

PDWAC 226

**REGIONAL INDUSTRIAL ENERGY
EFFICIENCY PROJECT**

**Second Evaluation
Final Report**

HBC Reference No. 85-4008

Prepared For:

**Central American Technical and
Industrial Research Institute (ICAITI)**

and

**U.S. Agency for International Development
Regional Office for
Central America and Panama (ROCAP)**

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Washington, DC**

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LIST OF ACRONYMS

GIT	Georgia Institute of Technology
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

Exhibits

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Introduction

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This report presents the findings of a follow-up on the evaluation of the ROCAP-sponsored Regional Industrial Energy Efficiency Project (RIEEP) conducted in 1984. The effort, which consisted of an in-country visit between November 18 and November 26, 1985, is more a follow-up on the implementation of the 1984 recommendations than an evaluation per se. However, a significant amount of time was devoted to understanding the changes that have occurred in the project environment since 1984, as well as getting an idea of what that environment is likely to be over the next few years.

The scope of work for this study, as proposed by ICAITI, is presented in Exhibit 1.

The decision was made, with ROCAP to extend the original scope of work to provide some information on (1) the actual energy savings realized so far and those that could be realized in the short and medium term, (2) the need for long-term technical support from U.S. specialized firms, and (3) the status of the involvement of private consulting and engineering firms in the project.

To facilitate a comparison between these findings and those of 1984, a similar outline has been used. The report is therefore organized in two chapters: (1) Findings and (2) Conclusions and Recommendations. Each

Exhibit 1

Scope of Work

1. Assess the organizational structure of the ICAITI project team and its effectiveness in carrying out the planned programs at ICAITI and at the country level.
2. 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 in project activities.
 - B. Degree to which experience from other industrial energy conservation programs has been incorporated in planning project activities.
3. The team's examination will also be designed to suggest areas and ways in which the efficiency of information exchange can be enhanced.
4. Determine whether existing reports and systems adequately describe project activities and the extent to which they reach all interested parties.

Exhibit 1 (continued)

5. Assess the present activities of RIEEP to evaluate its progress toward the fulfillment of projected goals and objectives.
6. Follow up previous evaluation recommendations.
7. Review the proposed 1986 workplan.

chapter successively covers the following 10 categories:

- 1 - General
- 2 - Project administration and management
- 3 - Staffing
- 4 - Regional links and information exchange
- 5 - Project components
- 6 - Financing and policy issues
- 7 - Private-sector role
- 8 - Project expenditures
- 9 - Technical assistance
- 10 - Likely project impact

The evaluator is grateful to all individuals who helped him gather the facts supporting this report and confirming his preliminary conclusions and recommendations, particularly M. Ludwig Ingram, ICAITI Deputy Director; Rodolfo Espinosa, Project Director; Mark Oven, Chief-of-Party, Georgia Tech; and M. Edward Nadeau of ROCAP. A detailed list of people interviewed is presented in Appendix A.

In this chapter, the major findings are summarized for the 1st categories.

General

Most of the numerous difficulties that plagued the project from its inception to the end of 1984, particularly with regard to project management deficiencies and the resulting inability to meet the goals of the annual work plans (see 1984 evaluation report), have been resolved. Project achievements over the past 12 months can be summarized as follows:

- Significant improvements have been made in most project components, particularly in project management.
- The project is now entering a phase of maturity, allowing a timely delivery of outputs, e.g., promotional materials and industrial services.
- The project is almost where the project paper expected it to be at the end of its second year.
- The project is ready to move to greater achievements.

Project Administration and Management

The original project director resigned in late 1984 and was replaced by an ICAITI project manager who has been acting as project director since early 1985.

The current status of project administration and management is noted below.

- The organizational structure is adequate and in line with the recommendations of the 1984 evaluation.
- Procedures for managing staff time are adequate. New time sheets are being used, which allow flexible manpower planning for a 3-month horizon.
- Reports are now produced within acceptable time frames. For example, detailed audit reports (level II audits) take 10-14 weeks from the first day in the plant to the mailing of the report to the regional delegates.
- Financial and accounting practices are also adequate and allow detailed estimates of cost by task, e.g., audits, seminars. Although such detailed data are not routinely provided to project managers, they can easily be obtained. For example, the average total cost of a level II audit is estimated at \$8,500.

