomes
1. Industry programs	• Energy audits • Demonstrations • Seminars to industry • Exhibits	• ICAITI Technical and Industrial Services Division • ICAITI Applied Research Division • Technical institute engineers (national level)	• 290 level 1 audits • 45 level 2 audits • 72 minor plant demonstrations • 13 major plant demonstrations • 2 pilot plant demonstrations • 105 seminars and 8 exhibits
2. Training	• Engineers trained to be experts in industrial energy management • Capability to conduct energy audits	• Consultant for training • ICAITI engineers • Technical institute engineers (national level)	• High-impact audit course • Basic industrial energy course • 10 technical modules • Well-trained local and regional capability
3. Promotion activities	• Promote and organize seminars and audits • Organize conferences • Disseminate reports, exhibits, newsletter, direct contracts • Promote institutional participation	• ICAITI Coordinator • Field representatives • Chamber of Associations • Advisors and FECAICA	• Quarterly newsletter • 10 special technical publications • Monthly activity reports • Annual regional conferences • Industry visits to demonstration sites • Brochures
4. Data base and analysis	• Computerized data base on industry and energy • Library service • Periodic analysis reports and statistical publications	• ICAITI Documentation and Information Division	• Computerized data bases • User manuals • Project library and catalogue • Series of technical studies • Industry energy statistical reports
5. Financing and public policy	• Macroeconomic studies of energy policy • Relation of project activities to national plans and policies	• SIECA/COMENER	• Identification of funding resources • Current national policies affecting industrial energy • Long-range economic-energy policy evaluation • Report on short- and long-term energy pricing

SOURCE: Project paper, page 16.

Exhibit 2

Schedule of Major Project Events
(As envisioned in May 1982)

	Date
AID/W grant authorization	7/82
Grant agreements signed	8/82
Chief of Party met -- annual work plans received from ICAITI and SIECA	10/82
ICAITI and SIECA start to recruit and select project staff	10/82
Selection of U.S. consulting firm(s) for rapid impact audits and demonstrations, training, and data base components	11/82
SIECA starts initial studies	11/82
Private-sector committees formed at regional and national level	12/82
Agreements signed between ICAITI and national-level institutions	12/82
Promotion program starts	1/83
Procurement of data base materials and computer	1/83
SIECA and ICAITI hold initial regional- and national-level seminars	1/83
Training course starts for rapid impact audits and demonstrations	3/83
Rapid impact audit and demonstration program starts	4/83
Exhibits prepared	5/83
Initial case studies prepared	5/83
Visits to demonstration sites start	6/83
Major training program for ICAITI personnel starts	6/83
Regular industry programs start (Level 1 and Level 2); audits and minor and major demonstrations	8/83
Work plans are submitted for second year of program	8/83
Pilot demonstration projects start	1/84
Second major training program starts with participation of ICAITI engineers	6/84
First evaluation	8/84
Third major training activity starts (taught by ICAITI engineers primarily for national counterparts)	6/85
Second evaluation	8/86
PACD	7/87
Final evaluation	10/87

SOURCE: Project paper, Annex A-6.

xhibit 3

ummary Financial Plan
Thousands of dollars)

Project component	ROCAP	ICAITI	SIECA	Private-sector organizations	Total
.. Industry program	$1,789	--	--	--	$1,789
. Training	279	--	--	$100	379
. Promotion	1,014	$404	--	500	1,918
. Data base and analysis	182	--	--	--	182
. Financing and policy issues	526	--	$260	--	786
5. Management	498	736	--	--	1,234
7. Evaluation	60	--	--	--	60
3. Overhead	783	--	--	--	783
9. Contingencies	869	--	--	--	869
	$6,000	$1,140	$260	$600	$8,000

SOURCE: Project paper, page iii.

Exhibit 4

Summary Cost by Components and Years
(U.S. dollars)

Component	Total	Year 1	Year 2	Year 3	Year 4	Year 5
1. Industry programs	$1,788,974	$ 230,910	$ 262,941	$ 556,111	$ 579,018	$159,994
2. Training	279,217	119,000	23,926	109,365	26,926	--
3. Promotion	1,014,186	226,809	281,239	234,122	210,875	61,141
4. Data base and analysis	181,694	104,500	22,218	17,214	18,295	19,467
Management	497,580	162,400	116,472	68,456	72,780	77,472
ICAITI overhead	708,547	71,118	133,907	226,482	188,480	88,560
Evaluation	60,000	--	10,000	--	30,000	20,000
Contingency and inflation	869,802	--	75,845	252,559	336,668	204,730
Total ICAITI	**$5,400,000**	**$ 914,737**	**$ 926,548**	**$1,464,309**	**$1,463,042**	**$631,364**
5. Financing and public policy (SIECA)	$ 525,007	$ 98,923	$ 101,807	$ 104,935	$ 108,329	$112,013
SIECA overhead and contingency	73,993	10,169	11,323	12,574	17,522	22,405
Total SIECA	**$ 600,000**	**$ 109,092**	**$ 113,130**	**$ 117,509**	**$ 125,851**	**$134,418**
Total project cost	**$6,000,000**	**$1,023,829**	**$1,039,678**	**$1,581,818**	**$1,588,893**	**$765,782**

SOURCE: Project paper, Annex A-9.

52

Exhibit 5

Expenses for U.S. Consultants
(Thousands of dollars)

	Year 1	Year 2	Year 3
Industry programs	$164.3	$21.6	$ 21.6
Training	119.0	--	84.0
Data base	90.2	--	--
Management	101.6	52.0	--
Total	$475.1	$73.6	$105.6

SOURCE: Project paper, Annex A-9.

Outputs

The planned outputs of the five PEEIR components are listed below:

1. **Industry programs.** Adoption of energy efficiency measures and technologies by industries

2. **Training.** Development of ICAITI's ability to provide industries with technical assistance in improving energy efficiency and development of ICAITI's ability to train national and private-sector technicians in energy auditing and other energy efficiency skills

3. **Promotion activities.** Promotion of awareness and energy efficiency measures and technologies

4. **Database and analysis.** Establishment of a regional database and energy library

5. **Financial and public policy.** Strengthened relationship of energy efficiency activities to the financial and public sectors.

Specific intended outputs of the industry program as planned over the life of the project are shown in Exhibit 6.

The impact of the program, expressed in tonnes of oil equivalent (tep)* saved, was estimated as follows (taken from the project paper, Annex B-5):

1983	25,000 tep
1984	52,000 tep
1985	110,000 tep
1986	144,000 tep
1987	182,000 tep
1988	223,000 tep
1989	266,000 tep
1990	313,000 tep
1991	365,000 tep
1992	421,000 tep.

*Ton-equivalent of petroleum.

Exhibit 6

Industrial Program Outputs

Actions	Total	Project year 1	2	3	4	5
Level 1 energy audits	296	36 14*	60	60	60	60
Level 2 energy audits	45	1	7	12	12	13
Minor plant demonstration projects	72	10 22*	10	10	10	10
Major plant demonstration projects	13**	7 studies	5 designs 10 studies	5 start-ups 8 designs	5 case reports 8 start-ups	5 case reports
Pilot plant demonstration projects	2	--	1	1	--	--
Seminars	105	5	25	25	25	25
Exhibits	8	1	3	3	1	--
Total	**535**	**98**	**119**	**124**	**122**	**113**

*These activities are part of the rapid and large impact energy conservation program.

SOURCE: Project paper, Annex B-5.

SUMMARY OF PROJECT HISTORY

Project funding began on August 1, 1982, and the earliest project activities took place in the following months. They consisted of briefings of delegates, planning and recruiting of the field engineers, the training engineer, and the promotional group. In parallel, agreements were signed with industry groups of several member countries.

By June 1983, the project was completely staffed, including management. Also, in May 1983, GIT was selected to provide training and technology support. Another contractor, Engineering & Economics Research, Inc. (EER), was also selected to provide support for the database component and began work in August 1983.

During the second quarter of 1983, the advertising agency Publicidad Siboney was contracted to assist with the design of promotional materials, and promotional activities began. Between June and December 4th, promotional conferences were presented in Guatemala and Honduras. By year end 1983, the eight field engineers had been trained in energy auditing, 19 walk-through audits and 9 level 2 audits had been completed, and a 1984 work plan was submitted to ROCAP.

The principal activities in 1984 were the formation of National Advisory Committees, further promotional conferences, technical seminars, training of delegates and their project assistants, plant visits, and level 2 audits. Also in 1984, audit follow-up actvities began, with a view toward encouraging monitoring and assisting implementation.

With respect to the project strategy, it appears that ROCAP's insistence on adhering to the "pyramid" approach, which emphasiced building understanding and support for industrial energy conservation activity, was correct. This laid the groundwork for management and plant engineers to take action on the technical energy audit reports produced by the ICAITI engineers. Evidence indicates that in other conservation projects, which stress only audits without the education and follow-up, actual conservation measures frequently are not taken by management.

The principal problems encountered to date have related to staffing, audit and seminar revenues, database consultants, audit quality, and delivery of audit reports.

116

The original chief of party provided by GIT was unsatisfactory (poor human relations) and was terminated in February 1984. There was a lapse of 3 months before a replacement was provided despite considerable efforts made by GIT, ICAITI, and ROCAP to find candidates.

Similarly, the original industrial component manager did not fit the position well, and was terminated in March 1984. This break in project leadership at a critical stage of project implementation impacted progress negatively as well.

The process of gaining experience in the pricing of audits and sharing of audit and seminar revenues resulted in controversy and shaken confidence in project leadership, and led to a 5-month break in the relationship with the Honduran Industry Association.

Project management was not satisfied with the performance of the database consultants, EERI, and are seeking a replacement (the computer was delivered in November 1984).

One of the first level 2 audit reports (Industria Papalera) was delivered to the company with a serious error in the savings calculation. Following this incident, the GIT chief of party was asked to increase his involvement in audit activities.

Slow delivery of audit reports (up to 6 months) has been a problem in recent months, and is currently being addressed by project management.

Project activities are now focusing on level 2 audits and their implementation and the preparation of a 1985 work plan.

PROJECT EVALUATION

Objectives

The objectives of this first PEEIR evaluation were to assess program soundness and achievement to date compared with the original project paper, and to propose recommendations for further program success.

The evaluation team was requested by ROCAP and LAC/DR to determine:

- Whether the project objectives are being addressed as planned and can be reached as scheduled
- The effectiveness of liaison between the institutions involved on the one hand and national advisory committees and industry associations on the other
- The appropriateness of planned project activities, and the need for reorientation or renewed emphasis on certain aspects of the project.

The complete ROCAP statement of work is provided in Appendix A.

In addition, LAC/DR requested that particular attention be paid to:

- The impact of the awareness campaign
- The financing issue, such as current or planned links to financing institutions.

Approach

A team of three people -- Robert Archer, LAC/DR, Washington, and Robert Kowalski and Alain Streicher, consultants from Hagler, Bailly & Company, Washington, D.C. -- spent 3 weeks in ROCAP countries (from October 28 to November 17, 1984) to conduct interviews and review materials. (Mr. Archer participated during the first 2 weeks.) Over 100 persons were interviewed in the course of the evaluation, as indicated in the list of contacts in Appendix B.

The first week was spent in Guatemala discussing the project with ROCAP staff, ICAITI directors, PEEIR and SIECA staffs, GIT consultants, and discussing the national program with the national advisory committee, banks, and private industry. An interim debriefing was given to ICAITI on Friday, November 2. During the second week, the evaluators traveled to Panama and Costa Rica to meet with national delegates, national advisory committees, consultants, financial institutions, government agencies, AID missions, and private industries.

Plant visits were made to obtain industry perceptions of the program, audit work and reports, and promotional activity. Numerous telephone interviews were also conducted with random selections from industry mailing lists to check the effectiveness of the various promotional activities. In Panama, energy conservation work performed prior to program initiation by other entities (e.g., Esso Standard Oil, TRANSENERG/IBRD) was reviewed; in Costa Rica, discussions with the local AID mission, the Directorate of the Energy Sector (Ministry of Energy and Mines), and Weston International Inc. (AID contractors) were held.

By the end of the second week, Mr. Archer returned to Guatemala to brief ROCAP staff on preliminary trip findings. Mr. Kowalski traveled to Honduras and Mr. Streicher to El Salvador to conduct the same kind of work as in Panama and Costa Rica. Both returned to Guatemala on November 13 and spent the following 3 days completing and validating their information. Final debriefings were given to ICAITI, PEEIR, ROCAP, and SIECA on Friday, November 16. A preliminary draft report was left at ROCAP by the consultants prior to their return to the United States on November 17.

Report Organization

Chapter 1 comprises the detailed findings of the evaluation, classified by major topics and project components. Chapter 2 groups conclusions and recommendations relating to each topic and component, in the same order, and adds a category for country-specific issues. The report is supported by seven appendices comprising (1) the detailed scope of work provided by ROCAP, (2) list of persons contacted, and (3) five country summaries, with country-specific findings.

1 DETAILED FINDINGS

This section presents the detailed findings of the PEEIR evaluation in terms of the following aspects:

- Project Administration
  - Institutions
  - Project management
  - Staffing
  - Regional links and information exchange
- Project Components
  - Industry programs
  - Training and field extension
  - Promotion
  - Database
  - Financing and policy issues
- Project Operation
  - Relationship of project to other AID-funded projects
  - Private-sector role
  - Technical assistance
  - Project expenditures
- Other
  - Likely impact of projects
  - Country-specific issues.

The major finding of this evaluation is that the project is one of the most interesting energy conservation projects currently being conducted in developing countries, and has the potential of becoming one of the most successful.

First, this project is the only really regional energy conservation effort in the world, including integrated

day-to-day operation in addition to common policies and objectives.

Second, the private sector, through the remarkably strong involvement of the national chambers/Association of Industries, is very active in the project and is the actual project beneficiary.

Third -- and this is really unique in the developing world -- **the project is receiving revenues from the private-sector participation in seminars** (about U.S. $75 per person) and for audits (U.S. $500 to $2,500 per audit).

Finally, this project has been able to attract and retain a number of experience, qualified engineers to conduct energy audits on a continuous basis.

Because the major objective of the evaluation is to recommend changes -- if any -- to increase the project efficiency, most of the report deals with those aspects which can be improved, and does not describe at length all of the numerous good features of the project.

PROJECT ADMINISTRATION

PARTICIPATING INSTITUTIONS

The key institutions involved in PEEIR are the Central American Technical and Industrial Research Institute (ICAITI), Secretariat for Central American Economic Integration (SIECA), and the national advisory committees. The interviews conducted and materials reviewed have confirmed that ICAITI is the single most appropriate and qualified organization to have implementation responsibility for the project. Moreover, the project will do as much to benefit ICAITI by enhancing its image in the region as ICAITI will do to to the project by providing facilities, access to its regional network of delegates, and regional experience.

Other institutions participating in PEEIR are the Regional Federation of Chambers of Commerce (FECAICA), the Central American Business Institute (INCAE), and the Central American Bank for Economic Integration (CABEI).

ICAITI*

ICAITI is a non-profit regional organization founded in July 1955 under United Nations auspices by Guatemala, Honduras, El Salvador, Costa Rica, and Nicaragua. The purpose was to provide advice and technical services to the region's industrial sector and to conduct appropriate technical research on products and processes using raw materials and natural resources. It has occupied its present Guatemala facilities, donated and maintained by the government of Guatemala, since March 1957.

ICAITI has seven technical divisions and a staff of about 160 employees, including 76 professional and technical personnel (see Exhibit 1.a for ICAITI's organizational chart). Professional personnel are experienced in such areas as chemical, industrial, and mechanical engineering, and economics. ICAITI's facilities include laboratories, pilot plants, and an up-to-date reference center and research service.

ICAITI is already familiar with energy issues. For example, ICAITI is currently implementing a portion of the Fuelwood and Alternative Energy Sources Project. ICAITI's share of this project involves technical assistance in wood-burning technologies, research in wood-fired cooking and baking, training of personnel in the region, and construction of wood stoves in various rural communities throughout the region. In addition, the project encompasses research on more efficient lime kilns, and experiments with solar energy and biogas digestors.

ROCAP's judgment is that this project in rural energy is progressing well, and the latest evaluation confirmed this judgment. ICAITI has been able to attract and maintain a core staff of dynamic young engineers who have rapidly acquired energy skills in solar, biogas, and combustion engineering. Many of the skills and experiences acquired under the fuelwood project can be applied by ICAITI to industrial energy efficiency, particularly in the area of alternative energy technology.

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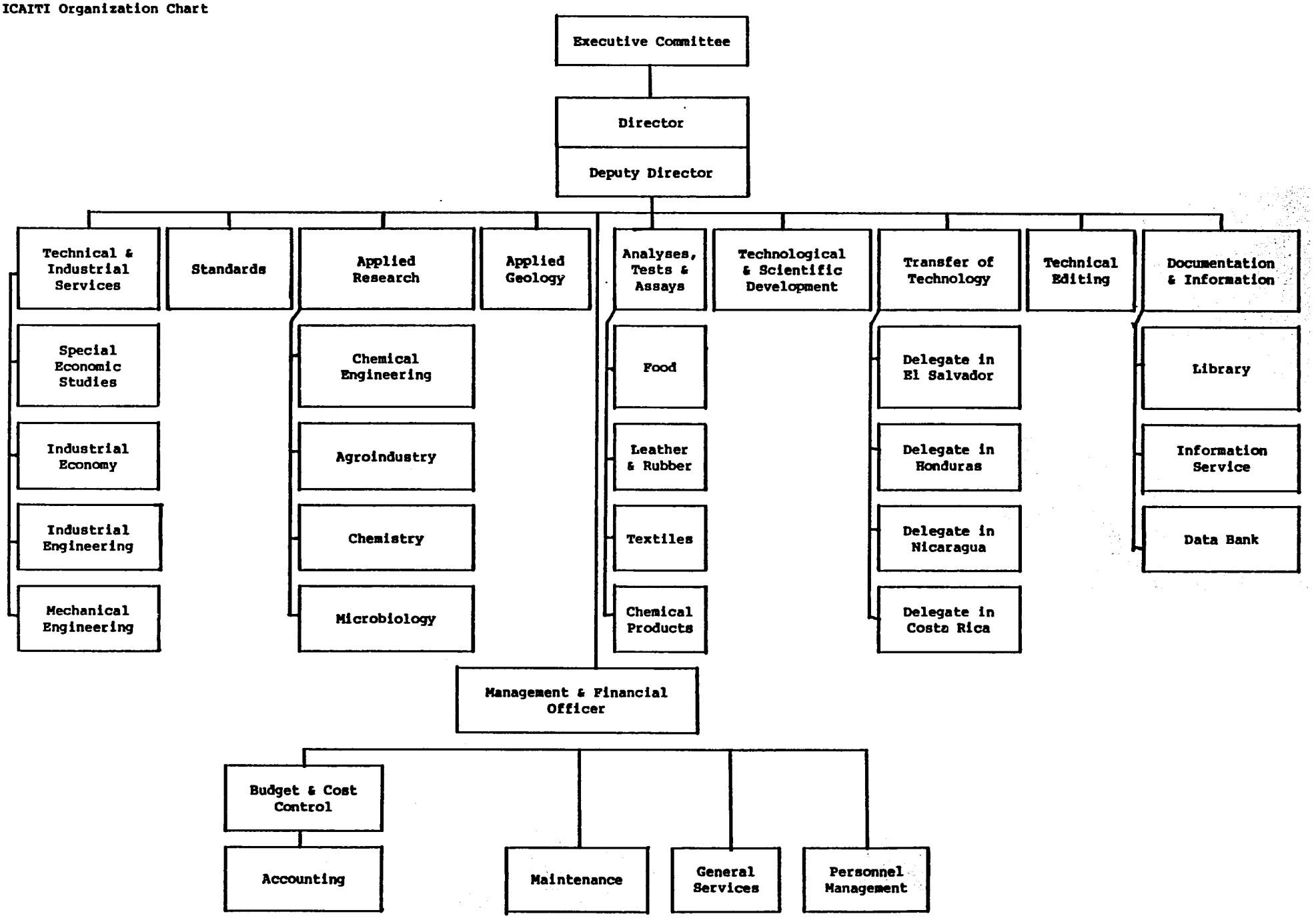
*Adapted from project paper.

