

4920281
PD-PMA-511
11/20/87

RMA/GOP - AR - 1

TECHNOLOGY TRANSFER FOR ENERGY MANAGEMENT

FIRST ANNUAL REPORT
(January - December 1987)

Prepared by

Resource Management Associates of Madison, Inc.
520 University Avenue
Madison, Wisconsin 53703

January 1988

RESOURCE MANAGEMENT ASSOCIATES

Suite 260, 520 University Avenue
Madison, Wisconsin 53703 U.S.A.
Telephone: (608) 255-9446
Telex: 469 453

Mr. Michael C. DeMetre
Project Officer
Office of Capital Development
U. S. Agency for International Development
Manila, Philippines

Dear Mr. DeMetre:

I am pleased to submit to you Resource Management Associates' First Annual Report of the Technology Transfer for Energy Management Project. This report is a deliverable under our Contract AID 492-0381-C-00-7002-00 dated December 17, 1986.

During this first year, a solid foundation has been laid for the implementation of project objectives. The Conditions Precedent have been met. The project is fully staffed with trained personnel. Most of the administrative procedures for the Demonstration Loan Fund have been developed, so that the first loans can be made in 1988, by which time the project will be fully operational.

We look forward to continuing to work with you and with the Office of Energy Affairs in this important project.

Sincerely,



Dr. Wesley K. Foell
President



Mark E. Hanson
Home Office Manager

cc: Office of Energy Affairs, Government of the Philippines
Marilyn B. Buchan, Contracting Officer, USAID/Philippines

TABLE OF CONTENTS

	<u>Page</u>
HIGHLIGHTS OF THE FIRST YEAR	1
I. PROJECT OVERVIEW	3
II. MAJOR ACCOMPLISHMENTS	5
A. Conditions Precedent	5
B. Project Staffing	5
C. Training	6
D. Preparation for Demonstration Loan Fund	9
E. Equipment Purchases11
III. FIRST YEAR PROGRESS COMPARED TO INITIAL PROJECT SCHEDULE12
IV. MAJOR ACTIVITIES PLANNED FOR SECOND YEAR (1988)14
A. Inauquration of Demonstration Loan Fund14
B. Training in the United States14
C. Additional Equipment Purchases15

APPENDICES

- A. Project Staff in Manila
- B. Project Outreach and Information Dissemination
- C. Commodity Procurements
- D. RMA Short-Term Consultant Trips

TECHNOLOGY TRANSFER FOR ENERGY MANAGEMENT
HIGHLIGHTS OF THE FIRST YEAR

The TTEM Project made significant accomplishments and was on schedule in its first year of implementation. Major highlights are presented below.

A. Conditions Precedent: All Conditions Precedent have been satisfied, allowing disbursements to be made from USAID to the Demonstration Loan Fund (DLF).

B. Project Staffing: All staff positions are now filled, and staff are performing their project functions.

- RMA Contract with USAID signed December 17, 1986

- RMA Resident Consultant started in Manila on February 23, 1987

- OEA Project Staff began work during February-July, 1987

- Project Director and Senior Staff hired November, 1987

C. Training: Philippine Project staff and other professionals have received training in technologies and analytical methods.

- Six short-term consultant trips totaling eighty-six working days in the Philippines

- In-house lectures on thirteen topics totaling seventy-two hours

- Eight UP-NEC training courses totaling two hundred hours

- DLF Technologies included in the RMA Consultant's Public Seminars were waste heat recovery and combustion controls.