- The new project director has been able to reconcile ICAITI's traditional practices and project requirements to achieve some independence in project management and operation.
- Staff compensation has been revised and increased to alleviate some of the loss in purchase power because of the drop of the quetzal. In mid-August, all PEEIR personnel became ICAITI permanent employees, with full fringe benefit allowances. A formal performance evaluation process, consistent with ICAITI's practices, was also initiated in mid-1985 and will be continued
- Engineers continue to feel rather remote from decisions affecting the project, and would like to see further progress in communications and merit awards. For example, most of them had not been informed that this evaluation was being carried out, and there has been no formal notice that the chief-of-party is leaving the project by year end.
- ICAITI management has planned a general staff meeting in early December to develop a greater understanding of overall ICAITI activities and make PEEIR engineers feel more a part of the institute.
- Delegates would like more meetings to be held, at least bimonthly, at which they can discuss key issues, jointly develop solutions, and learn more

about overall project development, e.g., SIECA activities.

- No decision has yet been made on the use of funds from audit and seminar revenues.

Staffing

The 1984 evaluation found that the Project was significantly understaffed to meet its objectives, particularly with respect to engineers.

- The project is now fully staffed at the central level, with the exception of the demonstration head position (who left ICAITI). Four engineers have been hired.
- Four additional engineers will be hired to fill decentralized positions as soon as ICAITI has completed its general decentralization plan. This plan calls for a comprehensive decentralization of all ICAITI activities through the establishment of regional units that will carry out most of the activities now carried out in Guatemala.

Not needed

Regional Links and Information Exchange

There has been a significant effort in 1985 to achieve a better balance among countries as far as project activities are concerned.

- The problem with Honduras has been solved. *What was it?*
- There is now a problem with the Guatemala National Advisory Committee, the president of which resigned in June 1985, to protest against what he called "the total lack of response of the project to the specific needs of Guatemala." However, he never resigned formally in writing, leaving the situation in an impasse. Nonetheless a review of past activities shows that Guatemala has benefited more from the project than any other country. *Agree!*
- Relations with the other three countries -- El Salvador, Costa Rica and Panama -- seem to be good, but the evaluator could only confirm this with Costa Rica, as there was insufficient time to visit with the other two countries. A telephone discussion was conducted with the delegate from El Salvador.
- The effectiveness of the relationship between ICAITI and SIECA has significantly improved, but there is room for further improvement.
- Communications between PEEIR and the National Committees and within PEEIR itself can be improved further.

Project Components

There are three project components: Industry Programs, Training, and Data Base.

A. Industry Programs.

The Industry programs component includes: energy audits, field and pilot demonstrations, and energy efficiency seminars.

Audits. Twenty-five level I audits and thirty-five level II audits will have been performed for 1985 by the end of the year, which is a good number. When and how level I audits should be conducted is still not well defined. Level II audits are of higher quality than in 1984, but they must still be improved.

Auditors are still reluctant to delve into process considerations and thus limit the scope of their work to routine, low-cost, short-payback opportunities.

Field and pilot demonstrations. Pilot demonstrations were eliminated by ROCAP from the project in 1984 to channel financial resources primarily to training and audit activities. The project is now considering the implementation of specific audit recommendations as demonstrations. Progress on this component has been slow and outputs are behind schedule. There have been five minor installed demonstrations in all participating countries. One portable demonstration on steam traps was successfully presented in all countries (six times), and two major demonstrations are

Productivity = $\frac{7\#}{\text{aug}}$

Poor!

under study, compared with an expected total of 10. ICAITI has been struggling for 12 months to finalize the contractual conditions. At this point in time, efforts are concentrated mainly on Guatemala, where the two major demonstrations both on electricity savings -- are to take place.

Energy Efficiency Seminars. Quantitative and qualitative goals will be met or exceeded. The response from the private sector has been extremely good. Undoubtedly, the seminars are the most successful component of the project (see Exhibit 1.a for details).