Exhibit 1.a

ICAITI Organization Chart



SOURCE: Project Paper, Annex B-7, page 3.

Despite constant progress, two institutional deficiencies persist and will be addressed by the project. First, outside Guatemala, ICAITI is perceived to have an insufficient presence; its technical reputation is strong, but it is sometimes regarded as a remote and relatively inaccessible organization. Second, ICAITI is dependent on funding sources from the industries and institutions of the various countries it serves. This funding is not sufficient to support the full range of activities of which ICAITI is capable. Because of the constraints on funding, ICAITI currently has only a limited staff on board to provide many of the services that must be rendered under the various components of this project.

Role of ICAITI in the Project

According to the project paper, ICAITI -- through its Technical and Industrial Services Division -- has primary responsibility for project implementation. Administratively, ICAITI's duties encompass a range of functions, including the technical management of work performed and the orchestration of a communications network with industries and institutions throughout the region.

To facilitate project implementation, ICAITI has created an Executive Committee and will include on its staff a project director and two deputy project directors. The function of each is discussed below.

The Executive Committee is composed of the director and deputy director of ICAITI and the project director. In general, the committee provides a mechanism for senior-level control of project activities by establishing policies that govern the conduct of each of the project components, as well as procedures for the review of activities, the evaluation of work progress, and the enforcement of quality control. In addition to being a member of the committee, the project director (also called project manager) has direct responsibility for project implementation. Specifically, the project director is responsible for:

- Managing and coordinating all project components on a day-to-day basis
- Working with technical staff in defining individual tasks, including scope and budget

54

- Supervising all training activities and coordinate consultant services for this purpose
- Supervising the database development component and the manager in charge of these activities
- Coordinating project activities with SIECA, FECAICA (Regional Federation of Chambers of Industry), and other regional organizations
- Informing international organizations such as the World Bank and Interamerican Development Bank of project activities and results
- Preparing periodic progress and evaluation reports.

The project has two deputy directors who report directly to, and operate under the guidance of, the project director. The deputy directors supervise the two largest project components (industry program and promotion and field extension), each being responsible for one component.

The deputy director for industry programs supervises the technical engineering staff that conducts audits, demonstrations, and seminars and prepares exhibits, ensuring that all technical tasks are properly documented for management evaluation and input into the database. The deputy director for promotion and field extension provides guidance to the ICAITI field representatives on promotional activities, including coordinating requests from industries for project services. This deputy director also manages and coordinates the activities of the public relations contractor; organizes regional conferences, meetings, and symposia; and initiates and implements ideas for brochures, exhibits, and publications.

Status. The current project organization is that presented in the project paper, and all the senior staff positions are filled. Current responsibilities of each individual are also those outlined in the project paper.

Problems Encountered. While significant progress has been made with the project over the past 9 months, the project organization needs to be slightly modified to provide an adequate framework to undertake new program activities in 1985 and beyond, namely the database, the

"hot line" inquiry service, and the demonstrations. In addition, the role of each key staff member needs revision and clarification. These problems are described in more detail in the next section, "Project Management."

SIECA

SIECA is a policy and research institute for the integration of Central America in areas of common economic interest, and serves as staff for the Central American Common Market. It is based in Guatemala City, and has a staff of approximately 150, including support personnel.

SIECA is organized in nine departments, which include Industry, Agriculture, Fiscal and Tariffs, Physical Integration, Commercial Policy, Statistics and Calculations, Economic and Social Programs, Finance and Administration, and Science and Technology.

The Infrastructure Section of the Physical Integration Department contains the project staff responsible for carrying out project activities.

There are four PEEIR staff professionals at SIECA: a director and three others with primary responsibility for policy studies, finance studies, and data bank development and management.

The National Committees

The national committees are the cornerstones of the project in each country. There is no uniformity in their size, composition, and operation among countries. One committee may meet very formally and regularly (e.g., Guatemala), while another communicates on an ad-hoc basis (e.g., El Salvador). Yet another can be just a two-man operation (e.g., Panama). This variety of arrangements is seen as a plus by the evaluators, as each country is able to define the type of operation that suits it best.

PROJECT MANAGEMENT

In this section, the following aspects of project management are reviewed: authority and responsibility of

key staff, management communications, energy audit management, financial reporting, budgetary controls, and other management issues.

Authority and Responsibility of Key Staff

ICAITI's director and deputy director are responsible for administrative project management within the organization and communication with regional delegates. According to the project organization presented in the previous section, the project director (or project manager) -- Lic. Guillermo Diaz -- is the central project authority as far as project implementation and day-to-day activities are concerned. His role should also cover personnel management and financial management, among others.

The responsibilities of each deputy project director (industry program component and the promotional component, respectively) are clearly limited to supervising component staff and executing the component under the guidance of the project director.

Based on a review of personnel profile descriptions in the project paper, the project director and subordinates appear to be qualified for their jobs. However, based on the numerous interviews conducted during this evaluation, project management appears to have been the poorest aspect of PEEIR, particularly prior to March 1984, when the new work plan was implemented. The roles and responsibilities of the project director and the ICAITI directors are not clearly defined. For example, all of them review the audit reports, which should be the sole responsibility of the project director.

In addition, the project director has had very little impact thus far on budgetary control. His recommendations to provide some project personnel with salary increases, bonuses, or other incentives such as traveling to the United States to attend energy conferences have not been implemented.

Moreover, too much of the planning is done at the top level, among ICAITI directors, GIT consultants, the project director, and ROCAP; planning does not follow a "bottom-up" approach that would allow each PEEIR engineer, for instance, to contribute. Such input would be valuable, as the engineers are exposed on a day-to-day basis to all the activities and problems of both the

central project and the regional components. Because of poor management, project personnel are not certain who is in charge of what; this situation creates conflicts and doubts about leadership, and finally affects morale.

Management Communications

Communications among central project staff are inadequate. At present, no regular staff meeting is held to review work progress, discuss problems, and inform personnel about general issues related to the project. According to project management, the failure to hold staff meetings is the result of the heavy workload necessitated by trying to achieve the quantitative goals of the 1984 work plan. Senior staff meetings are held each Monday morning.

Energy Audit Management

While audit management is the direct responsibility of the project deputy director in charge of the industrial component, four people (Ortiz, Oven, Diaz, and Ingram or assistant) are responsible for audit review, compared with one or two engineers who actually conduct the audit.

Financial Reporting

Financial reports relating to PEEIR-ICAITI are prepared by the ICAITI accounting staff, employing a breakdown into 15 accounts in a format that is common to all ICAITI projects. Distribution of financial reports is restricted to the director level of ICAITI, ROCAP, and to the PEEIR director. Two report formats are provided in sets. One format (primarily for ROCAP) is a report of expenditures/availability against funds allowed since the project start. The second format reports expenditures/availability against an annual budget, with back-up reports of the month's expenditures in detail Each set comprises a report for each of the five project components and a consolidated report for the total project. Project component managers and delegates receive no financial reports at all.

A financial control report should show monthly and year-to-date data compared with budgets for the same

periods, and a forecast of total year expenditures. The financial reports illustrated do not facilitate adequate management control, as the budget data cover a 1-year span (or total funds obligated to date), and no forecasts are provided. Also, there is no reporting by country.

The SIECA financial report lists eight accounts, and shows expenditures/availability against funds allowed since the project start; however, it lacks short-interval budget comparisons and forecasts which are essential to a financial control document.

Budgetary Controls

Budgetary planning and control is performed by Lic. Mario Santos, head of the ICAITI Budgetary and Cost Control Division. The process is confined to the ICAITI director level and the PEEIR director; project component managers and delegates are not involved.

An improved budgetary control system was introduced recently by ICAITI, but it is not yet functioning satisfactorily. Under this system, results are compared with budget at monthly, year-to-date, and allowed-to-date levels, and variances are shown. The report set consists of a report for each project component and a summary report incorporated in a broader report covering all ICAITI projects. Unfortunately, the report set is inaccurate in its present state because the figures are inconsistent. Another problem is that the report is not distributed to the project level.

In practice, budgetary control is exercised routinely by Lic. Santos, who checks each purchase requisition for availability of budgeted funds before approving it.

PEEIR-SIECA is a much smaller operation than PEEIR-ICAITI; consequently, budgetary control is relatively simple. It would not be difficult to set up a system that has the basic elements needed for adequate control.

Other Management Issues

At the time of the evaluation, it was very difficult to produce reports within an acceptable timeframe because of excessive report review and overall management

problems and inadequate secretarial support. In addition, communications between PEEIR and national delegates and committees seemed too much of a "one-way street," and evaluators heard requests in all countries for better communication between the countries and the central project. Specifically, regional staffs would like to have more responsibility in the area of promotion to tailor the promotional products to each country's needs where possible, and would appreciate being kept informed about overall project performance and prospects.

STAFFING

Staffing of the project and its host institutions is shown in Exhibit 1.b. In addition to the PEEIR personnel listed, all of whom are professionals, the project receives management and administrative support from ICAITI and SIECA staff.

The central PEEIR staff currently consists of a project director (or "manager") (Lic. Guillermo Diaz), an industrial component manager (Ing. Mario Ortiz), a promotion component manager (Lic. Francisco Segura), and eight field engineers (J. Gonzales, R. Cartagena, W. Flores, O. Posadas, O. Lopez, G. Bran, G. Rodriguez, and A. Garcia). Ing. Posadas is supposed to be the training coordinator, and Ing. Flores had been hired to manage the data base, but both are currently working as field engineers. Ing. Cartagena is also responsible for ICAITI's own engineering activities. In addition, there are a database assistant and a promotion assistant, for a total of 13 professionals, far from the 19 envisioned in the original 1984 work plan.

Staffing/management deficiencies have resulted in many program delays and difficulties, including a long waiting list for plant visits (level 1 audits) after promotional visits, an excessive backlog of audit reports awaiting preparation and delivery, delays in database and demonstration activities start-up, and a significant lag in training. While a strengthening of management skills will greatly improve the situation, it is clear that not all projected 1985 activities can be carried out without staff additions. Moreover, the extensive training recommended for 1985 (see section on training) will require a substantial share of staff time, and the recommended initial decentralization

Exhibit 1.b

Staffing of Project and Related Institutions

PEEIR-ICAITI	**Persons**
Project director	1
Industrial component manager	1
Field engineers	6
Training coordinator	1
Data manager	1
Programmer	1
Consultants -- GIT (contractor)	2
Promotion component manager	1
Promotion assistant	1
Delegates (ICAITI employees)*	4
Promotion assistant -- Costa Rica	1
Promotion assistant -- Honduras	1
Promotion assistant -- El Salvador	1
Delegate Panama (contractor)	1
Total PEEIR-ICAITI	23

PEEIR-SIECA	
Project manager	1
Economist	1
Assistant economist	1
Engineer	1
Assistant engineer	1
Total PEEIR-SIECA	5

ICAITI	160-170
SIECA	150

effort (see section on decentralization) will aggravate the situation.

Because the 1985 work plan is likely to call for completing about 100 plant visits and 25-35 level 2 audits, starting work on a database, carrying out demonstrations, providing "hot line" services, and conducting audit follow-up activities, some staff additions will be required. Although the needs cannot be identified with precision without a final work plan for 1985, it is likely that at least two more field engineers and one promotion assistant will be needed.

The PEEIR-ICAITI staff is supplemented by two major contractors, GIT and Publicidad Siboney. In addition, the Panamanian consulting firm ARTEFIP, whose general manager -- Ing. Celedonio Moncayo -- serves as the delegate for Panama. GIT, which is responsible for technology transfer and training, provides a chief of party (Mark Oven) and a resident trainer (Alan Pashkevich). GIT's contractual arrangements also allow for specialized short-term assistance. The advertising agency Siboney (Foote, Cone & Belding Communications, Inc.), which provides art work for promotional literature, helps the promotional staff arranges for production of the literature, and places advertisements for seminars.

The project has experienced a series of staffing problems. The original PEEIR-ICAITI industrial component manager and the GIT chief of party did not perform satisfactorily and were released from their positions in early 1984. In addition, the competence of the field engineers is very uneven and indicates a need for further training and improved recruiting practices.

Morale has also been strained by slow personnel administration action. Mario Oritiz was promoted to his present position of Industry Program Manager in March 1984, but was not given the title until July. Detailed planning of the PEEIR-SIECA manpower requirements must be deferred until the 1985 work plan is available.

REGIONAL LINKS AND INFORMATION EXCHANGE

The primary link of PEEIR-ICAITI with the regions is through the delegations, the national advisory committees, and the national industry associations. The industry associations have been the major vehicles for extending PEEIR to local industries, by endorsing

activities, establishing industry contacts, and providing logistic support. In the case of the Honduras Industry Association, however, assistance is given only on an as-requested basis (and with reluctance), owing to an unresolved dispute with project management over the sharing of seminar and audit fees. Also, as in other countries (e.g., El Salvador), the national advisory committee in Honduras is dissatisfied with a perceived lack of participation in decision-making. (The committee officers are all industrial managers.)

There is a serious lack of communication between the project team of SIECA and that of ICAITI, as indicated by the fact that the work plans of the two groups are not coordinated. The PEEIR-ICAITI project is reaching an implementation stage and requires support from SIECA in the form of country-by-country recommendations on financial assistance and government support through policies and regulations. In reality, SIECA's activities are not focusing on these issues.

A communication gap also exists with respect to data bank activities. Both project teams appear to be developing data banks without coordination. In fact, the two data banks should be designed to complement each other.

INCAE has been contracted to provide seven case studies, and is far behind schedule in providing them.

INCAE, FECAICA, and CABEI, together with ICAITI, SIECA, and ROCAP form a Regional Advisory Committee that is intended to assist in coordinating the project at regional level. The committee does not appear to play a significant role in the project. INCAE's role is limited to providing case studies, and it is far behind schedule in this activity. CABEI and COMENER do not appear to have played a significant role in the project to date.

PROJECT COMPONENTS

INDUSTRY PROGRAMS

As defined in the project paper, the industry program component consists of four activities: energy audits, field and pilot demonstrations, energy efficiency seminars, and exhibits. In this section, the technial content and the impact of each activity is reviewed. The

management aspects have been discussed in a previous section (project management).

Energy Audits

Two types of "audits" are being considered: plant visits (previously referred to as level audits) are the subject of a half-day on-site visit followed by a mainly qualitative diagnosis of plant energy efficiency; and audits (previously referred to as level 2 audits) which are detailed, instrumented energy audits requiring 5 to 15 person-days of on-site work, plus 10 to 20 person-days for data analysis and report preparation.

As of mid-November 1984, it seemed likely that about 65-70 plant visits and 10-15 audits will be completed (that is, with reports received by plants), compared with a 1984 goal of 75 and 25, respectively. Because of the current priority to develop the 1985 work plan, these achievements are satisfactory.

The plant visit reports are somewhat uneven because (1) clear guidelines about scope, objectives, audience, and content are still lacking; (2) the reports are strongly dependent on the personality and background of the engineer doing the work; and (3) inadequate quality control (see section on management) and the long lead time required to produce the reports militate against the pressure of the program manager and delegates to get the reports out as soon as possible. While most of the reports appeared to be of good quality for the purpose they are intended to serve (promote the concept of instrumented audits), some of them were not good enough to be sent to the plants or not acceptable to the delegates. Some of the problems were:

- Inconsistency (overall estimated savings greater or much less than the sum of individual OCE's* benefits).
- Unrealistic nature of some savings estimates. Some reports provide a degree of precision in costs and benefits estimates which is too high

*Energy Conservation Opportunity, or OCE in Spanish, is a typical energy conservation measure identified as the result of an audit.

to be credible for a half-day visit. This also results in confusing plant management about the role of detailed instrumented audits.

- Too much precision in the estimates and recommendations, which preempted the need to propose an instrumented audit (when it was in fact justified).

In addition, the plant visit reports do not contain sections describing either the condition of existing instrumentation in the plant or specific energy consumption (i.e., Btu and kWh consumed per pound of product, compared with standards).

The few audit reports reviewed by the evaluators were of good quality; the technical analyses, as well as the cost estimates, were solid. The reports can achieve a high level of quality (judged against international standards) with some improvement of the executive summary (directed to management), description of existing plant energy instrumentation, comparison of specific energy consumption per unit of output with international standards, and most computations and technical schematics presented in appendices.

In terms of cost and performance, a plant visit report requires slightly less than 1 person-week on average, and an audit requires about 7 to 8 person-weeks. In 1985, these durations are likely to fall to about 3-4 days for plant visits, of which 1/2 day to 1 day is on-site, depending on the plant complexity and the data availability, and to 6-7 person-weeks for audits. These figures, which are well within standards, correspond to about U.S. $500 for plant visits and about U.S. $5,000 for audits in direct costs.

Field and Pilot Demonstrations

The project paper called for about 85 minor and major demonstration projects and a limited number (2) of pilot projects. While the first demonstration projects were originally planned to start 1 year after PEEIR initiation, or by July 1984, there is still no firm decision about the final strategy to follow. A concept paper was recently prepared by Alan Pashkevich (GIT) and is currently under review at PEEIR. The paper proposes a selection methodology and management approach, and describes 27 candidate projects. So far, little

has been done outside Guatemala, but countries like Costa Rica appear to be good candidates for first projects because of the extensive background provided by existing studies (Meta System and Weston International) sponsored by the local AID mission.

Because of the current workload and the limited number of completed audits, it is not likely that a large number of demonstration projects will be completed in 1985, nor is it desirable because of the relative importance of other project activities, such as training, ongoing audit work, and follow-up. Five to ten medium-size projects (i.e., U.S. $10,000 each) seem to be a reasonable target. The most important element of these demonstration activities of 1985 is the establishment of a clear methodology and policy for project selection, implementation (including subcontracting to specialist private firms), and monitoring. The five to ten initial projects should be located in Guatemala and Costa Rica because of logistics, background, and availability of qualified engineering firms.

Based on a brief review of existing plant visit and audit reports, the first demonstrations could include:

- Automatic air/fuel ratio controls for boilers, kilns, and ovens
- Condensate recovery systems at atmospheric pressure and under pressure (e.g., paper plants)
- Economizers in boiler and oven stacks
- Simple electric load management systems.

With respect to the two projected pilot projects, both the project paper and the preliminary PEEIR documents focus on the use of biomass and biogas as substitutes for fuel oil. While this concept is clearly very interesting, implementing such projects will be difficult for several reasons. First, PEEIR engineers are not familiar with the technologies, and audits do not provide sufficient background for such projects. On the other hand, ICAITI staff have broad experience in these areas. Moreover, plant staff is also unfamiliar with the technologies. Finally, biomass-based technologies are largely unproven in Central America (see AID project in Costa Rica). Great care should thus be taken in the selection of projects and the overall implementation, training, and monitoring phases. The

demonstration/implementation specialist of the PEEIR engineering component (see revised organization chart) should play the key role, under guidance from the project manager and the GIT consultants.

As far as pilot projects are concerned, 1985 should be dedicated to the completion of a detailed feasibility study of a candidate project. Again, Costa Rica's Meta System and review studies should provide a unique basis for conducting the feasibility study.

Energy Efficiency Seminars

The project paper calls for approximately four seminars in each of the five countries every year of the project. This objective will be exceeded, as the 1984 work plan had set a goal of 32, which is likely to be met.