D. Demonstration Loan Fund Preparatory Work: Foundation activities were completed for the DLF to begin in early 1988.

- Planning meeting with participant groups

- Study on financial competitiveness

- Selection and delineation of target technologies

- DLF Policy Manual revised in final form

- Publication of brochures and application forms

- Design of evaluation procedures

- Development of loan procedures and tentative scheduling of application dates and loan amounts over the entire project life
- Contact with over five hundred potential DLF participants through letters, presentations, exhibits, and site visits
- Design and related training in industrial database/model to help in targetting technologies and firms

E. Equipment Purchases: Essential equipment has been purchased to perform project activities.

- Project vehicle
- Energy audit instruments
- Microcomputers
- Reference books and journals

TECHNOLOGY TRANSFER FOR ENERGY MANAGEMENT PROJECT

First Annual Report
(January - December 1987)

I. PROJECT OVERVIEW

The goal of the Technology Transfer for Energy Management (TTEM) Project is to accelerate the implementation of energy conservation technologies in Philippine industrial plants and commercial buildings through a program of technical assistance and technology demonstrations. The two major components of the TTEM Project are:

- Technical assistance, provided by U.S. and local consultants as well as the TTEM project staff, which includes evaluation of technology applications, training, and information dissemination, and consultative services in design, construction administration, operation and evaluation.
- Technology demonstrations, partly funded by the Demonstration Loan Fund, which will help to overcome the barriers to the adoption of technologies that are commercially available and widely applied elsewhere but have not yet found significant application in the Philippines. Demonstrations must be economically justifiable and realistically applied with a high degree of replicability, thus offering a large national impact on energy efficiency.

The TTEM project is supported by a \$5 million grant from the United States Agency for International Development (USAID), in accordance with a Project Agreement dated May 31, 1985, as amended on August 30, 1986. The host country implementing organization is the Office of Energy Affairs (OEA) of the Office of the President. The technical assistance contractor is Resource Management Associates (RMA) of Madison, Wisconsin, under a USAID direct contract dated December 17, 1986.

This First Annual Report on the project, a deliverable under the RMA contract, covers the first year of project operation, January through December 1987.

II. MAJOR ACCOMPLISHMENTS

A. Conditions Precedent

All Conditions Precedent have been satisfied, allowing disbursements to be made from USAID to the Demonstration Loan Fund.

Although materials in response to the Conditions Precedent (CP) had been submitted in late 1986 by the Office of Energy Affairs, certain of these were found by USAID to be deficient. USAID granted an extension of the CP deadline until December 27, 1987. After the hiring of the Project Director, OEA submitted the names of the Project Selection Committee. OEA also revised the Demonstration Loan Fund Policy Manual as required by USAID, with the approval of the Steering Committee. On December 11, 1987, Mission Director Schieck notified the National Economic and Development Authority that the Conditions Precedent were satisfied.

B. Project Staffing

All staff positions are now filled, and personnel are performing their project functions.

RMA Resident Consultant, Dr. Allan Evans, began work in Manila on February 23, 1987. Prior to departure from the United States, he met with RMA Home Office staff and other consultants to plan initial technical assistance activities.

The OEA professional and support staff for the TTEM Project began work at various times during the period of February 23 through July 1, 1987. The Project involves extensive and continuing collaboration of additional staff members of the Conservation Division, notably the Foreign Assistance Project Coordinator, Mr. Jesus Anunciacion; the Project Coordinator, Ms. Esther Pura; and the Technical Coordinator, Mr. Charlie Ouirante. The full-time OEA/TTEM staff, all hired under contract to OEA, consists of four engineers, two information officers, a draftsman, and two clerical staff. (See Appendix A)

The Senior Staff, consisting of the Project Director, Mr. C. Cirilo Jayco; two Senior Project Officers, Mr. Ernesto Pambid and Mr. Marcial Semira; and the Senior Financial Analyst, Mr. Jose Garcia, were hired in

November 1987. After consideration of various alternatives for contracting these personnel, OEA chose to hire them individually as host-country Personal Services Contractors, with salaries paid directly by USAID. Price Waterhouse was selected by competitive bid and subcontracted by RMA to handle all administrative tasks for recruiting the Senior Staff. Over three hundred applicants responded to the newspaper advertisements for these positions, and at least one tenth of these were interviewed by the subcontractor prior to their submission of candidate short lists. OEA, assisted by the Resident Consultant, interviewed thirteen candidates, including at least three candidates for each of the four positions. Both draft and final contracts for each position were approved by USAID.