B. Training

The 1984 evaluation recommended a very substantial effort for 1985 at all levels of PEEIR staff, with a budget of U.S. \$200,000 - \$250,000. Achievements are listed below.

PEEIR Staff

- The project director attended a 4-week management training course in Denver, Colorado, U.S.A.
- Junior engineers received a 2-week training course for energy audits and on-the-job training.

SEMINARIOS

Exhibit 1.a

Componente Industrial - PEIR

	<u>GUATEMALA</u>		<u>EL SALVADOR</u>		<u>HONDURAS</u>		<u>COSTA RICA</u>		<u>PANAMÁ</u>		<u>TOTALES</u>		
	<u>N° PARTICIP.</u>		<u>N° PARTICIP.</u>		<u>N° PARTICIP.</u>		<u>N° PARTICIP.</u>		<u>N° PARTICIP.</u>		<u>N° PARTICIP.</u>		
1984 CALDERAS	5	172	3	130	2	75	2	80	2	45	14	502	
ELECTRICIDAD	3	125	1	30	2	90	2	85	1	35	9	365	
ADMINISTRACIÓN	2	65	1	50	1	40	1	90	1	30	6	275	
SUBTOTAL	10	362	5	210	5	205	5	255	4	110	29	1 142	
1985 INSTRUMENTACIÓN	2	95	1	45	1	55	1	45	1	40	6	280	
CURSO DE AUDITORÍAS	1	20	SE IMPARTIRA EN SEPTIEMBRE, OCTUBRE Y NOVIEMBRE 1985					1		1		1	20
CALDERAS	1	30	-	-	-	-	-	-	-	-	1	30	
ELECTRICIDAD	1	30	-	-	-	-	-	-	-	-	1	30	
SUBTOTAL	5	175	1	45	1	55	1	45	1	40	9	360	
TOTAL	15	537	6	255	6	260	6	300	5	150	38	1 502	

CURSO DE ENTRENAMIENTO DE AUDITORES EN LA EMPRESA PRIVADA

TOTAL SEMINARIOS	38	COSTO POR SEMINARIO	\$CA 4 500.00	(TOTAL \$CA 172 600.00)
TOTAL PARTICIPANTES	1 502	COSTO POR PARTICIPANTE	\$CA 75.00	
ASISTENCIA PROMEDIO	40	INGRESO TOTAL	\$CA 112 650.00	
EMPRESAS ATENDIDAS	900			

16

- All engineers went the United States to attend specialized seminars (see Exhibit 1.b), with mixed results. Some engineers felt that attending a large international conference in the United States offered few benefits. *Agreed*

Private Sector

- Training seminars in energy auditing for plant engineers were given in all five countries, involving more than 100 engineers, delegates, assistant delegates and university representatives. These seminars have been highly successful.
- Several delegates and members of National Committees went to the United States to attend specialized conferences and workshops (Washington, D.C., Houston, Atlanta and Puerto Rico)
- Although the overall scope of training activities did not exactly follow the recommendations of the 1984 evaluation, extensive training activities have taken place both at the managerial and technical levels.

C. Data Base

The 1984 evaluation found this activity to be far behind schedule and recommended concentrating on (1)

Exhibit 1.b

Major Training Activities in 1985

<u>Topic</u>	<u>Place</u>	<u>Number of Participants</u>
- Energy Audits	Washington, D.C., U.S.A	1
- Project Management	Denver, Colorado, U.S.A.	3
- Steam Traps	San Antonio, Texas, U.S.A.	2
- Project Management	Atlanta, Georgia, U.S.A.	2
- Air Conditioning	Houston, Texas, U.S.A.	2
- Electricity Demand Management	Houston, Texas, U.S.A.	1
- Energy Conservation in Cement	Guatemala	11
- Visit to Information Handling Systems	Denver, Colorado, U.S.A.	2
- Steam Traps	Guatemala	11
- Air Conditioning	Guatemala	11
- Computers	Guatemala	11
- Basics of Management	Guatemala	1
- Energy Management	Houston, Texas, U.S.A	3
- Lighting	Guatemala	11
- Energy and Mass Balance and Thermodynamics Principles	Guatemala	11

meeting project internal needs (including SIECA's) for audit control and information on energy conservation equipment and (2) meeting private sector needs in terms of equipment cost and performance. The hiring of a specialized consulting firm to assist PEEIR in these activities was also recommended.