This activity is undoubtedly one of the most successful components of the project. Participants interviewed during the field trip were all extremely positive, suggesting only that more time be allowed for practical experience and additional topics to be covered, such as instrumentation and controls. They also recommended that seminars be taken to plant boiler operators and maintenance technical staff. In some countries like Panama, however, special care should be given in scheduling and selecting topics, as there is a high degree of competition with other organizations and some topics, such as boilers, are overcovered.

Exhibits

Each seminar has been the site of an exhibit. In addition, a specific exhibit has been set up for the 1984 international fair in San Salvador. Based on our interviews and a visit paid by Alain Streicher to the ICAITI stand in San Salvador, it appears that the quality of the exhibits has been very good and raised significant interest in seminar participants and visitors.

TRAINING

According to the project paper, the training component has two functions: developing the technical capability of ICAITI staff to carry out project activities, and using ICAITI staff to transfer that capability to

national level counterparts. Ten topics were identified as priorities, including audits, energy sources, specific technical subjects, and energy economics (see Exhibit 1.c). During 1983 -- the first year of the project -- ICAITI engineers and national delegates were supposed to receive a 2-week course of instruction. During 1984 -- the second year of the project -- ICAITI engineers and national delegates were supposed to receive instruction from a selected U.S. consulting firm in the ten topics presented above.

Status

Georgia Institute of Technology (GIT) was selected to assist the training in early 1983; training started in July 1983 with a 2- to 3-week training course for ICAITI engineers and national delegates, according to the project paper, followed by a 4-day seminar on controls in January 1984. No training has been given outside the project headquarters (although seminars, which have been conducted in all five countries, can be considered part of training), and no training on the ten modules has been carried out during 1984 owing to the various problems encountered by the project in early 1984 (see p. viii) and the absence of a dedicated ICAITI training coordinator.

The capabilities of ICAITI's engineers appear to be uneven, based on extensive discussions with project management and national delegates.* Most of the engineers have a good technical background and an understanding of their role, especially those who joined the project at an early stage. Some, however, definitely need more training. With sufficient training, the team should be able to perform all the tasks effectively. Training for ICAITI engineers is needed in some specific technical areas (e.g., refrigeration), in project analysis, and in communications. As far as future work for demonstrations and pilot projects is concerned, the evaluators were not able to seriously test staff capabilities.

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*A more objective evaluation of the PEEIR engineers' capabilities would require a formal test. Unfortunately, no test was given at program start to serve as a reference for later tests.

Exhibit 1.c

Training Modules

Title	Outline of topics	Participants
1. Introduction	General description of industries, companies, and processes	Staff engineers, field representatives, initial high-impact team, and others requiring general background
2. Concept and Application of Energy Audits	Provide formats for data collection; review test equipment; develop techniques for energy balances	Staff engineers, field representatives, initial high-impact team, and others requiring general background
3. Energy Sources and Uses	Description of existing and potential forms; alternative sources; relationships of source to industrial use by process and operation	Staff engineers, field representatives, and others requiring general background
4. Electricity Generation	Electric circuit theory and measurement techniques; hydraulic power systems; uses and costs	Staff engineers, initial high-impact team (utility engineers could assist in group discussions)
5. Thermal Management	Thermodynamic issues; combustion systems, including measurement techniques; system efficiency; heat transfer and recovery; cogeneration; alternative fuels; uses and costs	Staff engineers, initial high-impact team
6. Specific Industrial Process and Energy-Conserving Alternatives for C.A.	Drying and evaporation; distillation; other process changes; building design; space heating and cooling	Staff engineers, specific industrial plant engineers as appropriate
7. Industrial Energy Management Program	Role of energy coordinator; monitoring procedures; maintenance programs; use of specialized consultants; future planning	Staff engineers, specific industrial plant engineers,as appropriate, plant and management personnel
8. Energy Economics	Techniques for costing; alternative sources for capital; cost organization by project	Staff engineers, field representatives, specific industrial plant engineers as appropriate, plant management and personnel (banking officials could assist in group discussions)
9. Plant Visit(s)	Energy audit procedures; descriptions of past, present, and future energy technologies; plant optimization as overall goal	Staff engineers, field representatives, initial high-impact team
10. Review and Discussion	Coordination and audit and design procedures; system turnkey approach; specific problems and solutions	Staff engineers, field representatives

SOURCE: Project paper, page 24.

National delegates were uncomfortable with their current capabilities in carrying out PEEIR and would welcome more technical training and some training in management and marketing to improve their skills in persuading people (ICAITI engineers) and promoting products (plant visits and audits). They also said that they need more exposure to similar experience and programs in other countries. Project management could also be improved by providing specific training in communications, planning, and cost control to the project manager, the ICAITI subdirector, and the two component managers.

Other specific training needs will occur because of the new activities starting in 1985, such as the data bank, the hotline service, and the demonstrations. Besides the project staff internal needs, training will also be needed in 1985 for private consulting and engineering firms, plant engineers, and technical staff.

A summary of training needs is presented in Exhibit 1.d. As shown in the exhibit, training needs are great and across the board.

Under the category "basic training," two items deserve comment. First, "exposure to other audit procedures" means that PEEIR engineers should be given the opportunity of working closely with experienced energy auditors other than GIT's to refine their practice and increase their self confidence. The other item is "training in the United States." Such training would serve two purposes: provide actual top-level training* and act as an incentive for performance to be selected. Some training in the English language may be needed for some of the PEEIR engineers to meet the requirements of U.S. courses.

PROMOTION AND FIELD EXTENSION

The purpose of the promotion and field extension component of the project is to generate a great number of

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*Hagler, Bailly & Company recently evaluated the 1984 Tennessee Valley Authority's energy conservation training course (Industrial & Utility) and feels that this course would be quite appropriate for PEEIR's engineers.

Exhibit 1.d

PEEIR: 1985 Training Needs

Item	Description	Audience	Duration	Date	Location	Trainer
Basic	• Specific technical topics	All PEEIR engineers	2-4 weeks	At convenience	Guatemala	GIT
	• Project implementation	All PEEIR engineers	2-4 weeks	1st quarter	Guatemala	GIT
	• Demonstrations/pilots	All PEEIR engineers	2-4 weeks	1st quarter	Guatemala	GIT
	• Exposure to other audit procedures	All PEEIR engineers	2-4 weeks	2nd quarter	Guatemala	To be selected
	• Training in U.S. (e.g., TVA)	1 or 2 PEEIR engineers	2-3 months	At convenience	Depends on country	To be selected
Junior engineers	• Repeat 1983 course	Engineers hired after 1/84	2 weeks	ASAP	Guatemala	GIT
	• Additional specific courses	Engineers hired after 1/84	2 weeks	At convenience	Guatemala	GIT
Delegates	• Specific technical topics	All delegates	2 weeks	At convenience	Guatemala	GIT
	• Marketing	All delegates	1 week	1st quarter	San Jose	INCAE
	• Overseas	Depending on resources	2 weeks	At convenience	Depends	To be selected
Private sector	Phase I					
	• Basis of auditing instruments	Selected firms/individuals of Guatemala and Costa Rica	2 weeks	2nd quarter	Guatemala	GIT/PEEIR
	• On-the-job		4 weeks	2nd quarter	Guatemala/Costa Rica	GIT/PEEIR
	• Specific technical topics		2 weeks	At convenience	Guatemala	GIT/PEEIR
	• Project implementation/economics		1 week	2nd & 3rd quarters	Guatemala	GIT/PEEIR
	Phase II: 1986; other countries					
Plant engineers	• Basic classroom	Chief engineers, chief maintenance	1-2 weeks	3rd quarter	In specific countries	PEEIR
	• On-the-job		2-4 weeks	3rd & 4th quarters		PEEIR
Specific	• Data base management and use	Data base & promotion assistants	4 weeks	2nd quarter	Guatemala	Consultant
	• Personnel & project management	Project manager & head of project components	2-4 weeks	3rd quarter	United States	To be selected
	• Financial management	ICAITI's chief	2-4 weeks	1st quarter	Guatemala	Local consultant

SOURCE: Hagler, Bailly & Company.

activities and products, all focused on increasing awareness of the opportunities, measures, and technologies for conserving energy, and to stimulate demand for the auditing and demonstration services offered by the other project components.

PEEIR has produced a variety of publications, including newsletters, pamphlets, brochures, energygrams, seminar manuals, and a case study. Three seminars have been presented a total of 23 times to an audience of 1,280 people. Exhibits have been displayed on 30 occasions, and a major exhibit stand was shown at the International Fair in El Salvador in November. Audit follow-up calls are being made by the delegates to monitor implementation of audit recommendations and to promote demand for PEEIR's technical assistance services.

The promotion targets are primarily medium and small private-sector companies in the food, beverage, textile, and chemical industries. Contacts are made largely through industry associations and their membership lists. Personal connections play a major role in gaining access to a plant.

Overall responsibility for promotion and field activities rests with Lic. Francisco Segura and his assistant, J. R. Currera, at PEEIR headquarters. Field activities are conducted by the ICAITI delegates and their assistants. Generally, each delegate has one assistant, with the exception of Costa Rica, where there are two. Promotion activities in Guatemala are carried out by Lic. Segura's assistant. Design and production of most promotional material is centralized, as is the preparation, scheduling, and organization of conferences and seminars.

In November 1983, the advertising agency Publicidad Siboney (Foote, Cone & Belding Communications, Inc.) was contracted to provide artwork for the project publications and to print them. It was felt that a professional standard of promotional material was necessary to attract the attention and interest of the target audience. Sibney also designs and places seminar advertisements. Other resources employed in the project are the ICAITI publications service (mimeograph and offset), industry associations, audiovisual rental services, and journalists who arrange for publication of articles on the programs and its events in the news media.

72

Promotion and field extension activities include conferences, seminars, plant visits, mailings, telephone calls, media advertising, and exhibitions. In each country, promotion activities are conducted jointly with an industry association. In every case, the industry association -- with its membership list and personal communications -- provides an effective and efficient vehicle for reaching the audience and securing its participation in the project. Also, the industry associations provide considerable logistic support to the promotion activities.

Over the life of the project, promotional activities must generate a demand for 290 plant visits and 45 audits.

Promotion was initiated throughout the region during the June 1983-February 1984 period by means of promotional conferences aimed at a broad group comprising industry, consultants, government, and the academic community. These general awareness-raising events were followed by technical seminars intended for industrial managers and technical professionals. Mailings, exhibitions, telephone contacts in the promotion promotional visits proceeded in parallel in the promotion campaign, which led to the completion of 97 plant visits. At this point in time, activities are centering on delivery of the plant visit reports and generation of audit contracts. Personal delivery of the plant visit report provides an opportunity to promote the detailed audit.

The project has produced three of the four technical seminars planned for 1984. They were presented in all countries of the region, and -- with the exception of Panama -- attendance was essentially as planned. The seminars were titled:

1. How to Improve Boiler Efficiency
2. Efficient Use of Electrical Energy in Industry
3. An Energy Conservation Plan in Your Industry.

Seminar participants completed evaluation questionnaires at the conclusion of every seminar, and the completed forms were forwarded to project headquarters. Evaluation forms for 9 of the 23 seminars presented have been analyzed and tabulated. All seminars dealt with improving boiler efficiency. Analysis of the balance of the seminars had not been carried out at the time of the evaluation.

The responses to the questionnaires indicate that:

- Virtually all participants considered their time in the seminar well spent, and would recommend the program to other industrial managers and professionals
- Over 80 percent of the participants plan to implement the efficiency improvement measures suggested
- More stress should be placed on water treatment, instrumentation and controls, and practical applications
- The seminars should be longer than 1 day
- Most participants learned about the seminar through mailings or newspapers.

A further impression of the effectiveness of promotion activities was gained from a telephone survey of 10 names selected at random from the delegates' mailing lists in Panama and Costa Rica. The survey revealed that:

- The quality of the seminars and manuals was considered satisfactory to excellent
- The attitude toward PEEIR was positive
- Most respondents learned of PEEIR through mailings; the industry association was often mentioned as the source of the information.

Well over 160 promotional visits have achieved their objective of generating a strong demand for plant visits, based on conversations with many industrial managers and engineers who have been reached by the project activities. The visits have succeeded in raising awareness of energy efficiency and have created a positive attitude toward energy conservation. Also, the image of ICAITI has been enhanced in the process, which assists its role as the project implementing institution.

The quality and effectiveness of project outputs have been good. Printed materials are of a standard that would be difficult to achieve without the assistance of a professional advertising agency. Some criticism was received about the technical depth of the seminars and

manuals, but this was no doubt because of the broad range of technical competence within the audience. This situation could be corrected by more careful matching of participants to the technical level of the seminars.

Owing to a lack of detailed promotion cost data, and to the limited seminar evaluation analysis results available at this time, it was not possible to reach conclusions on the cost-effectiveness of the various promotional activities employed. Neither the promotion managers nor the delegates are provided with a budget or cost reports. Their management of promotion and field extension activities would certainly be more effective if they were aware of the financial resources available to them and the status of their expenditures.

The promotion program to date has been effective in raising awareness of energy conservation and in stimulating a demand for audits. However, the project is now entering a new phase that stresses implementation of energy conservation measures and achieving savings. In view of this, promotion and field extension activities must be reoriented toward promoting results. This new requirement calls for emphasis of audit follow-up and "hot line" services to provide technical assistance for implementation of conservation measures.

A variety of problems has been encountered in the course of the promotion and field extension program to date, but none was serious enough to affect results significantly.

In Panama, several groups staged boiler energy efficiency seminars, resulting in six seminars on the subject in 1984, of which two were presented by PEEIR. In connection with the project-sponsored seminars and conferences in various countries, there were also scheduling problems (conflicting dates) and late delivery of seminar programs. The problems were said to be caused by top-down, unilateral planning, and to grouping of mailings within the ICAITI organization. They were overcome by resourcefulness on the part of the delegations.

Problems were also encountered in the production of videotapes. The second tape produced, on the analysis of electrical efficiency, cost $8,000, compared with a budget of $1,300. In addition, a plan to dub videotapes produced by GIT encountered technical problems

15

and is likely to be abandoned. In view of the above problems and the fact that the Energy Management Seminar tape was not required, it was decided to reduce the year's tape production from four to two.

DATABASE

The original objective of this project component was to provide access to comprehensive (and periodically updated) information from international sources in addition to information generated by the project. Some of the information -- such as books, magazines, studies, and other hard-copy documents -- were to reside at the ICAITI library and be made available to a broad audience. Project-specific information, such as information available from promotional activities and audits (e.g., OCEs, specific energy consumption ratios) will be gathered and progressively input into a dedicated microcomputer. There are plans for a U.S. consulting firm to assist in this project component start-up.

Status

As of November 1984, little had been done on the database project component, and work seemed to be on hold. The contracted consulting firm, Engineering and Economics Research, Inc. (EER), had provided a general proposal for the database objectives and structure (John Uribe, 1983) with associated input forms, but had not completed its original scope of work owing to several factors, including hesitations and delays in equipment selection (hardware and software). Delays in other project components such as audits (which are supposed to be prime sources of data) also affected progress. The contract with EER is now on hold, but a computer has been selected and recently procured. The computer is currently undergoing tests at PEEIR.

The original proposal from EER was very ambitious, and the envisioned final product certainly had no equivalent in the developing world. However, it must be kept in mind that the database should remain a simple, understandable, and manageable tool aimed first at meeting project and private industry needs. Then, consideration can be given to other indirect users such as government agencies. A goal for 1985 should be to have an operational system that can store, organize, process, and make available information from (1) audits (e.g.,

16

OCEs characteristics), (2) promotional activities (e.g., evaluation forms, company energy profiles), and (3) costs and sources of energy efficiency equipment, materials, and services.

FINANCING AND POLICY ISSUES

Status

The financing and public policy issues component is designed to encourage public and private financial institutions to provide investment funds for industrial energy conservation projects and to increase the understanding by each country's officials of the interaction between public policy issues and energy matters. This part of the project actively involves the Secretariat for Central American Economic Integration (SIECA).

The project status reflects a late start in activities (April 1983) and inefficient coordination of work planning with PEEIR-ICAITI and ROCAP. Project expenditures of AID funds to September 30, 1984 were $83,462, or 14 percent of planned expenditures of $600,000 over the project life.

The 1984 work plan, which covers the period October 1983 to December 1984, states that SIECA is responsible for (1) identifying public policies that act as disincentives to efficient energy use and to the adoption of alternative energy sources, (2) recommending policy changes and encouraging their adoption, and (3) promoting the development of private- and public-sector financial and other support services that will facilitate and encourage the adoption by industry of more energy-efficient production techniques.

The primary work plan activities are: Central American country energy analysis (11-1/2 person-months), preliminary financial study (3-1/2 person-months), related studies, including policy-related studies (14 person-months), and data bank development (20-1/2 person-months).

Central American country energy analysis. This analysis consists of seven sections for each of the five countries in the project and was scheduled for completion in November 1984. To date, only the socioeconomic section for four countries and one part of the national

11

energy resources section for one country have been completed in draft.

Preliminary financial study. A draft preliminary study of financial options in Guatemala was published for discussion in February 1984. It examines lines of foreign exchange credit in Guatemala and provides a business investment case study, but contains no financial conclusions or recommendations. Nothing has been developed on other countries. The Guatemala paper is intended to serve as a model to be applied to other countries.

Related studies. There are 14 related studies divided into 8 first-priority studies (related to the project) and 6 second-priority studies dealing with general energy conservation issues that were not scheduled for 1984. The first-priority studies are:

1. Policy and Regulatory Analysis for Energy Conservation
2. Analysis of Central American Electrical Tariffs
3. Petroleum Product Prices
4. Use of Surplus Bunker Oil
5. Petroleum Product Pipeline
6. Urban Mass Transit
7. Commercial-Sector Transport Cost Impact
8. Agricultural-Sector Transport Cost Impact.

Only studies number 2 and 4 have been completed. The electric tariff analysis covers all Central American countries and gives block rates by sector (residential, commercial, industrial, and government) and some comparative analysis. The analysis focuses on the industrial sector but depends on outdated 1974 energy data to derive some important conclusions concerning electrical energy use in industry. In August 1983, SIECA also prepared a document for ICAITI on short-term energy prices in Guatemala to support the financial analysis of energy conservation opportunities.

During the discussions with SIECA staff on the reasons for delay on any broader based study covering all policy, tariff, tax, and regulatory factors affecting

industry, it was suggested that expiration and renegotiation of the Central American Common Market tariffs (due by April 1985) prohibited such analysis. In addition, it was stated that industrial tax revision was not a realistic policy option.

Data bank development. The data bank contains energy statistics (petroleum and electricity) that provide the basis for the annual SIECA energy summaries. Publications on the content, use, and control of the data bank have been issued. No price data are included in the data bank, but such inclusion is under consideration.

Development of the PEEIR-SIECA 1985 work plan is now in progress. PEEIR-SIECA management intends to orient the plan strongly toward meeting industry needs for financing and toward public policy support of the energy conservation measures being developed by the industry program component. To this end, SIECA and ROCAP are seeking planning assistance.

Accomplishments

An energy data bank has been established, with historical data on Central America and Panama as follows:

- Production and sales of electrical energy (1960-1983)
- Petroleum consumption by sector (1960-1983)
- Apparent consumption of petroleum derivatives (1960-1983)
- Apparent consumption of energy (1960-1983)
- Energy consumption by sector (1960-1983)
- Imports of petroleum and derivatives (1960-1983)
- Exports of petroleum and derivatives (1960-1983).

These data are essential for developing and supporting recommendations on government policies and regulations relating to energy.