- Work still lags expectations, although some progress has been made.
- Key information from the audits is now computerized and provides updated summaries of the situation by country and type of audit, including time table of activities, auditor in charge, identified savings and investment required, payback, energy bills and follow up.
- Evaluation forms from seminars are now being processed by computer and will provide quick and useful information for project management.
- Staff time is now managed by computer on the basis of biweekly time sheets that are completed using a number of relevant charge codes.
- Other activities under way include mailings of promotional information, standard reporting format for level I audits and OCEs (Energy Conservation Opportunities).
- Progress on technical and cost information for energy conservation projects is still very slow;

Why not coordinate with W/L... energy activities?

moreover, PEEIR is not likely to receive the required information from a recent large-scale mailing of requests, because suppliers do not generally respond to this kind of request.

- There has been no progress on contracting the services of a U.S. or local specialized consultant, because PEEIR wants to have a better idea of precise requirements first.
- The head of the data base component suggests starting new activity in 1986 aimed at establishing in-plant monitoring systems to follow upon savings achieved after implementation of audit recommendations.

needed
✓

Financing and Policy Issues

This category is the focus of a separate consulting assignment (Steven Fisher, Hagler, Bailly & Company, Nov. 22-31), a detailed report of which will be available at the end 1985.

- A scope of work was developed in early 1985 to assist SIECA in achieving concrete results before yearend.
- Major outputs expected are (1) a series of reports presenting and summarizing current financing available for energy conservation projects in each country and (2) policy-related studies.

ICAITI has provided input to SIECA for its analyses, and PEEIR staff is anxious for concrete financing information to be given to industry, especially for implementation of capital-incentive audit measures.

Private-Sector Role

The 1984 evaluation recommended that private-sector consulting/engineering firms be involved in the project, their staff and plant engineers in PEEIR-sponsored training activity also be involved, and that some activities be subcontracted to the private sector where possible and justified. The evaluation recognized that private small and medium-sized industries were deriving great benefit from the project, thanks to the exceptional cooperation between PEEIR and the Chambers of Industry, via the National Committees.

In 1985, the major achievements have been:

- Continuation of excellent cooperation between PEEIR and the National Committees, with the exception of Guatemala
- Training of private-sector plant engineers, delegates and assistants in energy auditing techniques in the five countries

However, subcontracting of project activities, such as audits, demonstrations, and promotion, has been negligible. Only some promotional activities, printing

of documents, and production of audio-visuals have been subcontracted.

In addition, the subcontract to Siboney for promotional activities is to be terminated, as ICAITI feels that it can do the job more efficiently. However, PEEIR still intends to use Siboney's services, but more as consultants than "general contractors." For example, PEEIR can save a substantial amount of money by contracting directly with printing shops, instead of using Siboney as an intermediary.

Finally, there is a general problem of competition between private-sector services and PEEIR services, especially in the area of energy audits. PEEIR sells its audits at a subsidized price of U.S. \$500-\$2,500, while the actual cost is \$8,000-\$8,500 on average. Private-sector consulting/engineering firms cannot sell audits for less than \$6,000.

Project Expenditures

The 1984 evaluation estimated 1985 expenditures at U.S. \$1.3 million. The latest ICAITI budget projection, as agreed by ROCAP, estimates expenditures close to this level.

- Cumulative ICAITI expenditures by December 31, 1985 will be around \$2.7 million, or half the project's total proposed funding. Because the project will be roughly half completed by then

expenditures are in line with original projections.

- Cumulative SIECA expenditures are likely to be around \$200,000, or 33 percent of the \$600,00 budgeted, which reflects the delays incurred in carrying out the work in 1983 and 1984.
- Except for ICAITI's demonstrations, achievements are in line with projections, with some activities -- like seminars and audits -- ahead of projections.

Technical Assistance

The 1984 evaluation recommended that (1) Georgia Tech's (GIT's) long-term advisor contract be extended to December 31, 1985 and (2) more consulting activities be subcontracted through GIT.

- The first recommendation has been implemented, but not the second, as ICAITI preferred to send engineers directly to the United States to attend specialized seminars and workshops rather than use GIT's services.
- As of December 31, 1985 there will be approximately \$90,000 remaining in the GIT contract to provide short-term technical assistance. GIT has recently submitted a proposal to ICAITI outlining possible support activities

for 1986, but ICAITI has not yet made a decision on the proposal.

- In 1985, Hagler, Bailly & Company was contracted by SIECA to (1) assist it in developing its 1985 work plan in January/February and (2) review its outputs and help it prepare its 1986 work plan. Hagler, Bailly has also been contracted to carry out this second evaluation.
- ICAITI is considering hiring the services of specialized firms or individual consultants on an ad-hoc basis for 1986 and 1987, e.g., waste heat recovery, refrigeration, and cogeneration.
- Total remaining funds for technical assistance will be around _____ as of December 31, 1985.

Likely Project Impact

The 1984 evaluation found that only one-third to one-half of the benefits originally expected in the Project Paper on energy savings were likely to be realized, because the assumptions on general economics and oil prices were far too optimistic about the likely future situation in Central America. The evaluation recommended that (1) the project focus its activities on large oil users (even if this meant altering the original project scope slightly) and (2) SIECA take an active role in disseminating information on existing

lines of credit and other available financing mechanisms.

- According to the follow up done by ICAITI on the implementation of energy saving measures identified in the audits, only a small fraction -- perhaps 20 percent -- of the expected savings has been realized.
- Plants to be audited have been selected thus far mainly on criteria other than oil consumption.
- Financing is mentioned by industry as the main obstacle to implementing audit recommendations.
- While not as large as originally expected, energy savings will still be sizable. For example, a brief analysis of audit follow up showed that about \$0.5-1 million is already being saved annually, mostly through implementation of low-cost measures. Indirect results from extensive participation in seminars and training course and from the promotional activities have probably led to similar savings. To date, it is estimated that about \$1.5 million in foreign exchange is being saved annually.

Summary of Draft 1986 Work Plan

The draft work plan was still in preparation at the time of the in-country visit. The major guidelines of

this plan, as available from a preliminary draft, are summarized below:

- 1986 will be a year of project reorientation, with a strong emphasis on decentralization.
- Improvements in the internal communications, planning process, and time management will be made.
- Energy audits (Level II) will remain a key project activity, and 35 are planned for 1986. Selection criteria will focus primarily on the magnitude of the potential savings.
- Four new engineers will be hired, plus an assistant for the promotion component.
- Improvements on audit follow up will be made, with allocation of a large amount of time for face-to-face discussion with plant management.
- Specialized technical seminars on refrigeration, waste heat recovery, electric demand management, application of energy and mass balances, alternative energy sources, and heat pumps will be held.
- With respect to promotional activity, a survey will be organized to select the high pay-off activities and concentrate the remaining and

decreasing financial resources on the most efficient ones.

CONCLUSIONS

The conclusions are summarized in two categories: achievements and remaining (or new) problems.

Major Achievements

- 1) The project has come a long way in the last 12 months, and is now almost in line with original Project Paper expectations.
- 2) Project organization, management staffing, industry programs and promotion activities are satisfactory.
- 3) The private sector praises the project for raising awareness about cost reduction and providing technical information, advice, and assistance.
- 4) The regional aspect of the project is one of its unique and best features. The project provides substantial economies of scale in all project areas (e.g., seminars, audits, training) and helps build a regional capability and philosophy that will be available for future activities.
- 5) The project is successful in selling its services to the private sector; income from these sales has

been growing and is expected to continue to grow over the next few years.