Quality and Effectiveness of Outputs

The component has not produced any outputs that specifically fulfill the objectives (i.e., identify and recommend policy changes favoring energy efficiency and encourage their adoption; and promote and develop financial support of energy conservation activities). In fact, much of what has been published is not directly relevant to the central objectives of the component.

Problems

During the discussions with SIECA staff on the reasons for delay in developing recommendations covering all policy, tariff, tax, and regulatory factors affecting industry, it was suggested that expiration and renegotiation of the Central American Common Market Tariffs (due by April 1985) prohibited such analysis. In addition, it was stated that industrial tax revision was not a realistic policy option.

Financing Survey

The evaluators interviewed bankers in all countries of the region to determine the availability of financing for energy projects. Also, industry representatives were asked to give their perceptions of the availability of financing. The picture that emerged is one of a foreign exchange crisis in most of the region, except for Panama, where the U.S. dollar serves as the national currency. Therefore, the central banks tightly control foreign exchange operations, and the loan approval process is lengthy and bureaucratic, taking up to a year. In some cases, personal and political connections are said to be a major factor in obtaining credit approval.

In no case are funds specifically designated to support energy conservation. Throughout the region, various funds are provided by international institutions and lenders such as AID, IDB, IBRD, CABEI, the World Bank, and foreign central and export-import banks. These funds are generally limited to specific applications, such as industrial revival, raw material imports, promotion of exports, and imports of goods from the sponsoring countries.

To the extent that energy project implementation requires imported equipment, availability of financing is generally seen by industrialists as a problem. International companies, of course, have greater access to the necessary financing.

There is considerable uncertainty on the part of both industrialists and bankers as to the eligibility of energy projects for the array of funds available in the various countries. The current approach is case by case. SIECA could play a major role in clarifying applicability of funds to energy conservation projects.

CABEI is interested in seeking funds for energy projects, but needs data from SIECA to establish the parameters and magnitude of the requirement.

The need for financial assistance was identified in the project paper but not included in the project. It is not yet clear what the nature of financing needs are, as the economic recession clouds the picture. The presence or anticipation of additional industrial lines of credit (foreign exchange) may indicate that such lines are insufficient to serve the industrial conservation investment needs expected to grow in 1985 and beyond as firms receive more and more audit results.

PROJECT OPERATION

RELATIONSHIP OF PROJECT TO OTHER AID-FUNDED ENERGY PROJECTS

Two AID-funded projects are currently in progress in the ROCAP region: the Fuelwood and Alternative Energy Sources Project and the Costa Rican industry auditing project. The Fuelwood and Alternative Energy Sources Project has financed both research on fast-growing trees, fuel-efficient stoves, and other alternative energy sources for firewood, and the dissemination of the technologies developed. The project is part of a rural energy program and does not overlap the PEEIR project.

In Costa Rica, Weston International, Inc. was contracted by AID to conduct detailed energy audits of 15

plants and to train a core group of engineers from DSE* in energy auditing. Work began on July 9, 1983, and will conclude on March 9, 1985. There are two work teams, each consisting of a Weston engineer, an engineer from the local subcontractor (Sol 2000 S.A.), two DSE engineers, and several observers, including an ICAITI engineer from the San Jose delegation. Each of the plants being audited represents a different business sector and was selected either because it had high energy usage or belonged to a major business sector.

The audit procedure being employed is described in Exhibit 1.e. Audit reports were highly confidential and are not reviewed by DSE; therefore, the evaluators were not able to examine them. However, conversations with the Weston auditors indicated that they were quite competent to carry out their project, and that their approach to auditing was sound. The final phase of the project involves preparation of a comprehensive report with estimates of potential energy savings and related investment requirements for the entire industrial sector of Costa Rica. These data will be extrapolations of the audit results based on information to be gathered in a DSE energy survey.

At present, 10 of the 15 audits have been completed, and the 5 remaining audits are scheduled for completion by December 14. A draft final report is to be presented by January 9, 1985, and will be reviewed over a 2-month period by AID and DSE before the final report is presented on March 9.

Training activities will conclude with a 5-day workshop beginning January 21 for up to 125 people. It will be geared to plant technical personnel and will focus on major energy-consuming systems. The objective is to get technical personnel involved in energy efficiency programs in their own plants.

There has been some confusion on the part of plants that have been approached both by Weston and the ICAITI delegate. Better coordination by the Costa Rican National Committee is required to correct this situation. There is no evidence, however, that there will be a significant duplication of efforts by the two projects.

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*Direccion Sectorial de Energia. Ministry of Energy and Mines.

97

Exhibit 1.e

Audit Procedure: Weston International

1. One- to 2-day plant tour and review. Purpose: to plan audit.

2. Field work: data collection and operating data.

3. Office preparation of list of ECOs and preliminary calculations.

4. Wrap-up meeting at plant to review each ECO in concept and present preliminary calculations.

5. Detailed calculation of each ECO (with DSE team, as training exercise), specialized training applying to specific systems or equipment involved.

6. Write report and have translated.

7. Present report to plant.

PRIVATE-SECTOR ROLE

Private operating firms will be the major beneficiaries of PEEIR, and to a lesser extent, the local consulting and engineering firms and private banks. A project paper objective was to reach 3,000 small and medium firms in four industries: food products, beverages, chemicals, and textiles. Activities were supposed to focus on developing awareness of conservation opportunities and benefits through a series of promotional and technical assistance services, including pamphlets, seminars, exhibits, energy inquiry (hot line), energy audits, demonstration projects, and assistance in obtaining financing for projects. Consulting and engineering firm involvement was intended to consist mainly of carrying out audits and providing design and construction services for demonstration projects and implementing projects identified after the audits. The national chambers and industry associations of the five countries were to be the transmission gears between the central project and national industries.

Status

As of November 1984 (i.e., 17 months after project start), several hundred firms had been reached by the seminars, and more than 1,000 by promotional activities. Each country's national committee was fully operational by spring 1984, and all committees have been very active in the project.

With the exception of Panama and Honduras (see country appendices D and E for more details), national committee and delegate activities have been very successful. First, the national committees -- which vary in composition from country to country -- include key members of the local chamber of industry, generally the president, executive director, and/or vice president (all being extremely committed to the project). By their presence, contacts, and role, they have been able to transmit their enthusiasm to the members and ensure high interest in the program within the private industries. Some members have already created, or are in the process of creating, a specific energy commission within the chambers to share information and provide assistance to other members. Therefore, the involvement of the private industries appears to be well in line with the expectations of the project paper.

On the other hand, the involvement of the private consultants and consulting engineering firms is minimal. There has been no participation thus far in the audits, and no demonstration/implementation activities have taken place yet.

Problems

There are three major problems associated with the private-sector role. First, the project is still highly centralized, as most decisions are taken directly from central project staff and little has been done to identify and involve local consulting and engineering firms. Second, PEEIR and ICAITI staff members have felt, at least until now, that they were capable of carrying out all the tasks of the program, including audits. Third, based on brief surveys conducted during the evaluation, it was clear that countries like Panama and El Salvador had too small a market and too few private specialized firms to warrant a specific effort.

The number of potential energy audit candidates in each country is estimated as follows:

- Guatemala (200-300)
- El Salvador (100-200)
- Honduras (200-300)
- Costa Rica (200-300)
- Panama (100-150)
- **TOTAL (800-1,250).**

TECHNICAL ASSISTANCE

As stipulated in the project paper, a U.S. consulting firm was to be hired to assist ICAITI in carrying out the industry program and training activities. The consultants were charged with two functions:

- Lending direct technical assistance and expertise acquired from experience with industrial energy conservation programs

- Assisting ICAITI staff to become self-sufficient in conducting energy audits and achieving energy conservation.

The contractor was intended to provide ICAITI with (1) a resident field team consisting of a chief of party

and a technical training advisor, each one for a period of 2 years at the beginning of the program, and (2) consultants with relevant technological and industrial experience to meet specific ICAITI needs, on a short-term basis.

From a short list of five firms, Georgia Institute of Technology (GIT) was selected in early 1983, and the contract was signed on May 11, 1983. The effort was estimated to require a total of 72 person-months of direct labor, of which 48 were for field professional staff and 13 for short-term specialists. The total original cost was U.S. $485,100, plus U.S. $170,000 for local cost adjustments paid by ICAITI on top of the basic contract.

Status

The original chief of party (COP) was replaced in March 1984 by the then-technical training advisor, who has acted as official COP since that time. A new permanent technical training advisor has recently been hired. As of the end of October 1984, GIT's expenditures totaled $273,000, or 56 percent of contracted budget. This level of expenditures is below original projections, primarily because short-term assistance requirements have been less than expected with a total of 6 man-months spent, compared with a total of 13 man-months as stipulated in the contract (see Exhibit 1.f).*

Budgeted funds for the chief of party and training advisor will be exhausted by late spring 1985, but substantial funds for short-term assistance may remain available -- about $70,000 -- at the end of the current GIT contract if ICAITI decides not to use them.

In terms of achievements, GIT has been able to make significant contributions to the industry program despite the problems associated with the replacement of the COP. Most PEEIR engineers are early able to do audits on their own, conduct seminars on boilers and electricity on their own, and initiate assistance in such areas as demonstrations.

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*Short-term technical assistance in provided when a request is made by ICAITI.

Exhibit 1.f

Short-Term Consulting: GIT

October 1983	Claudia Huff (3 weeks) (technology transfer) • preparation of promotion and seminar materials (1 week[1]) • development of manual and procedures for effectiv seminar organization and presentation (2 weeks)[2]
February 1984	Claudia Huff (2 weeks)[2] (technology transfer) • publicity work for the first boiler seminar • overall seminar organization
February/ March 1983	Hank Jackson (4 weeks) (energy audit group leader) • participation (2 weeks)[1] • participation in the first round of boiler seminars (1.5 weeks)[2] • training of ICAITI engineers to present boiler seminar (0.5 weeks)[2]
August 1984	Alan Pashkevich (12 weeks) (energy auditor) • work on preparation of the energy management seminar, work on definition and plan for demonstrations, and general support for the project (9 weeks)[2] • identification and compilation of vendor and design data (3 weeks)[1]
October 1984	Carl Salas (4 weeks) (private consultant -- non-GIT) • presentation of energy management seminar (2 weeks)[1] • presentation of the energy management seminars, and development of the manual for this seminar (2 weeks)[2]

[1]In United States.
[2]In Central America.

SOURCE: Georgia Institute of Technology.

While the training specialist faces some problems of credibility with PEEIR engineers, the new COP is performing his duties in an outstanding manner, showing the required communication and managerial skills as well as technical skills. There is a consensus among ICAITI, ROCAP, and the evaluators that this individual has been the cement of the project and deserves much of the credit for the "new beginning."

Problems

The major problems facing the technical assistance is, first, the exhaustion of contract funds as early as May 1985; second, the perception of the engineers as far as their needs are concerned.

As a result of the exhausion of contract funds for long-term assistance, some important activities need to be carried over (e.g., demonstrations, additional training), and there will not be sufficient funds in the GIT contract to provide ongoing assistance.

The second problem comes from the perception of the engineers, who now feel they only need short-term, highly-specialized technical assistance, rather than permanent assistance.

PROJECT EXPENDITURES

PEEIR-ICAITI expenditures through September 30, 1984 (15 months of actual project activity) were $1.3 million, or 24 percent of total planned expenditures of $5.4 million. The original financial plan scheduled approximately $1.2 million in expenditures over the 1first 15 months. Thus, although spending is essentially on plan (adjusted for late start-up), output of training, demonstrations, and database activities is far behind plan. Consequently, the work in these areas must increase substantially in 1985, requiring increased expenditures (over 1984) roughly estimated at $275,000 for training, $100,000 for demonstrations, and $50,000 for database work. Expenditures in the industry program (other than demonstrations) and promotion components are expected to remain at current levels throughout 1985.

The second evaluation (November 1985) will provide guidelines for planning project expenditures for 1986-1987.

As mentioned earlier in this report, PEEIR-SIECA expenditures through September 30, 1984 were $83,462, or 14 percent of total planned expenditures of $600,000. A substantially higher level of expenditure will be required in 1985 to support new PEEIR-SIECA activities.

LIKELY PROJECT IMPACT

With respect to the major project objective of improving the balance of payments by reducing oil imports, foreign exchange benefits are unlikely to be achieved for a variety of reasons, mainly resulting from the current economic situation of the project countries and optimistic assumptions from the cost/benefit analysis. For example, the project paper assumed (in the DSI analysis) that the larger industries in the six countries would consume about 2.5 million tep (project paper, Annex B-5, page 10) in 1984 in direct use of fossil fuels and through electricity use. However, the evaluators' analysis, which is based on the latest SIECA statistics and takes account of the fact that Nicaragua is no longer a project country, is likely to be between 1.0 and 1.5 million tep (statistics on Panama are not available after 1980). In addition, the DSI analysis assumed a rate of growth in oil consumption of 5 percent annually; oil consumption is currently steady.

Moreover, the oil price assumption of $245/tonne (see project paper, page 51) in 1982 is roughly 20 percent above current prices ($28 x 7.33 = $205/tonne, in 1984 dollars). Finally, because of project delays, savings will not be achieved according to the projected timetable but rather 2 to 3 years later. More importantly, industrial firms audited by ICAITI and visited during the evaluation mission are implementing low-cost/no-cost (housekeeping) measures but are reluctant to consider any investment of more than U.S. $10,000 (for a medium firm).

All these factors indicate that only one-third to one-half of the project's expected benefits are likely to be achieved. However, the cost to the private sector will also be proportionally much less than anticipated because of the priority on non-capital-intensive

measures, and the benefit/cost ratio for the private sector will be better than expected. The benefit/cost ratio for ROCAP, however, will be lower than expected.

With respect to the secondary objective of developing a regional institutional capability in industrial energy efficiency, the project is likely to succeed in all countries but Nicaragua, mainly because of the enthusiasm, commitment, and effective work done by the national delegates of the chambers and industries.

2 CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations presented in this chapter are based on the findings in the previous chapter. The organization of this chapter parallels that of the previous chapter.

PROJECT ADMINISTRATION

PARTICIPATING INSTITUTIONS

Conclusions

ICAITI is the appropriate institution to host the project because of its mandate and its regional organization.

SIECA is also a logical party in the program because of its access to national data on energy financing and incentives and its background, which includes a number of energy studies and energy databases.

The national advisory committees, which consist -- "de facto" -- mainly of the chambers of industries, are undoubtedly the right institutions to ensure broad and efficient private-sector involvement.

The overall institutional program set-up is therefore adequate. The project suffers, however, from deficiencies inherent to each organization and recognized in the project paper. ICAITI is a technical research institution and thus unaccustomed to running activities as private businesses, while PEEIR is aimed at serving private enterprises with service for a fee. For its part, SIECA is more inclined to perform theoretical economic research than provide quick services to outside parties.

Major problems resulting from these deficiencies are (1) the high level of project centralization within ICAITI and (2) delays in obtaining critical intelligence on financing and incentives for industrial energy conservation projects from SEICA. SEICA needs assistance to develop a 1985 cost plan that will produce key

impacts needed by the project by the second quarter of 1985.

Recommendations

- ICAITI should attempt to provide PEEIR with the flexibility needed for work in the private sector. Specifically, ICAITI should give more autonomy to the project director in running day-to-day activities, including hiring people and providing incentives.

- It is time to plan and initiate some decentralization of project activity. One, two, or more project field engineers should move to the national program level to work alongside the delegate and assistants. The effort should be phased, with one engineer relocating in another member country (such as Costa Rica). This initiative will be monitored for 6 months before deciding on subsequent decentralization.

  For decentralization to succeed, it is necessary to define clearly duties and roles (position description), responsibilities (work plan), and supervision (reports to Industrial Division Chief and collaborates with delegate).

- One economist from Hagler, Bailly & Company should spend about 10 days in early 1985 assisting SEICA in developing its 1985 work plan.

MANAGEMENT

Conclusions

Program management is the weakest aspect of PEEIR. The roles of the ICAITI director and deputy director and the project director are not clearly defined, and leadership is diffused. ICAITI's confidence in the project director is not high enough to ensure proper project operation. The credibility of the project director has been affected by mistakes and hesitations in areas such as fees to be charged for audits (e.g., Honduras). In addition, ICAITI directors are too involved in project day-to-day activities.

The industrial and promotional divisions do not hold staff meetings.

Personnel management staff needs training and improvement in human relations. There is currently no incentive for above-average performance on the part of project personnel, especially field engineers. In addition, field engineers and promotional assistants are not involved in planning. Quality control is done by too many people (e.g., audit reports), with the result that there is a big backlog of reports to be produced resulting in an embarrassment to some national delegates (Panama, El Salvador). Secretarial services are too limited and constitute one of the major causes of delay in report production. The status of each plant visit or audit report is not easily identified, as there is no simple, updated tracking system. Finally, the existing organization chart may not be valid for the future, as new activities (e.g., the data bank, the "hotline", and demonstrations) are going to absorb a significant share of staff time.

Recommendations

- The ICAITI director must clarify the responsibility/authority of the ICAITI deputy director and the project director so that conflicts are reduced and clearer lines of responsibilty and authority are established.

- The project director should be judged based on achievement of the 1985 work plan and the effectiveness of his management of the staff.

- The ICAITI director and deputy should participate in the planning process, concur in the plan and methods to achieve it, and allow the project director greater latitude to achieve it. Day-to-day involvement is inappropriate at this stage. Bi-weekly oversight meetings are appropriate; quarterly work plan and achievement reviews are the vehicle for assessing the project director's performance.

- Senior staff meetings held Monday mornings should be preceded or followed by a staff meeting of the Industrial Division and the Promotion Division. It is essential that the field

engineers and promotion staff be aware of all project activities.

- Senior staff minutes and project status reports should be provided to all staff and delegates.

- Project supervisors should receive training in management, supervision, and human relations.

- Consideration should be given to a short course on public relations/presentation for field engineers, delegate assistants, and those with frequent contact with plant managers and engineers.

- Supervisors should focus on incentive or "carrot" management, including awards, certificates, titles, and bonuses to increase staff productivity.

- ICAITI personnel requirements and guidelines must be made clear and available to project staff; managers need to know what incentives they can offer, and uncertainty creates conflict and discontent.

- PEEIR-ICAITI delegates and component managers, as well as the PEEIR director, should participate in the financial planning process and provide bottom-up input to budgeting.

- An adequate financial reporting and short-interval budgetary control system should be designed and implemented for PEEIR-ICAITI, and budgetary control responsibility should be extended to the delegate and component manager levels. The account breakdown should be based on users' requirements. Also, financial reports should show variances from a monthly budget and year-end forecasts to provide warnings in time for corrective actions to be taken. Similarly, a suitable short-interval budgetary control system should be provided by PEEIR-SIECA.

- Progress reports for both PEEIR-ICAITI and SIECA should include financial data and budget comparisons, with comments by the project directors.

- Work plans must be prepared for each individual. Their implementation requires that time/activity sheets be completed by staff to determine if planning assumptions are valid and time is being allocated within the general range of the individual's work plan and that of the overall 1985 work plan. Time should initially be recorded for no more than ten categories -- including plant visits audits, promotional visits, training, and seminar development/presentation.

  The work preferences of field engineers should be seriously considered in preparing the work plans (plant visits or audits, type of industry, oil or electricity user, seminar teaching).

  Plant visits should be reviewed by two people only: the industrial division chief Mario Ortiz and Georgia Institute of Technology consultant Mark Oven. Chief field engineer Orlando Posada should review audits when Ortiz is absent.

- A model plant visit and guide should be prepared so all staff clearly understands the context, effort, and format required by such a visit.

- 90 percent of the plant visit reports should be in final form within 4 weeks.