- 6) PEEIR will undoubtedly constitute a solid basis in the future -- and beyond its own expected life span-- from which to extend technical support to the small- and medium-sized private enterprises in the areas of general productivity, cost management, and quality control.
- 7) The project could break even by 1987, with the cumulative value of the estimated energy savings outweighing the cumulative project cost.

Remaining Problems

Under ICAITI Control

There are two major remaining problems:

- Insufficient participation of private-sector consulting/engineering firms in the project.
- Insufficient communications between (1) project management and staff and (2) project headquarters and National Committees.

Under SIECA control

- Industry's lack of knowledge about available financing for energy conservation projects.

- Insufficient collaboration with ICAITI and industry, although the situation is improving.

Other

- Only 20 percent of audit recommendations are being implemented, which will not allow the overall project cost/benefit ratio to come close to the original Project Paper expectations.
- Elections and a poor economic situation in all concerned countries are creating an unfavorable climate for investment in general and implementation of capital-intensive projects for energy conservation in particular.

RECOMMENDATIONS

The recommendations are presented below for the 10 basic categories as defined in the introduction, and deal only with activities not yet included in the draft 1986 workplan.

General

- The 1986 project focus should be on:

- a) Implementing audit recommendations and demonstrations, with adequate monitoring of actual energy savings.
- b) Decentralizing activities.
- c) Subcontracting activities to private sector firms.

Items a) and b) are partially discussed in the draft 1986 work plan, but there was no provision for item c).

Management

- Develop and implement a management system for ensuring effective and regular evaluation of staff performance (with adequate mechanisms to translate good evaluations into merit pay) and better information and communication within the project.
- Plan a mid-term, high-level internal evaluation of the project in the second quarter of 1986 to draw lessons from past experience, discuss future project orientation, and resolve outstanding issues of importance for long-term project success, e.g., a policy for pricing services provided to the private sector and for using the

resultant revenues. Delegates, chairman of National Committees and other officials should be invited to the evaluation in addition to project management. Substantial effort are needed including a major survey of project impact to be conducted during the first quarter of 1986.

- A simple, internal bimonthly newsletter to prepare for the evaluation, should be initiated to keep project staff informed about project-related activities.
- By mid-year, the project organization may be changed to create a high-level position for coordinating all implementation activities, including assistance to the private sector in financing and technical matters.
- PEEIR staff should get more involved in all implementation-related aspects of the project, including working more closely with SIECA to promote available financing mechanisms and suggesting policy initiatives to accelerate realization of energy savings.

Staffing

- Proceed with the hiring of four additional engineers to implement the decentralization plan.

Regional Links and Information Exchange

- Attempt reconciliation with Guatemala National Committee.

- ICAITI and ROCAP should discuss the best arrangement for promoting SIECA results on financing and policy initiatives in each country, since ICAITI/PEEIR already use a computerized mailing list for their own promotional activities.

Industry Programs

- Now that audits are routine, the audit coordinator should introduce higher standards and increase the audit scope to include more emphasis on process modifications and capital-intensive projects and, perhaps, more engineering.

- To implement the above recommendation, PEEIR/ICAITI should obtain short-term assistance and training by contracting foreign firms with proven track records in carrying out this type of audit (candidate firms in the United States include Arthur D. Little, Stanley Consultants, Foster Wheeler and Hagler, Bailly, all of which were awarded recent U.S. AID and World Bank contracts to carry out similar work).

- Develop a list of candidate plants for audits that will allow selection on the basis of magnitude of

potential oil savings, and include country lists in data base.

- Increase audits and seminar fees by 50 percent in early 1986 and by another 50 percent later in the year.

Training

- Training must be provided for everyone. Most engineers should be sent to the United States to attend conservation training courses and others to specialized seminars/courses/workshops.
- At least one engineer should attend the 1986 TVA training course on energy conservation.
- Develop training modules to effectively implement the previous recommendations.

Promotion and Field Extension

- The head of promotion should travel to the United States and other countries (e.g., England, France, Spain, and the Philippines) to benefit from international experience in promotional activities.

- Proceed with the survey to plan efficient use of remaining funds for promotional activities.

Data Base

- Contract a specialized consulting firm as soon as possible to accelerate information gathering and operation of the data base in covering international and regional equipment costs and performance. The contracted firm or individual could also assist in the other project components, such as the industry reporting system.
- The head of the data base component should attempt to initiate a regional network of specialists to share information on equipment suppliers, costs, and performance.

Financing and Policy Issues

- Develop a plan to monitor and use financial resources available from the sale of services to the private sector, including the possible use of these funds as seed money for national leasing/revolving funds to finance project implementation.

Private Sector Role

- Assign a minimum of 5 percent of the 1986 budget, or about \$80,000, for private-sector subcontractors to handle the engineering and installation of five demonstration projects.

Technical Assistance

- Ensure the availability of sufficient outside support by contracting technical assistance services (see Exhibit 2.a).

Likely Project Impact

- Increase project scope beyond original targets, to include any large energy user (except refineries and power plants) and buildings.
- For the 1986 audits, the cumulative oil consumption of the candidate plants should not be less than 70,000 tonnes, to ensure that identified savings are several times higher than corresponding project expenditures.

Exhibit 2.a

Proposed Technical Assistance 1986

GEORGIA TECH	Proposal task 1	17,500
	Proposal task 2	10,100
	Proposal task 3	12,020
	Proposal task 4	12,250
	Proposal task 5	18,300
	Proposal task 6	19,730
	<hr/>	
	Total Georgia Tech	89,900
HAGLER, BAILLY	Data base support = equipment & monitoring	20,000
	General management consulting, evaluation, and guidance	15,000
	<hr/>	
	Total Hagler, Bailly	35,000
OTHER	Audit, training, data base, implementation	20,000
	<hr/>	
	Total (rounded)	145,000
	<hr/> <hr/>	

Appendix A

LIST OF INTERVIEWS

A.1

- November 18 - Ing. Ludwig Ingram - Deputy Director
- ICAITI
- Ing. Rodolfo Espinosa - Project Director
- PEEIR/ICAITI
- Ing. Mark Oven - GIT/PEEIR
- November 19 - Ing. Rodolfo Espinosa
- Sr. David Chavez - ROCAP
- Ing. Mario Ortiz - Subgerente Industrial
- PEEIR
- Ing. William Flores - Banco de Datoes
- PEEIR
- Sr. Ed Nadeau, ROCAP
- November 20 - Ing. Lewis Chinchilla - Subgerente
Promocion - PEEIR
- Ing. Enrique Quintana - Comite
Nacional/Guatemala
- Sr. Ricardo Castillo - Ex Presidente,
Comite Nacional, Guatemala
- Sr. Alejandro Huart, Aceros del Sur
Guatemala
- Sr. Mario Santos - ICAITI
- Ing. William Flores - PEEIR
- Engineers, PEEIR
- November 21 - Ing. Felix del Barco - Delegado - Costa
Rica
- Ing. Jorge Blanco - Director, Direccion
Sectorial de Energia - San Jose, Costa
Rico

- Ing. Max Goberg, Presidente del Comite Nacional - Costa Rica
- Ing. Juan Manuel Perez - Gerente General - Lactareria
- Ing. Kare Allan Jensen - Gerente de Planta Plumrose/CODASA - San Jose, Costa Rica
- November 22
 - Ing. Jose Chacon, Director - Sol 2000 - San Jose, Costa Rico
 - Ing. Luis Arce - Assistant delegado - San Jose. Costa Rico
 - Ing. Jorge Blanco - Director/DSE. - San Jose, Costa Rico
 - Ing. Rodolfo Espinosa - PEEIR
 - Ing. William Flores - PEEIR
 - Sr. Ed Nadeau - ROCAP
 - Sr. Ron Bloom - ROCAP
 - Ing. Montenegro Castillo - Cervezeria Centro Americana
 - Ing. Mark Oven - GIT/PEEIR
- November 23
 - Sr. Jaime Gonzales - Salvador Delegate - Telephone Conversation
- November 24
 - Ing. Rodolfo Espinosa - PEEIR
 - Ing. Mark Oven - GIT/PEEIR