- Field engineers should, when possible, discuss preparation of their drafts with plant engineers. Reviewers should discuss proposed substantive changes with the field engineers who wrote the report.

- Field engineers should sign their name on each report and be responsible for their work and follow-up.

- The audit program and follow-up should build on work done by others (Weston in Costa Rica, TRANSENERG and Esso in Panama).

- The selection of plants for audits should be based on the potential for oil savings.

- A simple audit tracking system should be prepared immediately. It should show (1) date of plant visit, (2) date of draft report submitted for review, (3) date review completed, (4) date draft submitted/received from typing, (5) date of final typing, and (6) date mailed to delegate.

- Audit assignments must be spread out to avoid bunching in a short period such as occurred when 15 plant visits were done in one week in Panama. Quality will suffer, and delays are inevitable.

- A secretary should be taken out of the ICAITI pool to work full-time at PEEIR. A second secretary should be assigned to PEEIR 3 months later if the workload justifies it. Priorities should be set for the secretary so that important material is worked on first and lower priority material is sent to the secretarial pool. Priorities might be typing audits, maintaining the audit tracking system, and filing.

- The project weekly meetings between ROCAP and ICAITI should continue through March 1985 to ensure implementation of evaluation recommendations; meetings should be bi-weekly from April through June 1985, and reassessed at that point.

- A 1-week project review should be carried out in late October 1985 using the AID/Washington Energy Conservation Services Program (ECSP). This review should be included in the 1985 work plan and budget.

- Financial reporting must be made available, broken down to correspond to project activities, particularly promotion activities.

- Closer supervision is required by ICAITI management to ensure that technical editing of project materials is handled in a timely manner, because the technical editor is not under the PEEIR project director.

- "Bottom-up" planning is essential ing preparing of the 1985 work plan, to ensure that it is realistic, gains the support of <u>all</u> staff, and

provides a basis for good, stable management in 1985.

Guidance (1 page) should be issued by the project director on the process of preparing the 1985 work plan. The following process is proposed:

1. The project director provides broad guidance and a schedule for preparing the 1985 plan. Guidance might be (a) continue the same number of plant visits, (b) increase the number of audits, (c) continue the same number of promotional visits, (d) present fewer sessions of established seminars (boilers, electricity, management), (e) develop/present new seminars (1-3 on heat recuperation, instruments, or other subjects identified by engineers, delegates, or promotion staff), and (f) initiate some demonstrations in the second half of the year.

2. Delegates identify "need" or "demand" for project services (i.e., number of audits, visits, seminars, demonstrations) using National Advisory Committees and Chambers of Industry.

3. Project staff (director and heads of industrial and promotion divisions) identifies resources available:

   - Determine total work days available for each professional staff person. Estimate amount of time for each person to be spent on each activity (for example, a field engineer might spend 60 percent of time on audits, 15 percent on seminars, 10 percent on promotion, 5 percent on training, and 10 percent on other activities).

   - Determine number of days required for plant visits, audits, and other major activities so that an estimate can be developed for the total amount of work that can be accomplished in 1985. These figures are critical for good planning and management and must not be arbitrarily assigned. Development of figures should begin with a survey of or meeting with field engineers to determine what they feel can be accomplished.

4. Based on the resources available, a range of possible activities can be established for each person and for the project as a whole (e.g., 100-125 plant visits, 25-35 audits, and 200 promotional visits).

   - Each field engineer prepares a 1985 work plan containing the number of plant visits, audits, promotional visits, seminar work, training, and other appropriate activities (no more than 10) categories.

5. The project director (1) convenes a meeting of delegates, project staff, and the ICAITI director and deputy director to determine "demand" for project and initial resource estimate; (2) prepares preliminary draft plan (with quarterly breakdown); (3) revises field engineer and all professional work plans to see if resources available and work projected are in balance.

6. Delegates present draft work plan to Advisory Committees for comment.

7. Monthly status meetings are held, and a quarterly meeting is held to determine project progress, problems, and necessary revisions. The 1985 work plan and individual work plans form a basis for managing the program and for employee evaluation.

8. The organization should be slightly modified to reflect 1985 needs in undertaking additional activities, such as the database, demonstrations, the hotline for service inquiry, and follow-up on audit work (see Exhibit 2.a for a proposed revised organization chart).

STAFFING

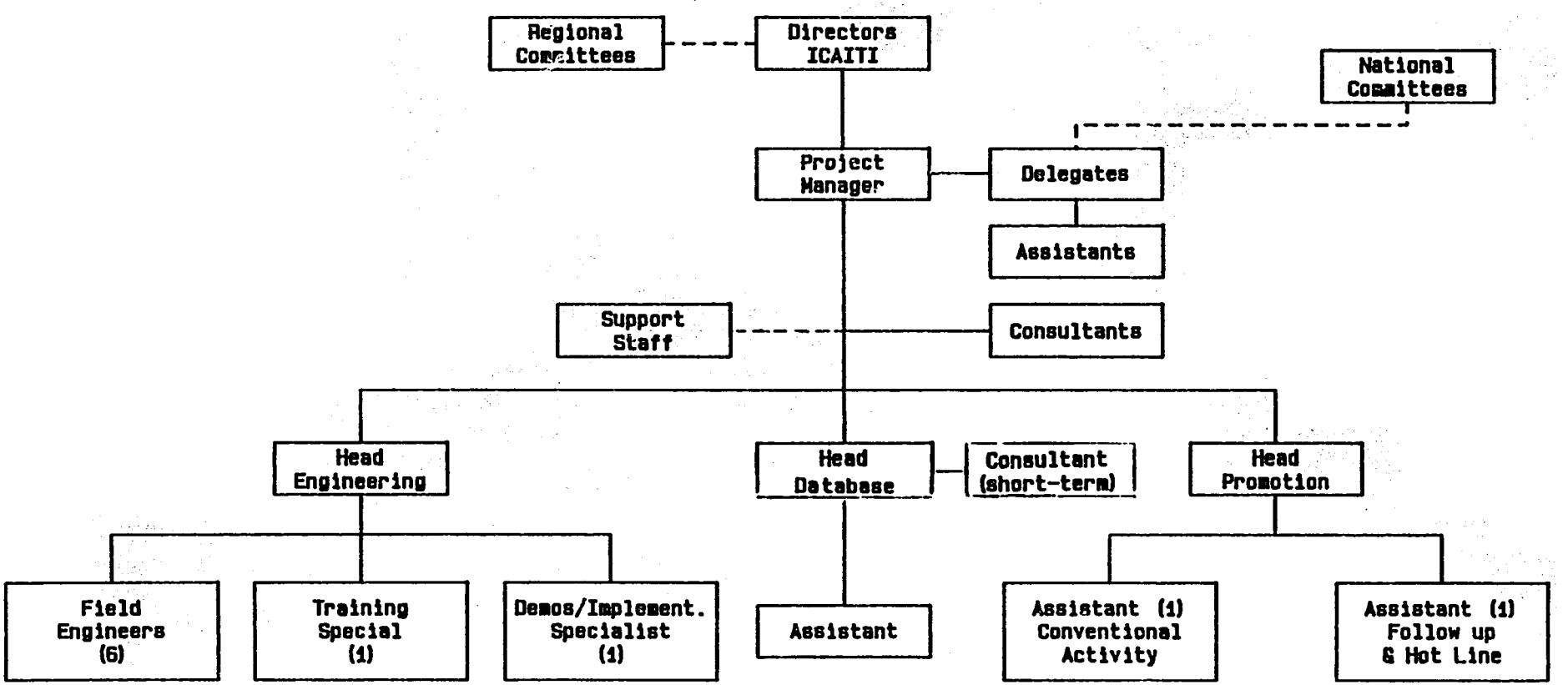
Conclusions

PEEIR-ICAITI

Although the 1985 work plan has not yet been established, it is clear that the workload will increase significantly in the following areas: training, decentralization, plant visits, audits, database, inquiry service (hotline), and audit follow-up. A preliminary

Exhibit 2.a

PEEIR: 1985 Proposed Organization



Plant visits
Audits
Training
Demonstrations

PEEIR staff
Private sector

Contracting
Monitoring

Audits
Promotion
Equipment services

Seminars
Brochures
Media

Audit followup coordination
Cost/Saving information for database
Hot line

Additional staff needed by mid-1985: two engineers and one promotion assistant

Source: Hagler, Bailly & Company

organizational analysis indicates that at least two more field engineers and one promotion assistant will be needed.

GIT lacks resources to provide adequate specialized short-term assistance for technology transfer and training.

The competence of the field engineers is very uneven, resulting in substantial variation in the quality of audits and audit reports. Morale is also a problem. Ing. Cartagena, the ICAITI maintenance chief, now works 75 percent on the project, but would prefer to concentrate on his previous position.

The delegates and assistants feel that a higher level of technical knowledge is needed to credibly represent the project to technical personnel in industry.

Analysis of seminar evaluations is late, owing to insufficient manpower.

PEEIR-SIECA

There is a need to accelerate work on the specific objectives of the component.

Recommendations

PEEIR-ICAITI

- Recruit one field engineer immediately and add an additional promotion assistant within 3-6 months. In addition, recruiting practices applying to PEEIR-ICAITI should be improved to ensure hiring of satisfactory personnel.

- The ICAITI maintenance chief now works 75 percent on the project and 25 percent at ICAITI. Consideration should be given to reassigning him to his preverious position, reversing these percentages and focusing his expertise in this project on equipment maintenance/teaching and seminar lecturing in place of audit work.

- Improve recruiting practices to ensure hiring of satisfactory fiel engineers. The hiring procedure should include a formal test on

energy auditing by Mark Oven and a 1-month trial period.

- Contract temporary personnel as required to complete the analysis of seminar evaluations by participants.

PEEIR-SIECA

- On the basis of the 1985 work plan, design and staff an organization to provide necessary financing and public policy support on a timely basis.

REGIONAL LINKS AND INFORMATION EXCHANGE

Conclusions

The present arrangements with industry associations and national advisory committees provide very satisfactory links with the regions, except in the case of Honduras, where a dispute with the industry association has reduced participation to a minimum.

Several delegates feel that communication with PEEIR-ICAITI is inadequate to support their field activities.

The delegates have considerable information on financing and policy issues, but are not communicating it to PEEIR-SIECA.

Recommendations

- The dispute with the Honduras Industry Association should be resolved to gain its full support for PEEIR activities in Honduras.

- Regular meetings should be scheduled between PEEIR-ICAITI and the delegates, some in Guatemala and some in the field.

- A suitable communication channel should be established between the delegates and PEEIR-SIECA. This could be done by a semi-annual round of visits to delegates by the project director. He would then convey the information to SIECA.

PROJECT COMPONENTS

INDUSTRY PROGRAMS

Conclusions

The quantitative targets set in the revised 1984 work plan are likely to be met (by more than 90 percent) except for the number of audits. It is likely that 10-15 will be completed, as opposed to the 25 planned.

The capabilities of the engineers are uneven, which results in uneven report quality.

The plant visit reports still lack uniformity, and some are of poor quality. Others are too detailed, providing costs and benefits of each proposed conservation measure and leaving little room for any significant value added by instrumented audits. All plant visit reports lack sections on instrumentation and estimates of specific energy consumption (e.g., Btu and kWh consumed per pound of product).

The audit reports are of relatively better quality, their structure is adequate. The calculations/estimates of costs and benefits are well presented, and the technical content is good (see Appendix C, Guatemala -- visit to La Luz). However, they too need a section on existing instrumentation and specific energy consumption.

The time currently spent for plant visits (3 to 4 days) and audits (25-35 man-days) is adequate.

The work on demonstrations and pilot projects is still in the planning stage, and no final strategy has been agreed on. There are currently 27 candidate projects.

Energy efficiency seminars are one of the most successful activities of PEEIR. Feedback from private industry rated the seminars very highly. Exhibits were also well received. New engineers would like to have access to the instruments and various supplies exhibited.

The conclusions on organization, manpower, and planning have been presented in the section on management.

Recommendations

- Provide additional training to all engineers to ensure consistency and improve capabilities on a continuous basis.

- Include sections on instrumentation and specific energy consumption in plant visit and audit reports. Detailed computation in audit reports should be moved to appendices.

- A priority for 1985 is to strengthen project capabilities, make audit work routine and involve the private sector in PEEIR. The initiation of new activities must be planned very carefully and quantitative objectives must be realistic. Between five and ten demonstrations should be organized, financed in 1985, about half of them in Costa Rica. The PEEIR demonstration specialist must be nominated soon (see proposed 1985 organization chart).

- 1985 work on pilot projects should be limited to feasibility studies (one in Costa Rica, based on MetaSystem/Weston work, see Appendix C). Implementation should occur in 1986.

TRAINING

Conclusions

Training activities are far behind project paper requirements and program needs. Additional training is highly desired by (and desired for) all project participants, including PEEIR engineers, other PEEIR staff members, national delegates, industry engineers, and potential consulting/engineering firms.

Training coordination and management is insufficient.

More and more specialized training (e.g., auditing refrigeration plants, organizing and implementing demonstration projects) will be needed on an ongoing basis for the next 2-3 years.

107

Recommendations

- The PEEIR director should ensure that one person (O. Posadas) is effectively coordinating training activities.
- A comprehensive and intensive training program is needed for 1985, directed toward almost all categories of project staff: engineers, delegates, managers, private-sector consultants, plant engineers, and project specialists (database, follow-up).
- GIT should continue to go outside to contract necessary short-term assistance for PEEIR if resources are not available in-house.
- Provide further technical training to the field engineers as required, and evaluate their performance regularly as a basis for future personnel actions. Also provide incentives to improve performance and morale.
- Provide further technical training to delegates and their assistants.
- Provide sales training to all project personnel who are in a position to promote the concept of audits and their implementation to industry people.

A possible program is presented in Exhibit 1.d.

Training needs are likely to require U.S. $250,00-300,000, or up to U.S. $200,000 more than previously projected. PEEIR should propose, and ICAITI and ROCAP accept, that this amount be taken from the fund set aside for demonstration and pilot projects.

PROMOTION AND FIELD EXTENSION

Conclusions

The promotion and field extension component has been very successful in stimulating interest in energy efficiency, generating demand for the projects' services, and in enhancing the image of ICAITI throughout the region.

The industry associations and national advisory committees contributed significantly to the success of the promotion by providing contacts with their members and by actively endorsing the promotion activities. Their logistic support was also a valuable element.

The quality of the promotional materials and seminars was high, and the seminar topics were well chosen. Evaluation forms completed by seminar participants have not been fully analyzed. Their analysis will provide guidance for further activities.

With the completion of the first wave of audits, promotional efforts must now focus on implementation of audit recommendations.

Owing to competing activities in Panama, further promotional efforts in that country must be carefully designed to avoid duplication and conflicts.

Recommendations

- Promotion activities should now shift their emphasis from creating demand for audits to supporting the generation of results. Efforts should focus on promoting implementation of audit recommendations through intensive audit follow-up and a "hotline" service that provides technical support to implementation of energy conservation measures.

- The level of audit promotion activity should be adjusted to match the project's auditing capacity in 1985. However, care should be taken to maintain the level of awareness and interest already created in the industrial sector.

- Seminar evaluation forms should be analyzed to provide guidance for the selection of the most effective media and activities. Detailed promotion cost data that are being provided to the project manager should be analyzed and combined with the seminar evaluation results to determine the most cost-effective media and activities. Temporary personnel should be contracted to perform the above analyses if project resources are insufficient. The results of the analyses should then be used in designing the 1985 promotion work plan.

- The results of the analysis of seminar evaluation forms should also be used to plan and design future seminars. Consideration should be given to increasing the seminar hours, stressing practical applications, limiting class size, and revising criteria for selection of participants to provide more homogeneous groups. Also, the choice of seminar subjects should be guided by the interest expressed by participants (e.g., water treatment, instrumentation and controls).

DATABASE

Conclusions

While the database is an important element of the project, little has yet been done, and work is about 6 months behind the original schedule. The need for the database has been confirmed by project managers and PEEIR engineers, and the concept developed in the project paper is still valid, although ambitious.

A computer has arrived recently (November 1984) and is undergoing testing. There is already a great amount of information that can be input into the database, namely information from promotional activities (e.g., information about plants contacted by project, seminar evaluation forms) and industrial activities (e.g., detailed plant energy profile, OCEs, costs of conservation measures).

There is still no detailed written work plan and budget.

Recommendations

- The project director and the head of database should prpare a draft work plan for 1985 with associated budgets to be submitted for approval.

- Initially, keep the database a simple tool designed to meet project and private industry needs. Later, give thought to its expansion to such indirect users as government agencies.

- Assign (W. Flores) full-time or almost full-time (i.e., a minimum of 60 percent of his time) to design and organize database activities.
- Contract with a specialized, experienced consultant to assist the head of the database (W. Flores).
- Assign the database assistants full-time to completing input forms from audit reports and other sources and then inputting data into the computer (after program development and testing).
- Survey user needs (using delegates/assistants and national committees).

FINANCING AND POLICY ISSUES

Conclusions

Financing Studies

The financing study contains some useful information on Guatemalan lines of credit but a case study of questionable value. The audience for the study is unclear -- industry, financial intermediaries, or central banks -- and the absence of conclusions and recommendations reduces substantially the usefulness of the document.

A survey by the evaluators revealed that the region has funds designated specifically for energy conservation projects. The potential availability of financing varies from country to country and is not clearly understood by lending institutions or potential borrowers, as there has been little experience in financing energy projects up to now.

CABEI is interested in seeking funds to establish a means of financing energy projects, but needs data from PEEIR to proceed.

Data Bank

The data bank contains useful basic energy statistics except for pricing data, which are under consideration.

107

The roles of SIECA and ICAITI in developing industrial energy data appear to be unclear.

Policy-Related Studies

The Central American country energy analysis is substantially behind schedule, and the scope of work is at times too broad and general to be of significant use in the project.

The first-priority related studies in the 1984 work plan schedule do not entirely coincide with the more detailed description in the work plan. Also, they include proposed studies that are essentially unrelated to the project (e.g., petroleum product pipeline study, transportation studies).

The proposed policy study (Policy and Regulatory Analysis for Energy Conservation) focuses on marginal issues: electricity savings with daylight savings time and petroleum savings through restricted weekend sales.

The overall list of activities does not provide a basis for SIECA to identify or understand the impediments and disincentives to industrial energy conservation.

The causes of the substantial delays in conducting and publishing the policy-related studies are not justified.

There has been attendance at some conferences that are remotely related to project activities.

Recommendations

Financing Studies

- A revised scope of work should be developed for the financial component SIECA subproject that reflects industry needs and incorporates information acquired to date. SIECA should determine ICAITI views on industry perceptions of financing problems and options.

- SIECA should clarify the applicability of the various sources of financing available throughout the region and sponsor seminars for the industrial and

106

banking communities in each country to clarify the situation.

- SIECA should provide CABEI with information on financing requirements and savings potential, and recommend that CABEI establish a special fund to finance energy projects.

Data Bank

- Energy pricing data should be incorporated into the SIECA data bank as soon as possible.

- Development of the data bank that deals directly with industrial energy data should be closely coordinated with ICAITI. A written memorandum of understanding should be prepared between ICAITI and SIECA on their respective data bank roles.

Policy-Related Studies

- Policy studies conducted by SIECA should be directly relevant to the main project activity of industrial energy conservation. Indirectly related activities should be deleted or postponed until the primary work is achieved. Before developing a scope of work for the policy study, SIECA should meet with ICAITI to determine its perceptions of constraints -- such as import tariffs, taxes, energy prices, policies, and regulations -- on energy conservation activities.

- A scope of work should be prepared for studies that (1) identify the key policy issues and impediments affecting conservation and (2) identify financing needs, options, and impediments.

- Technical assistance available through the AID Energy Conservation Services Program (ECSP) should be used to develop the policy and financial scopes of work, and to determine staffing and scheduling, in mid-January 1985, if possible.

- After these activities are completed, monthly meetings should be held between ROCAP and SIECA

109

to review the progress of each item in the 1985 work plan.

PROJECT OPERATION

PRIVATE-SECTOR ROLE

Conclusions

The project has been successful, through the operation of the operation of the national committees, in involving the private sector in most project activities (e.g., promotion, audits). The private-sector companies are convinced of the important to them of conducting energy cost reduction programs.

There is still, however, no involvement of private consulting and engineering firms in the project, especially in conducting audits and implementing recommended measures.

Based on extensive discussions with a dozen potential consulting firms, it appears that most of them are not ready to get into these activities as they need substantial training prior to entering the business. Most of them (except in Costa Rica) were also concerned about the market size, which they felt was too small to deserve the effort. There is also a tendency from ICAITI and PEEIR staff to believe that these activities are their "bread and butter," and that they should be very careful in promoting private-sector consulting activities.

Finally, the high degree of centralization in planning activities does not favor the involvement of these firms.

The current level of project decentralization depends on each delegate or national committee. Starting in 1985, more project decentralization will be desirable.

Recommendations

- Involve the private-sector consulting/engineering firms in training activities, including on-the-job training with PEEIR engineers.

110

- Contract the services of private consulting/ engineering firms to implement demonstrations (e.g., in Costa Rica).

- Provide more responsibility to delegates in selecting and scheduling promotion activities and seminars.

PROJECT EXPENDITURES

Conclusions

Project expenditures required for 1985 are estimated at $1.285 million, based on a $425,000 increase over 1985 expenditures of approximately $860,000. The increase is required to fund new training, demonstration, and database activities.

The estimated 1985 expenditure level is in line with the financial plan provided in the project paper (for years 2 and 3); therefore, budgeted funds should be adequate for the requirement.

PEEIR-SIECA's required expenditures for 1985 are estimated at $100,000, plus $15,000 for consultants.

Recommendations

- Assuming that the PEEIR-ICAITI 1985 work plan is in agreement with the aforementioned activity plan, ROCAP should plan and allow expenditures of approximately $1.3 million in 1985 for PEEIR-ICAITI.

- ROCAP should plan and allow expenditures of approximately $115,000 in 1985 for PEEIR-SIECA.

TECHNICAL ASSISTANCE

Conclusions

ROCAP and ICAITI's experience with the Georgia Institute of Technology (GIT), the selected consulting firm, has had some difficult moments, despite the general good will and good understanding of the three parties. The original COP had to be replaced by the training specialist after 9 months on the job. A new training

specialist has just joined the project on a full-time basis. GIT's contract funds for long-term assistance will be exhausted by May 1985, and some of GIT's originally envisioned duties, especially in training, will not have been fulfilled, primarily because of changes in project direction and absence of a dedicated training coordinator at PEEIR.

There are, however, a number of very positive factors in GIT's technical assistance, including the quality of the documents transferred to PEEIR, the quality of their contributions to the highly successful seminars, the quality of their contractor (Carl Salas), and -- above all -- the performance of Mark Oven, the new Chief of Party, who is praised by almost everyone, except some PEEIR engineers.

Recommendations

- ICAITI and ROCAP should extend GIT's contract to allow the COP to remain on his job until the end of 1985 and use second evaluation results (end of 1985) to decide on further steps.

- ICAITI and ROCAP should continue to encourage GIT to subcontract short-term technical assistance to consulting firms or individuals other than GIT. Investigate the merits of subcontracting through GIT versus contracting directly with specialized firms (e.g., in food technologies, chemicals).

LIKELY PROJECT IMPACT

PEEIR is likely to be successful if the proposed modifications are made. However, PEEIR will not achieve the expected quantitative savings because of current and projected regional economic situation and the lack of dedicated financing for conservation projects (foreign exchange).

Recommendations

- PEEIR should focus audit work on large oil users

112

- SIECA should disseminate information on existing lines of credit and other available financing mechanisms across industry.

COUNTRY-SPECIFIC ISSUES

Conclusions

PEEIR is performing well in Guatemala, Costa Rica, and El Salvador. In Panama, it faces difficulties in selling its "products" (seminars, audits) because of competition and market size. In Honduras, efforts have suffered from bad communications with the central project.

Recommendations

- Organize a meeting with the Panama delegate to help him solve project problems (e.g., make certain that plant visit reports are of top quality).

113

Objective

The purpose of this activity is to conduct an evaluation of project 596-0095, "Regional Industrial Energy Efficiency.

The proposed evaluation will concentrate on an in-depth review of the administrative, technical, organizational, planning, and operational aspects of the project to determine whether the stated project objectives are being addressed as planned and can be achieved as scheduled. The degree of effectiveness of liaison, exchange of data, and cooperation between ICAITI, SIECA, INCAE, FECAICA, and CABEI, as well as between these institutions and participating national committees and national chambers of industry, will also be assessed. The evaluation will ascertain the capacity of ICAITI to work with and assist national counterpart committees and chambers in agreed-upon areas of promotional and technical endeavors. Finally, the evaluation will review the appropriateness of planned project activities and suggest possible reorientation or renewed emphasis of certain aspects of the project, if deemed necessary

Approach

Specifically, the team will:

1. Assess the organizational structures of the SIECA and ICAITI project teams and their effectiveness in carrying out the planned programs at SIECA, ICAITI, and the country levels. It is essential to assess the quality and thoroughness of planning, selection, and assignment of responsibilities and authority to carry out the assigned research tasks at SIECA and ICAITI and in the collaborating countries.

2. Conduct technical reviews at the industrial centers in Central America and Panama to assess the method used to select energy audits and the receptivity by local clients, and to examine

the potential impact of the project on fossil fuel consumption and foreign exchange requirements.

3. Examine regional links and information exchange between SIECA, ICAITI, and appropriate regional and national institutions to determine:

   a. Effectiveness of efforts to involve personnel from national chambers of industry or energy in project activities,

   b. Degree to which experience from other industrial energy conservation programs has been incorporated in planning project activities

   c. Potential of relevant institutions to assist in developing and disseminating energy conservation information,

   The team's examination will also be designed to suggest areas and ways in which the efficiency of information exchange can be enhanced.

4. Evaluate methodologies and procedures used by ICAITI for plant visit and audit site selection and final audit report preparation.

5. Determine whether existing reports and systems adequately describe project activities and the extent to which they reach all interested parties (e.g., country officials, USAID missions). Suggest how the reports and systems can be improved.

6. Examine planned levels of financial contributions by ICAITI, SIECA, national chambers, and ROCAP, and assess whether they are sufficient to achieve project objectives. If the availability of human and/or financial resources is a constraint, recommendations should be made on what can and should be done to relieve the situation.

7. Analyze the relationship of this project to any other AID-funded energy projects at the country level within the region and recommend how relationships can be strengthened.

115

Exhibit B.1 gives the list of contacts in Central America and Panama.

Exhibit B.1

List of Contacts:
Central America and Panama

Date	Office or plant	Persons contacted
	Guatemala	
10/29/84	USAID/ROCAP	Edward Nadeau, General Development Officer
		David Chavez, Development Contractor
		Gustavo Ruiz, Assistant Development Officer
	PEEIR-ICAITI	Mark Oven, COP -- GIT
10/30/84	Chamber of Industries, National Advisory Committee	Ricardo Castillo, President
		Ing. Carlos Quintana, Executive Assistant
		Ing. Rudolfo Santizo, Member
	PEEIR-ICAITI	Lic. Guillermo Diaz, Project Director
		Ing. Mario Ortiz, Industry Component Manager
		Lic. Francisco Segura, Promotion Component Manager
		Ing. Guillermo Braun, Field Engineer
	ICAITI	Lic. Francisco Aguirre, Director
		Ing. Ludwig Ingram, Jr., Subdirector
	AID/ROCAP	Gustavo Ruiz*

*See above.

Exhibit B.1 (continued)

List of Contacts:
Central America and Panama

Date	Office or plant	Persons contacted
	ICAITI	Lic. Mario Santos, Chief -- Budgetary Control and Cost Division
	La Luz (soap manufacturing)	Ing. Cruz, N.A.
11/1/84	Holiday	
11/2/84	SIECA	Ing. Carlos Santi*
	PEEIR-ICAITI	Lic. Francisco Segura* Lic. Guillermo Diaz* Ing. Mario Ortiz*
	ICAITI	Lic. Francisco Aguirre* Ing. Ludwig Ingram*
	AID/ROCAP	Edward Nadau* David Chavez*
	PEEIR-ICAITI	Mark Oven*
		Alan Pashkevich, Resident Trainer -- GIT
	Chamber of Industries/ National Advisory Committees	Ing. Carlos Quintana*
	Panama	
11/3/84	PEEIR-ICAITI (Panama)	Ing. Celedonio Moncayo, Delegate -- Panama
11/4/84	PEEIR-ICAITI (Panama)	Ing. Celedonio Moncayo*
11/5/84	ARTEFIP S.A.	Damaris Solanos, Promotion Manager
	Universidad Tecnologica	Tomas Bazan, Consulting Engineer

*See above.

Exhibit B.1 (continued)

List of Contacts:
Central America and Panama

Date	Office or plant	Persons contacted
	PEEIR-SIECA	Ing. Julio Obiols, Project Director
		Ing. Raul Valdez, Project Advisor
		Lic. Jorge Borstcheff, Project Advisor
		Ing. Carlos Santi, Project Assistant Engineer
	SIECA	Rafael Perez Riera, Director -- Physical Integration Department
10/31/84	Banco del Cafe	Alfredo Leal, Director -- Financing Division
	FIASA (industrial finance company)	Roderico Rossell, Investment Department
	PEEIR-ICAITI	Lic. Guillermo Diaz*
		Lic. Francisco Segura*
		Ing. Mario Ortiz*
		Ing. A. Garcia, Field Engineer
		Ing. Orlando Posadas, Field Engineer/Training Coordinator
		Ing. R. Cartagena, Field Engineer
		Ing. J. Gonzales, Field Engineer
		Ing. W. Flores, Field Engineer/Database Manager
		Ing. O. Lopez, Field Engineer
		Ing. G. Rodriguez, Field Engineer

*See above.

Exhibit B.1 (continued)

List of Contacts:
Central America and Panama

Date	Office or plant	Persons contacted
	Instituro Politecnico	Carlos Penna, Consulting Enginee
	Levapan de Panama	Roberto Lombana, Assistant Genera Manager
	Panama Industry Association	Daniel Vega, Executive Director
	Industria-Papelera Nacional	Ing. Franklin Arosemana, Plan Engineer
	PEEIR-ICAITI (Panama)	Ing. Celedonio Moncayo*
11/6/84	Panama Industry Association	Ing. George Richa, President
	CONADE	Ing. Ramon Argote, General Manage
	USAID/Panama	
	Kimberly Clark International	Fausto Fernandez, N.A.
	Cia. Panamena de Licores	Ing. Burgos, Production Manager
	Heliacero y Preformados de Panama	Ing. Roberto Asyn, General Manager
	The Star & Herald Periodicos	Sr. Morillo, N.A.
	Olfasa S.A. (clothing manufacturer)	Ricardo d'Arte
	PEEIR-ICAITI	Ing. Celedonio Moncayo*
	Costa Rica	
11/7/84	USAID/Costa Rica	David Hagan
	PEEIR-ICAITI (Panama)	Ing. Felix del Barco, Delegate Ing. Luis Fernando Arce, Assistant Ing. Agustina Rodriguez, Assistant

*See above.

Exhibit B.1 (continued)

List of Contacts:
Central America and Panama

Date	Office or plant	Persons contacted
	PEEIR-ICAITI	Ing. Mario Ortiz*
	Chamber of Industries of Costa Rica	Max Koberg, Former President -- National Committee
		Gustavo Gutierrez, Executive Director
		Ing. Mario Cantillo, Consulting Engineer
	Vidrios Centroamericana	Ing. Alejandro Arce, N.A.
11/8/84	Fideos Precocidos	N.A., Plant Manager
	SOL 2000 S.A. (consulting engineers -- energy)	Ing. Jose Joaquin Chacon, President
	USAID/Costa Rica	Heriberto Rodriguez, Energy Officer
	PEEIR-ICAITI (Panama)	Ing. Felix del Barco* Ing. Luis Fernando Arce* Ing. Agustin Rodriguez*
	Direccion Sectorial de Energia	Dr. Jorge Blanco, Director
	Grupo Tidesa (consulting engineers)	Ing. Ana Lidia Retana, Manager
	Banco Central	Lic. Claudio Urena, Chief of Credit Department
	VICESA (glass jar manufacturing)	Bicente Badilla, General Manager
	Productes de Concreto	Ronulo Picado Chacon, Manager
	Pozuilo S.A. (food processing)	Eduardo Herra, Plant Superintendent

*See above.

Exhibit B.1 (continued)

List of Contacts:
Central America and Panama

Date	Office or plant	Persons contacted
	INCESA Standard (ceramics, plastics)	Carlos Trujillo, Technical Director
	Lactaria Costariccense (milk products)	Juan Manuel Perez, Assistant Manager
	Sterling Products	Elmer Solano, Manager
	PEEIR-ICAITI (Costa Rica)	Ing. Felix del Barco*
11/9/84	PEEIR-ICAITI (Costa Rica)	Ing. Felix del Barco*
	Weston International, Inc. (consultants-designers)	Alan Zupko, Principal Engineer Wilfredo Gomez, Principal Engineer
11/10/84	Weston International, Inc.	Alan Zupko*
	El Salvador	
11/9/84	PEEIR-ICAITI (El Salvador)	Ing. Jaime Gonzalez, Delegate Ing. Oscar Maldonado, Assistant
11/12/84	Comision Ejecutiva Hidroelectrica del Rio Lempa	Arq. Luis Garcia Prieto, Chief of Energy Maintenance
	Especialidades Industriales	Ing. Mario Gonzalez, General Manager
		Ing. Pedio Mendoza, Director
	Salvador Industry Association	Lic. Roberto Ortiz Alvados, Executive Director
	Central Bank	N.A. N.A.

*See above.

Exhibit B.1 (continued)

List of Contacts:
Central America and Panama

Date	Office or plant	Persons contacted
	Plastymet	N.A. N.A.
	PEEIR-ICAITI (El Salvador)	Ing. Jaime Gonzalez*
11/13/84	Productos de Cafe	Ing. Miguel Valienta, Plant Manager Peter Deinken
	PEEIR-ICAITI (El Salvador)	Jaime Gonzalez*
	Honduras	
11/12/84	PEEIR-ICAITI (Honduras)	Ing. Angel Porfirio Sanchez, Delegate
	Textiles Rio Lindo	Ing. Mario Diaz, Plant Engineer
11/13/84	National Advisory Committee	Lic. Henry Bahr, President Eduardo Aragon, Vice President Lic. Marco Tulio Mendieta, Secretary Lic. Taufic Andonie, Alternate
	Honduran Industry Association	Lic. Dorcas Cantarero, Executive Secretary
	PEEIR-ICAITI (Honduras)	Ing. Angel Porfirio Sanchez*
	USAID/Honduras	Lynn Shelton, Energy Officer Blair Cooper, Rural Technologies Val de Beausset, Engineer

*See above.

Exhibit B.1 (continued)

List of Contacts:
Central America and Panama

Date	Office or plant	Persons contacted
	CABEI	Lic. Yolando de Suazo Tome, Officer
	Guatemala	
11/13/84	GIT	Ken Maddox, Associate Director, Technical Applications Laboratory
	PEEIR-ICAITI	Mark Oven*
11/14/84	AID/ROCAP	David Chavez*
11/15/84	ICAITI	Lic. Mario Santos*
	ICAITI-PEEIR	Lic. Francisco Segura* Lic. Guillermo Diaz*
	Publicidad Siboney	Stanislas Gevrden, Manager
11/16/84	AID/ROCAP	David Chavez* Edward Nadeau* Gustavo Ruiz* Jack Eyre, Mission Director Mike Diehl Dick Delaney Ramiro Eduardo, Chief Accountant
	PEEIR-SIECA	Ing. Julio Obiols* Lic. Jorge Borstcheff*
	PEEIR-ICAITI	Mark Oven* Alan Pashkevish* Ing. Guillermo Bran* Ing. A. Garcia* Ing. Orlando Posadas*

*See above.

Exhibit B.1 (continued)

List of Contacts:
Central America and Panama

Date	Office or plant	Persons contacted
	PEEIR-ICAITI (continued)	Ing. R. Cartagena* Ing. J. Gonzalez* Ing. W. Flores* Ing. O. Lopez* Ing. G. Rodriguez*
	ICAITI	Lic. Francisco Aguirre*

*See above.

INTRODUCTION

Guatemala has traditionally been perceived as the capital of Central America, and is the most important industrial country in the region. Since both host institutions (ICAITI and SIECA) are situated in the capital city, facilitating communications and logistic support throughout the country, PEEIR activities were first initiated here. Consequently, the project has progressed further in Guatemala than elsewhere in the region. The country is suffering from a policital-economic crisis, and the business contraction was exacerbated by the breakdown of Common Market arrangements.

REGIONAL INSTITUTIONS

In addition to ROCAP, ICAITI, and SIECA, the Regional Federation of Chambers of Industry (FECAICA) is also situated in Guatemala City. FECAICA is a small, informal organization which has assisted in arranging the project relationship with chambers of industry throughout the region. Having successfully accomplished this task, FECAICA no longer plays a leading role in the project.

Guatemalan Institutions

In January 1983, a cooperation agreement was signed between the Chamber of Industry of Guatemala and ICAITI for carrying out PEEIR in Guatemala. To this end, the National Advisory was formed, consisting of:

- Sr. Ricardo Castillo (President)
- Ing. Carlos Enrique Quintana (Executive Assistant), Chamber of Industry of Guatemala
- Ing. Rodolfo Santizo (Director of Operations, Distribution -- Guatemala City), Empresa Electrica de Guatemala

- Lic. Guillerimo Diaz (Project Director), PEEIR
- Lic. Francisco Segura (Promotion Manager), PEEIR
- Ing. Mario Ortiz (Industry Program Manager), PEEIR.

The Chamber of Industry and ROCAP also signed an agreement for personnel support to PEEIR.

The National Advisory Committee meets weekly and exercise close control over project activities in Guatemala. Also, the Committee has published a 5-year plan (1983-1987) that includes a long-range macroeconomic analysis, a cost/benefit analysis, and detailed plans for a regional Energy Conservation Month (April 1985). Also, an Industrial Maintenance Year is mentioned.

INDUSTRY PROGRAMS

The principal activities in the industry program are audits and seminars. Sixteen plant visits were planned for 1984, and all have been completed to date. Five audits have been performed, and one other is planned by year end. (Eight audits were conducted in 1983.)

The National Advisory Committee feels that plant visits do not produce positive results and that emphasis should be placed on audits, who are effective in producing results.

Eight seminars were conducted in 1984 as follows:

- "How to Improve the Efficiency of a Boiler" was presented four times to a total of 150 people
- "The Efficient Use of Electrical Energy in Your Industry" was presented three times and drew 125 people in all
- "An Energy Conservation Plan for Your Industry" was presented once.

Eighteen audit follow-ups have been conducted, which far exceeded the year's target of ten. This activity is intended to monitor and encourage implementation of audit recommendations and provide data on results. Unfortunately, the current political-economic climate

does not favor industrial investments. This situation will have a negative impact on the implementation of audit recommendations.

Based on a visit to a soap company (La Luz), it appears that the quality of the audit has been very good. In particular, the estimate of the implementation costs differed by only 10 percent with actual project cost. The plant manager was extremely suportive of the program.

TRAINING

The National Advisory Committee's 5-year plan expressed a need to provide training to industry personnel who desire training. In view of the need for resources to complement the ICAITI staff engineers in audit/design/implementation, it would be desirable to train personnel from selected industries and consulting engineering firms during 1985. Training should comprise fundamentals of auditing and audit instrumentation, on-the-job energy auditing, specific technical topics, and project implementation/economics.

PROMOTION

Since two promotional conferences initiating PEEIR were presented in 1983, 1984 activities centered on promotional visits to companies. Fifty-two companies were visited for the purpose of explaining the benefits and services of the project, and to stimulate interest in audits. Promotional conferences will resume in 1985.

Also, nine exhibits were displayed in 1984, consisting of a selection of books, manuals, and measuring instruments.

FINANCING

SIECA has produced a preliminary discussion paper on the availability of foreign exchange credit for energy conservation measures in industry. It appeared to indicate that no funds were available with specific application to energy projects.

A visit by the evaluators to two financial institutions described as "dynamic" provided a first-hand picture of the credit situation.

At the Banco del Cafe, which claims to be the fourth largest commercial bank in the country (51 percent of the international operation of Guatemala), Sr. Alfredo Leal explained that all foreign exchange transactions are channeled through the Central Bank, which exercises tight control.

Energy projects might have access to BLADEX funds, or to a $50-million World Bank fund currently under negotiation. It would be desirable to demonstrate savings of foreign exchange or promotion of exports. The business would pay 12-percent interest (Central Bank) plus the intermediary's commission. There is an ample supply of credit in the local currency.

Apparently, the success of each loan application will depend on its particular merits. Sr. Leal suggested submitting a trial application to test the availability.

FIASA is a finance company that provides medium (3-year minimum) and long-term loans at 2 percent above market. FIASA has dollar resources, but does not accept equipment as collateral (only land and buildings). In any case, exchange control is exercised by the Central Bank. Sr. Roderico Rossell of FIASCA did not know of any credit lines specifically applicable to energy conservation projects.

PRIVATE-SECTOR ROLE

Private-sector industry reflects the attitude of the Chamber of Industry and the National Advisory Committee: they have great interest in PEEIR and confidence in the benefits to be obtained from energy conservation. The fact that 52 promotional visits were carried out in 1984 (target was 40) supports this view.

According to ROCAP and PEEIR staff, Guatemala has a substantial engineering/consulting base that will be used in 1985 in auditing and project implementation, including demonstrations.

CONCLUSIONS

- The National Advisory Committee is very active and deeply involved in the project. In practice, the Committee orients, evaluates, gives opinions on the conduct of the project, and makes recommendations. It meets weekly.

- With 5 audits completed, and 13 audit follow-ups carried out, the project has advanced further in Guatemala than in any other country of the region.

- The National Advisory Committee feels that the project should concentrate on audits, which are thought to be more effective in achieving results than are plant visits.

- The current political-economic climate of Guatemala discourages industrial investment, and may impact implementation of audit recommendations negatively.

- Thee is a need to train private-sector groups in energy engineering to complement the limited resources provided by the PEEIR field engineers.

- There are no foreign exchange credit lines available specifically for energy conservation projects. Loan applications involving foreign exchange must pass through the banking system. The process appears to be lengthy and approval uncertain.

- Private-sector industry has great interest in energy conservation and in its benefits.

RECOMMENDATIONS

- Since the project has gained over a year's experience and is performing well, the involvement of the National Advisory Committee should be reduced. The frequency of meetings should be reduced to bi-weekly.

- Based on audit follow-up results, the effectiveness of plant visits should be evaluated. Measures should then be taken to alter their

structure or the resources devoted to them, if the follow-up results so indicate.

- SIECA should give priority to providing financing and policy recommendations to support implementation of energy conservation measures in Guatemala.

- Private-sector industry engineers and consulting engineers should be given energy engineering training in 1985 to complement the energy conservation resources provided by PEEIR.

INTRODUCTION

Panama is a unique participant in PEEIR because (1) it has not been part of the Common Market; (2) it does not entirely consider itself as part of Central America; (3) it is not familiar with ICAITI; (4) its industrial base sector is not very important compared with other of its sectors (e.g., services); and (5) it uses the U.S. dollar as its currency. Consequently, Panama does not face the problem of foreign exchange availability that other PEEIR countries do.

INSTITUTIONS

The National Committee

The National Committee (CN), established in February 1984, consists of:

- Ing. Celedonio Moncayo, Delegate
- Ing. George Richa, President of the Sindicato de Industriales de Panama (Panama Industry Association) (SIP)
- Ing. Victor Fabregat, Vice President of Refineria Panama (Texaco)
- Arq. Carlota Bieberach, General Manager, Ministry of Commerce and Industry
- Ing. Ramon Argote, General Manager, CONADE
- Ing. Jose Olvaldia, Esso Standard Oil.

The full committee has met only twice, the first time to organize the promotional conference and the second time to prepare the scheduling of seminars. To invite representatives from industry, the committee relied primarily on the SIP mailing list, which contains 286 members, most of whom belong to the industrial sector. This list was later used to identify potential

candidates for plant visits. CN's operation and decisions are actually in the hands of two men -- the delegate and SIP's president.

Unlike ICAITI's delegates in other countries, the Panama delegate has little experience with the institution. Ing. Moncayo is the general manager of a private Panamanian consulting firm, ARTEFIP, specializing in natural resource technical and economic studies. ARTEFIP was first contracted by ICAITI to conduct the local fuelwood program. In mid-1983, ARTEFIP was also contracted to represent PEEIR in Panama.

For both the technical fuelwood project and PEEIR, Ing. Moncayo is assisted on an ad-hoc basis by two other ARTEFIP engineers, Ing. Alberto Scott and Ing. Ernesto Guardia. For the promotional activities, another person is involved, Sra. Damaris Bolanos. ARTEFIP operates from two offices. The fuelwood project and the technical work of PEEIR are conducted from the first office, while the promotion activities are carried out from the second office, which works with the local Siboney agency. The contract between ICAITI and ARTEFIP is very flexible, and has a limit of U.S. $2,000 on monthly expenditures.

Sindicato de Industriales de Panama (SIP)

SIP is the only industry association in Panama. Its president is a very dynamic individual and extremely supportive of PEEIR. The association has adequate logistics, with headquarters providing legal and economic services, a library, and conference/training facilities. It issues weekly, monthly, and bi-monthly publications that are also used for PEEIR promotion. In energy matters, the major concern and focus of members are electric rates, which are constantly increasing and have reached an average U.S. $0.13/kWh, including demand charge. This high electricity price is the result of large hydro investments recently made by IHRE, the national utility, which is suffering from cost overruns and large financial losses.

Comision Nacional de Energia (CONADE)

CONADE, which has been quite active in recent years under World Bank assistance, is now seeing a slow-down in its activities; there are rumors of changes to the

institution's composition and mandate following the recent change in government. A World Bank-sponsored energy conservation project conducted under CONADE culminated in 1982, with the performance of 31 industrial audits and 4 audits in the commercial sector by the French firm, TRANSENERG. The project also sought to (1) to estimate the national potential for conservation and (2) establish a local capacity within CONADE to conduct audits through on-the-job training with TRANSENERG specialists. There are at present three engineers and one economist working in the audit division who are concentrating on auditing large electricity users (they were auditing the Marriott Hotel at the time of the evaluators' visit).

As CONADE is, defacto, a division of IRHE (the national electric utility), its free audits may be provided to alleviate customers' anger over IRHE rates. With respect to the follow-up on TRANSENERG audits, CONADE said that little has been done, owing to the bad economic situation of industry.[1] CONADE indicated that it desired more cooperation with PEEIR, and suggested that perhaps it could perform all plant visits for no charge while ICAITI conducted all audits for a fee.

Major Problems

In addition to the difficulties mentioned above and those resulting from each member institution's activities, it is the opinion of the delegate that there is too little communication between the project headquarters in Guatemala and his own operation. Two examples are the lack of sufficient bottom-up input to the overall planning process and the lack of coordinated communication for seminar scheduling. There have been four seminars on energy efficiency since January, and the delegate was not in favor of including a second ICAITI seminar on the topic, as the market was saturated. It turned out that the second seminar failed to attract even 30 participants.

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*However, interviews conducted by the evaluators revealed that some of the TRANSENERG recommendations have been implemented.

134

INDUSTRY PROGRAMS

Following the promotional conference held in May 1984, which was attended by about 150 people, 20 promotional visits were made by the delegate, resulting in 18 plant visits. There is currently an outstanding proposal for an audit (Cerveceria Panama), and another is contemplated in a plant previously audited by TRANSENERG (Vidrios Panamenos).

The major problem concerning the audit is that ICAITI's audit reports must be of outstanding quality -- that is, better than Esso's and TRANSENERG's -- to ensure the credibility of PEEIR and of ICAITI as an institution. The few plant visit reports received thus far by the delegate are not of such quality,mainly because of the nature of a plant visit report (preliminary review of potential areas for savings) and, in the case of Cerveceria Panama, because the contents of the report appear questionable to the delegate.* The quality of the reports prepared by Esso Standard Oil is between that of ICAITI's plant visit reports and audit reports. The TRANSENERG reports, although providing neither cost estimates of recommended measures nor recommendations for an implementation plan, are of excellent technical content, providing schematics of all proposed modifications and detailed savings estimates.

PROMOTION AND FIELD EXTENSION

Status

A broad program of promotion and field extension has been carried out, aimed principally at the SIP mailing list of 286 companies. Seminars, promotional visits, and plant visits have been employed to raise awareness and generate audits. These activities were reinforced by mailings of pamphlets, bulletins, and energygrams. The Panama delegation is awaiting receipt of 18 plant visit reports from ICAITI, so that audit follow-up activities can begin. Also, private-sector consultants

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*Cerveceria Panama has an annual energy bill of about U.S. $450,000, of which about half is electricity. The 38-percent savings announced in the report seem very high, and in any case the estimate is too precise.

135

are being sought to support auditing, design, and implementation work.

Accomplishments

The delegation has developed a close working relationship with SIP, a large and reputable organization that has provided good logistical support for PEEIR. Four training seminars and one promotional seminar have been carried out despite political disturbances and competing activities conducted by other groups.

Quality of Outputs and Effectiveness

A sample of seminar participants contacted indicated that the quality of the seminars and the printed materials was perceived to be good. A review of the participants' post-seminar evaluation questionnaires indicated **(TO BE COMPLETED)**.

Problems and Obstacles Encountered

A major problem is the time required by ICAITI to produce audit reports (up to 6 months), which tends to diminish the interest of the audit recipient. There is also a problem in matching the quality of audits performed earlier by Esso Standard Oil (Panama) and TRANSENERG (France). Another reported problem is inflexibility in scheduling seminars and delays in receipt of seminar promotional materials from ICAITI.

PRIVATE-SECTOR ROLE

Based on discussions of the energy engineering consultant market size with SIP and the delegate, and interviews with three representatives of private consulting/engineering firms (including ARTEFIP), the industrial market appears to be limited to perhaps 80-100 plants. Inasmuch as Esso has visited 19 plants, TRANSENERG has audited 31 industrial firms, ICAITI plans to conduct about 30 to 50 audits within the next 4 years, and CONADE is also engaged in auditing activities, the market does not appear to warrant a specific marketing effort from private-sector consulting firms. However, because of the availability of local financing (including foreign exchange), there may be some scope for the

private sector to participate in project implementation, including demonstration/pilot projects.

CONCLUSIONS

Because the case of Panama is unique, only some of the conclusions presented below are relevant to the overall project. These conclusions are:

- The delegate is technically and "socially" (good connections in industry) qualified to lead the effort in Panama, despite his lesser experience of working with ICAITI, compared with other delegates.

- The delegate wants more involvement in the planning process for activities relevant to Panama, including scheduling and conducting activities such as seminars.

- The delegate is very concerned about quality issues (audit reports), ICAITI image (still relatively unknown), and overall PEEIR impact, as industry is generally more concerned about pressuring IRHE to obtain lower electricity rates than saving energy.

- Industry's prime interest is increasing production and exports.

- The National Committee is essentially a two-man operation that tends to work informally.

- It will be difficult, and will require a special effort from PEEIR, to sell and produce top-quality audits to (1) surpass Esso and TRANSENERG reports and (2) lead to actual implementation.

- CONADE's activities are unclear, which results in the existence of two parallel and uncoordinated auditing services to industry. CONADE appears to act as an IHRE arm to alleviate the burden of the electricity bills of angry customers by offering them free audits with a view to cutting consumption.

RECOMMENDATIONS

To address the issues mentioned above, the following actions are recommended:

- Immediately organize a review meeting (in Guatemala or Panama) between the delegate and two PEEIR engineers to review and finalize audit reports to a standard that will make them acceptable to the delegate and meet industry expectations. Assign the best staff to this task and to the preparation of the first audit reports.

- Increase the number of industry representatives on the National Committee, and increase the frequency of formal meetings to discuss and take positions on the numerous issues facing the project.

- Use more objective criteria to select plants for audits (until now, selection has been largely on a political basis).

- For the 1985 work plan, involve the delegate and National Committee in the planning process to account for Panama specificities to a greater extent.

- Conduct a survey of SIP members to identify seminar, training, and other program service needs.

- Investigate the possibility of conducting one to two audits in large buildings in collaboration with the CONADE auditing team.

INTRODUCTION

The industrial output of Costa Rica ranks fourth in the region, after Guatemala, El Salvador, and Panama. At present, the economy is in poor condition, with most plants operating at 50 to 60 percent of capacity. Trade with Common Market countries has dwindled to a low level, owing to political and foreign exchange problems.

The ICAITI delegation is housed in the headquarters of the Chamber of Industries of Costa Rica and is staffed by a delegate and two engineers, both of whom work on PEEIR and other ICAITI projects as well.

There is a high level of interest in energy efficiency in Costa Rica. It is the only country in the region where a government institution is actively promoting energy conservation through a central energy agency. The Directorate of the Energy Sector (DSE), which works in all energy consumption sectors, is currently leading an industrial energy audit project.

INSTITUTIONS

The National Commission of Energy Conservation

In April 1984, the National Commission of Energy Conservation was created by the Chamber of Industries of Costa Rica. The Commission consists of:

- Ing. Max Koberg, Chamber of Industries of Costa Rica (President)
- Dr. Jorge Blanco, DSE (Vice President)
- Sr. Guillermo Porras, Chamber of Industries
- Lic. Orlando Ortiz, Chamber of Industries

- Lic. Ana Lorena Leon, DSE
- Sr. Herberth Diaz, Chamber of Industries
- Sr. Fernando Sunol, Chamber of Industries (Secretary)
- Ing. Heriberto Rodriguez, USAID, Costa Rica
- Ing. Felix del Barco, ICAITI delegate.

The Commission's functions are to promote activities that lead to greater energy efficiency, to guide both PEEIR and DSE in selecting target companies and in supervising and evaluating projects and results, and to coordinate the work of PEEIR and the DSE project.

The Chamber of Industries of Costa Rica

The Chamber of Industries and the Chamber of Commerce are the most prominent business organizations in Costa Rica. The Chamber of Industries, with 17 employees, has 700 members that account for 20 percent of the country's GNP. There are about 3,000 manufacturing companies in Costa Rica.

The PEEIR delegation is housed in the Chamber's building, and the project benefits from the industry connections, endorsement, and logistic support of the Chamber.

Directorate of the Energy Sector (DSE)

The DSE, which is attached to the Ministry of Energy and Mines, is funded by the UNDP, AID, and the state petroleum and electricity companies. It is staffed by some 17 professionals organized into two sections, planning and development. DSE is currently hosting an AID-funded project that is being carried out by a U.S. contractor, Weston International, Inc. The project involves auditing of 15 plants, on-the-job training of DSE auditors and others, and preparation of a comprehensive report on potential energy savings in all industrial sectors, together with the related investments. DSE plans to establish an energy services center offering technical assistance in energy conservation to industry.

INDUSTRY PROGRAM

Since PEEIR initiation in February 1984, 40 promotional visits have been made with the objective of developing energy audit candidates. In those industries where significant energy conservation opportunities were found, a plant visit was proposed for the purpose of enumerating the opportunities, estimating the savings potential, and recommending immediate implementation where justified. The recommendations were included in the plant visit reports prepared by the ICAITI engineers, at no cost to the companies.

In the case of industries with substantial savings opportunities, a proposal for an audit was prepared and presented. Ten audit proposals have been tendered to date. A total of 28 plant visits has been carried out, and two audits have been completed (DADA S.A. and Lacterea Costarricense S.A.). The 1984 work plan called for 15 plant visits and 5 audits.

Two plants -- Vidrios Centroamericanos and Fideos Precocidos -- were visited for the purpose of evaluating the project results. Both plants had been the subject of a plant visit by ICAITI engineers and had received the subsequent report.

Vidrios Centroamericanos (Ing. Alejandro Arce)

Ing. Arce is very enthusiastic about the program. He and three other staff members attended the promotional conference on February 23, 1984 and the seminars on boilers, electricity, and conservation plan management. The plant visit took place in March 1984, and the report was received in May 1984. The plant management is considering a detailed audit of the use of Bunker C in the glass furnace and is currently studying the ICAITI proposal. An energy committee of five members has been created, including the production manager, the glass melting manager, and the maintenance supervisor, who acts as committee director.

Vidrios Centroamericanos is in the process of purchasing energy metering equipment for use in the plant on a regular basis, and the company is interested in developing its capability in auditing and using it in other plants of the Mexican group to which it belongs (e.g., plants in Guatemala). The only suggestion was to

141

include more practical aspects in the seminars; overall, the company is extremely supportive of PEEIR.

Fideos Precocidos (Plant Manager)

The plant manager did not attend the promotional conference, but attended the first seminar on boilers, which he said had been very useful to him. The plant maintenance engineer attended the seminar on electricity. The plant was visited by ICAITI engineers in May 1984, and the report was sent in July 1984. The company liked the report and implemented most of the recommendations except for those that were not practical or timely because of the current plant expansion program. Fideos Precocidos would like more seminars, more topics, and more practical experience. The company is very supportive of PEEIR and believes it meets a real need in the country.

PROMOTION AND FIELD EXTENSION

Status

Promotional activities were initiated in February 1984 with a promotional seminar attended by 203 people. The seminar was followed by a campaign consisting of promotional visits, seminars, exhibitions, and dissemination of literature. Following completion of 28 plant visits, emphasis is being placed on visit follow-up, with a view toward generating demand for audits and submitting audit proposals.

Accomplishments

A formal agreement was signed with the Chamber of Industry of Costa Rica providing ICAITI with an introduction to the Chamber's membership list and the advantages of joint mailings of literature and invitations to selected chamber members.

Thirty-nine promotional visits were carried out to companies to explain the project's objectives and benefits, which led to the execution of 28 plant visits. Four technical training seminars were presented, with an average of 40 participants, followed by an energy management seminar that attracted 91 participants.

142

Audit follow-up visits will provide detailed information on OCEs implemented and results obtained.

Quality

A telephone survey of five managers who attended the seminars indicated satisfaction with the quality. Two managers praised the seminars very highly, while one thought that more selectivity should have been exercised with respect to the audience for the energy management seminar. The telephone survey also indicated that the promotion had generated a positive attitude toward energy efficiency on the part of private-sector industry.

Problems

No serious problems have emerged during the promotion campaign to date. A minor problem was late reception of seminar promotion artwork from the subcontractor, Siboney, but a design was improvised locally.

FINANCING

Mr. Archer visited Claudio Urenane, head of credit operations at the Central Bank. Sr. Urenane said that the economy is in bad shape and operates at 50 to 60 percent capacity. IMF had targeted a 15-percent credit increase for 1984, but this target had already been exceeded by October. The interest rate to industry is 23 percent. There are several sources of funds available to industrial projects:

- "Fondo de Desarollo Industrial" (FODEIN), with a total of U.S. $11 million; $6.5 million have been used.
- Two sources of funds (IBRD) totaling U.S. $6 million, of which some $2.5 million have been used.

Sr. Urenane did not know if the funds were available for energy conservation projects.

PRIVATE-SECTOR ROLE

With a view toward determining the availability of private-sector resources, three Costa Rican consulting engineering firms with an interest in energy projects were interviewed: Sol 2000 S.A., Ing. Mario Cantillo, and GRUPO TIDESA.

Sol 2000 S.A.

This firm, headed by Ing. Jose Joaquin Chacon, is a subcontractor to Weston International, Inc. in the current DSA auditing project. The firm has 25 permanent employees, 5 of whom are consultants. Contract engineers are also used as required. The primary business of Sol 2000 appears to be the design and manufacture of energy-related equipment (e.g., ovens, furnaces, dryers, heat recuperators). Energy auditing is undertaken as a means of promoting other aspects of the firm's business. Recent energy projects of the firm involved the drying of coffee and wood.

Ing. Chacon felt that there is not a significant market for energy auditing at present, owing to a depressed economy, lack of financing, and lack of a long-term government energy policy. Both Ing. Chacon and a vice president of the firm are members of the DSA/Weston audit groups.

Ing. Mario Cantillo

Ing. Cantillo's firm has four permanent engineers and four contract engineers, whom he uses as required. His principal business seems to be importing energy-related equipment. Principal clients are RECOPE (refining) and ICE (electricity). The firm claims to be strong in energy diagnostic work, but has no energy audit experience. It is not strong in design work. Ing. Cantillo said that there were no Costa Rican consulting engineers experienced in energy engineering.

GRUPO TIDESA

GRUPO TIDESA was formed in 1984 by a group of professionals who had worked together at the Research Division of the Technological Institute. The group is in a start-up mode and can provide 6 to 15 people in a

variety of specialties. One member is reported to be experienced in windmills, wood waste, biodigestors, and industrial audits. It appears that the staff has had little industrial experience.

CONCLUSIONS

Favorable

- Staffing and institutional support for the project is adequate, and the project is on schedule (1984 work plan), except for a lag in audits and minor demonstrations.
- Industry is very supportive and has responded to the promotions with high interest.
- DSE is playing an active role in promoting energy efficiency and will be a key factor in continuing energy conservation efforts.
- The Chamber of Industries has created a National Commission for Energy Conservation that involves the private sector in coordinating all major energy projects in the industrial sector.
- Costa Rica has good potential for involving private consulting engineers in energy conservation activities. The consultants are interested, but require training and experience.

Unfavorable

- Although several funds provide credit to industry, none is specifically earmarked for energy conservation. Some industrial managers perceive financing to be an obstacle.
- DSE's plans to establish a technical service center for energy conservation would discourage private consulting engineers from entering the market.

RECOMMENDATIONS

- The energy conservation commission (within the Chamber of Industries) should play a major role

in involving private industry in the project and in coordinating major projects and sponsors.

- Weston/DSE audits and Meta System study should be used to select demonstration projects.
- Encourage private consulting firms like Sol 2000 to play a major role in energy audits, design and implementation of conservation measures, and demonstration projects.
- Investigate the feasibility of having one full-time resident ICAITI engineer in Costa Rica.
- Include in the 1985 work plan strategy (1) the training of private firms in energy auditing and (2) the training of plant engineers.
- Coordinate PEEIR planning and efforts closely with those of DSE.
- Develop recommendations for financial assistance to energy project implementation and promote their adoption.
- Develop recommendations on government incentives to energy conservation and promote their adoption.

Despite the extreme economic difficulties encountered by the industrial sector during the past 5 years (the number of affiliates to the chamber of commerce dropped from 500 to 300). PEEIR is active in El Salvador and receiving a good response from private industry. Below, an overview of the institutional situation, training, promotion, audits, financing, private-sector roles, and likely program impacts is presented. In addition, conclusions are drawn and recommendations made.

INSTITUTIONS

Institutions involved directly and indirectly in PEEIR are the National Committee, the Chamber of Industry (ASI, or Asociacion Salvadorena de Industriales), and the Comision Ejecutiva Hidroelectrica del Rio Lempa (CEL), which manages government energy activities.

The National Committee consists of the ICAITI delegate, Ing. Jaime Gonzalez; ASI's executive director, Lic. Roberto Ortiz Alvados; and ASI's president and vice president. Unlike other national committees, the Salvadoran committee operates very informally within ASI headquarters; it does not hold regular meetings but rather interfaces on an ad-hoc basis. The committee believes that this type of operation is better suited to the project and provides the required flexibility and effectiveness. Past experience (e.g., the fuelwood project) has shown that large and formal commissions are counterproductive.

Comision Ejecutiva Hidroelectrica del Rio Lempa (CEL) is a government institution dedicated primarily to electricity generation (mostly hydro and geothermal). However, its responsibilities have grown over the past 6 years to include hydrocarbons and renewable resources. A specific division within CEL is in charge of national energy planning. Projects that are illustrative of its activities include an OAS-sponsored wood commercialization survey and an IDB-sponsored institutional build-up study. The relationship between CEL and the

ICAITI/National Committee appears to be good. The head of the planning division is interested in eventually participating in audits and in obtaining information about the conservation potential for planning purposes. He is not interested in participating in the National Committee but wants to maintain informal contact.

Problems

While PEEIR seems to be proceeding rather well, the delegate mentioned several problems. First, he thought that the project was too centralized and that more responsibilities should be given to the delegate, especially in planning seminars and designing and producing promotional documents. Next, he mentioned his concern about the follow-up on promotional visits, as there is a substantial backlog in plant visits and audits (see "Industry Programs," below, for further details).

The delegate also expressed concern about the quality of some plant visit reports, which either were too specific, were inconsistent (total estimated savings differing from the sum of savings of individual identified projects), or led to a recommendation that a detailed audit not be performed. He also mentioned his salary problem, in which his purchasing power was decreasing with the increasing difference between the official exchange rate (2.5¢/U.S.) and the parallel exchange rate (4.0¢/U.S.).

A serious problem is that of keeping good assistants. Of the two original assistants, one left because his salary was too low, and the other is still a student and spends no more than 25 percent of his time on PEEIR. Keeping him will also be difficult if salaries are not adjusted to make them competitive with the private sector.

With respect to the financial gain that can be realized from the seminars and the audits, the delegate indicated that he was considering establishing a bank of energy metering equipment for leasing to industrial firms.

INDUSTRY PROGRAM

The industry program component consists of seminars and audits. A total of five seminars have been conducted:

145

- Three boiler seminars in May, June, and July, which attracted 47, 45, and 41 participants, respectively; all were presented at industrial sites

- One electricity seminar in August, with 30 par ticipants (ASI)

- One seminar on "plan de conservacion" in October, with 54 participants (ASI).

Feedback gathered by the evaluators ranged from very good to excellent for all five seminars.

Following about 27 promotional visits (as of October), 17 plant visits were conducted and 11 reports have been prepared. Two audits have been performed, and three others are either being initiated or planned. A total of four completed audits seems likely for fiscal year 1984.

As mentioned earlier, the quality of plant visits does not quite satisfy the delegate, who sometimes feels that they will be of little use to the companies. He would like to see them more "like audits without measurements." Again, his major problem is the long waiting list for plant visits and audits, which made him postpone any further effort in promotional visits.

Two plants were visited to obtain management comments on overall program audits and promotional activities. The first plant, Plastymet, was the subject of a recent instrumented audit. The general manager was extremely supportive of the project (his brother is vice president of ASI) and said he would implement all sound measures with a payback of up to 2 years and up to U.S. $10,000 investment cost.

The second plant, Productos de Cafe, is a major energy user in El Salvador, with a total energy bill well in excess of U.S. $2 million. The plant manager was also very supportive of the program, but said that he will have to wait to implement recommended measures because of a major ongoing expansion plan (U.S. $5 million, 100-percent equity-financed), which was absorbing all plant engineering resources. He also said that he was establishing a plant energy committee, following the recommendation of ICAITI and the National Committee. To accelerate the energy conservation effort in El Salvador, the plant manager proposes to hold informal

industry meetings to share energy conservation experience among Salvadoran engineers and managers.

TRAINING

The delegate wishes to receive more general training, to participate in international energy trade shows, and to improve his skills in marketing people (PEEIR engineers) and products (audits and seminars). He also requested more training for his assistant(s).

PROMOTION

The overall promotion activities were rated very highly by the people interviewed by the evaluators. The only suggestion came from the delegate, who wishes more responsibility in planning and conducting the promotional effort. He specifically questioned the usefulness of the contribution of the local Siboney agency and thought it was not always necessary to use its services.

FINANCING

As a result of a visit to the Central Bank with the national delegate, two existing lines of credit were identified that could possibly be used to finance energy conservation equipment. First, the IDB's "fondo de reactivacion industrial" has about U.S. $65 million remaining in its Phase II for new machinery (modernization) at 15 percent interest, a 2-year grace period, and 5 years for amortization. Second, the USAID's credit line for manufacturing industries should be studied closely to see if it would be applicable. A very brief review of each credit line showed that the IDB line was more likely to be suitable for conservation investments.

PRIVATE-SECTOR ROLE

Private-sector industrialists are very enthusiastic about the program and are very active. A representative consulting/engineering firm, Especialidades Industriales, was visited to assess the private sector's ability to conduct audits and design/implement conservation projects. It was concluded that the market was

too small for audits and would raise a conflict-of-interest issue, as these consulting firms are also exclusive representatives/distributors of equipment. In contrast, there was great interest in participating in the design/engineering and construction phases.

CONCLUSIONS

- The Salvadoran National Committee consists of the delegate, one part-time assistant, and three top executives of the Chamber of Industry (ASI).
- The Committee's operation is informal to ensure flexibility and efficiency.
- There is little experience so far with the project, as the program really started 6 months ago.
- The promotion activities have been relatively successful, as evidenced by the waiting list for plant visits once promotional visits have been made.
- The National Committee wants more autonomy in planning and organizing local activities such as seminars and promotion (it questions Siboney's effectiveness).
- The National Committee wishes to be more involved in program planning and kept more informed about overall project development (Guatemala seems remote).
- Audit fees can be increased in the future.
- Plant visit reports are not quite satisfactory to the delegate.
- ICAITI is very well established in El Salvador.
- ICAITI staff salaries are not competitive with the local private sector.
- Financing appears to be available through existing AID and IDB credit lines.

- The market is too small to involve private firms in the auditing business, but there is potential for demonstrations/project implementation.

RECOMMENDATIONS

- Increase the National Committee's strength by assisting the delegate in recruiting assistants.
- Investigate ways of reducing the plant visit waiting list.
- Increase the National Committee's role in conducting local promotion activities (e.g., sele tion of actions, hiring contractors).
- Conduct a survey of local consulting/engineering firms to identify them and develop a certification process.
- Investigate conditions of applicability of existing AID and IDB credit lines for energy con servation projects.

INTRODUCTION

Honduras, with Guatemala, was one of the first countries to form a national committee and to initiate promotion. Subsequently, a dispute over control of revenues from seminars and audits led to a suspension of relations with the Honduran Industry Association. A working relationship has recently been restored, and the project has made good progress since September. Honduras is the only PEEIR country in which the national committee is made up entirely of private-sector industry people.

In terms of industry importance, Honduras ranks lowest among the countries of the region. The country is presently suffering from a severe economic crisis, and there is strong pressure on the currency. Foreign exchange is controlled tightly by the Central Bank.

The project staff, consisting of the ICAITI delegate and an engineer, divide their time between PEEIR and other ICAITI projects. They have been successful in carrying out most of the 1984 plan, despite a tenuous relationship with the Industry Association and the national committee.

INSTITUTIONS

The National Advisory Committee

The National Advisory Committee was formed in late 1983 and consists of:

- Lic. Henry L. Bahr (President), General Manager, Industria Resinera Bahr
- Sr. Eduardo Aragon (Vice President), Vice President, Tela Railroad Comany
- Lic. Marco Tulio Mendieta (Secretary), General Manager, Mendieta & Associates

157

- Lic. Taufic Andonie (Alternate), Distribuadora, S.A.
- Licda. Dorcas Cantarero de Gonzales (Industry Association Representative), Executive Secretary of the Honduran Industry Association
- Ing. Angel Porfirio Sanchez, ICAITI delegate.

Since early 1984, the committee (and the Industry Association) has been engaged in a bitter controversity with the project management. As a result of this dispute, which centers on jointly controlling funds generated by seminars and audits, the committee's participation was suspended in April 1984. Efforts by project management to re-establish a relationship failed until August 1984, when a visit from the Deputy Director of ICAITI, Ludwig Ingram, re-established a limited working relationship. This permitted seminars and plant visits to be carried out in September and October.

The ICAITI delegate, Ing. Sanchez, is housed in the Industry Association (ANDI) and has had a long history of cooperation with ANDI on numerous ICAITI projects. The PEEIR activities in Honduras enjoy joint sponsorship with ANDI and benefit from the use of the ANDI membership list at present. However, the relationship with ANDI and the committee is cool, and assistance is given reluctantly. The committee feels that decisions on the conduct of the project in Honduras are made unilaterally by PEEIR-ICAITI, and resents exclusion from the decision-making process. In view of the circumstances, the committee has no meeting schedule; it meets only as requested by PEEIR-ICAITI.

Asociacion Nacional de Industrias (ANDI)

ANDI is the major industrial association in Honduras, with a membership of 190 companies, all of which are capitalized at over U.S. $500,000. There are almost 500 industrial companies in Honduras. ANDI operates from a modest headquarters with a small staff. Financial constraints are felt keenly by the association and are a factor in its current dispute with PEEIR-ICAITI.

ANDI wants to establish a local energy efficiency advisory service, housed in its headquarters, and needs funds for this purpose. The objective is to give

continuity to the project by developing and maintaining local resources.

Central American Bank for Economic Integration (CABEI)

As CABEI has its headquarters in Tegucigalpa, an appointment was arranged to discuss its role in providing financial assistance to the project. The meeting failed to take place. However, a telephone interview was obtained with Lic. Yolanda de Suazo Tome, a CABEI officer. Lic. de Suazo said that the bank has no special funds for energy projects; however, the bank is willing to seek funds to create an appropriate fund. To initiate this process, PEEIR must submit information indicating the funding requirements and request that an energy project fund be established.

INDUSTRY PROGRAMS

The promotion program resulted in 19 plant visits, exceeding the goal by 4. Two audits have been completed, and a third has been contracted and scheduled for completion by year end. The delegate estimates that there are 300 potential audit candidates in Honduras.

The major problem encountered has been the excessive time required to produce plant visit reports (analysis, writing, approvals, mailing). The project is behind schedule in audits and minor demonstrations. In both cases, five were planned for 1984.

Plant Visit

A visit was made to Textiles Rio Lindo in the outskirts of Tegucigalpa, where a meeting was held with the plant engineer, Ing. Mario Diaz. The company was host to the PEEIR promotional conference in December 1983.

The 60,000-square-meter plant, which employs 1,000 people, has recently undergone major expansion, and activities associated with the expansion are still in progress. Production capacity is 1 million meters of cotton/synthetic cloth per month.

Ing. Diaz said that the plant's engineers have a clear picture of the benefits of energy conservation and actions to be taken; however, management must be

convinced of the need to implement measures, as they are not certain that the actions will produce the desired results. He feels that an audit will act as a catalyst and add credibility to the program. Other constraints are the priority given to expansion-related activities and the relatively small plant engineering staff.

Ing. Diaz also felt that energy efficiency promotion efforts should be directed at operations as well, since their cooperation is a major factor in the success of implementation. He suggested videotapes aimed at operations for in-plant training.

A plant visit had been made in September and the plant was awaiting a report that had been promised in 15 days. Although management had indicated earlier that ar audit would follow, Ing. Diaz said that a decision to proceed with the audit was not certain.

PROMOTION AND FIELD EXTENSION

Status

Following the reconciliation with ANDI in August, promotional activities have resumed and are essentially on plan. Promotional visits were carried out and led to the completion of 19 plant visits. Five plant visit reports have been received from PEEIR headquarters and are being used to generate audits. A further 14 reports are awaited to support further audit promotion activity. Three audits have been contracted, but the goal of five audits will not be achieved owing to the 5-month lapse in project activity.

Accomplishments

Despite the interruption of activity from April to August 1984, the delegation succeeded in creating a demand for more than the planned number of plant visits, even contracting three audits without the benefit of a plant visit report.

Quality and Effectiveness of Outputs

The delegate feels that a strong technical background and experience is essential for promotion and field

156

extension work, so that the project representative can speak with authority to the industrial contacts. In view of this, he has engaged an experienced engineer as his project assistant.

The delegate feels that seminar manuals should be working manuals with considerable technical depth. While he considered the electrical energy manual to be satisfactory, he felt that the boiler and energy management manuals lacked depth. For example, the boiler manual lacked precise graphs and did not deal with Bunker C oil, a common fuel in Honduras. Also, the energy management manual was weak in financial calculations.

Problems and Obstacles Encountered

The major problem is slow delivery of plant visit reports by PEEIR-ICAITI, which undermines the interest and confidence of the companies audited, and hinders promotion of audits.

Also, the delegate feels that the level of the 1984 promotion effort exceeds the capacity of the PEEIR auditing staff and that the activities should be brought into balance.

PRIVATE-SECTOR ROLE

According to the delegate, there are no energy consulting firms in Honduras. The Industry Association, ANDI, however, wishes to sponsor an energy consulting service.

FINANCING AND POLICY ISSUES

There are no special financing arrangements for energy projects in Honduras. The loan approval process is a long one, and is influenced by political and personal connections.

There are no specific policy incentives for energy efficiency, and according to the National Advisory Committee, any proposal that would reduce revenues would be rejected by the government because of the current economic crisis.

In this connection, the AID Mission Energy Officer, Lynn Sheldon, is interested in receiving recommendations from PEEIR on policies and regulations to promote energy efficiency.

CONCLUSIONS

- The delegate has succeeded in carrying out most of the 1984 work plan despite a 5-month lapse in relations with the host industry association (ANDI) and a 2-month delay by PEEIR headquarters in furnishing 19 plant visit reports.
- The National Advisory Committee is not an ideal project coordinating group, as it lacks banking and national electrical utility participation.
- The National Advisory Committee and the PEEIR delegate are largely excluded from project planning and decision-making. Also, they do not participate in the budget process or financial management of the activities in their country.
- ANDI wishes to sponsor an energy consulting service within its organization.
- Late delivery of plant visit reports is a serious hindrance to securing contracts for audits.
- There appear to be no private Honduran consulting engineers who are qualified in energy engineering.
- Financing will be an obstacle to implementation of energy audit recommendations.
- The AID Mission energy officer, Lynn Sheldon, would like information on the magnitude of investment and savings involved in the Honduran industrial energy conservation program and recommendations on policy measures to promote energy conservation.

RECOMMENDATIONS

- It is essential that the current differences with ANDI be reconciled and that the full support of ANDI be gained for the project.

- Given the National Advisory Committee's negative view toward the public sector, it would not be advisable to invite public-sector participation at this time; however, the private banking sector should be represented on the Committee.

- The planning and conduct of the project should be decentralized to provide more authority and responsiblity at the national level.

- Project management should determine the best way to provide continuing energy engineering resources in Honduras (ANDI, private consulting engineers, or ICAITI) and take action to develop such resources.

- The delivery time for plant visit reports should be 4 weeks maximum, and for audit reports, 8 weeks maximum.

- CABEI should be provided with data needed to seek funds for financing energy conservation projects.