The project staff are located at the TTEM Project Office in the OEA Building (formerly Ministry of Energy Building) at Fort Bonifacio, Makati, Metro Manila.

C. Training

Project staff and other professionals have received training in technologies and analytical methods.

Six RMA short-term consultant trips, totaling eighty-six working days in the Philippines, have provided on-the-job training to project staff and other professionals as well as assistance in completing other project tasks.

Table 1 - Consultant Training

<u>Consultant</u>	<u>Working Days</u>	<u>Topic</u>
Charles Fafard	11	Project planning, technical information
Robert Lopez	13	Data base development and computer training
Michael Roelofs	19	DLF selection criteria, forms, and procedures for application and evaluation
Malcolm Lindsay	15	Data base/modeling
William Liegois	14	Waste heat technologies
Steven Warner	14	Combustion control technologies

Each consultant trip included in-house seminars and working discussions. During the Liegois/Warner trips, additional seminars were presented in collaboration with the National Engineering Center of the University of the Philippines (UP-NEC) and with the Energy Management Association of the Philippines (ENMAP).

Seminars for OEA personnel were presented by the RMA Resident Consultant, short-term consultants and other professionals on thirteen topics covering a total of seventy-four hours as shown in Table 2.

Table 2 - Seminars for OEA Personnel

<u>Seminar Topic</u>	<u>Presenter</u>	<u>Duration</u>
Engineering economics/financial evaluation	Allan Evans (RMA)	10 hours
Banking and project finance	Price Waterhouse	5 hours
Microcomputer software packages	Electroworld	10 hours
BASIC programming language	Allan Evans (RMA)	12 hours
Harvard Total Project Manager	Esther Pura (OEA)	4 hours
Project planning and evaluation	Charles Fafard (RMA)	3 hours
Data base development	Robert Lopez (RMA)	4 hours
Selection criteria and application procedure	Michael Roelofs (RMA)	2 hours
Steam system fundamentals	Jean Fule (Steam Systems, Inc.)	3 hours
Energy case studies	Prof. M. Lopez (Asian Institute of Management)	6 hours
Modeling national conservation impacts	Malcolm Lindsay (RMA)	2 hours
Electronic control systems	Foxboro, Inc.	2 hours
Energy conservation in building design	Ed Yco (Parsons International, Inc.)	2 hours
Waste heat, combustion control project evaluation	William Liegois/ Steven Warner (Stanley Consultants, Inc.)	9 hours

OEA/TTEM staff attended six training seminars at the National Engineering Center of the University of the Philippines (UP-NEC), in most cases with course fees paid by the TTEM project through RMA. (See Table 3)

Table 3 - UP-NEC Training Seminars

<u>Course Attended</u>	<u>TTEM-Staff Attendees</u>	<u>Duration</u>
Basic Energy Management Training Course	Maximino Marquez Jaime Roa	40 hours
Preventive Maintenance of Motors and Electrical Equipment	Eduardo Fernandez Maximino Marquez	24 hours
Reliability: A Tool for Efficient Plant and Facility Engineers and Management	Ruth Dellota San Diego Eduardo Fernandez Jaime Roa	36 hours
Industrial Process Controls	Ruth Dellota San Diego Eduardo Fernandez Maximino Marquez	
Efficient Boiler Operation	Jaime Roa Maximino Marquez Eduardo Fernandez	24 hours
Design, Efficient Operation and Maintenance of Airconditioning and Refrigeration Systems	Maximino Marquez	30 hours

TTEM staff attending each course individually prepared reports summarizing what they had learned from this training.

Additional training was provided by RMA short-term consultants in two eight-hour seminars at UP-NEC for potential project participants and other professionals:

<u>Title</u>	<u>Date</u>	<u>Attendance</u>
Waste Heat Recovery	Nov. 24	36
Combustion Monitoring and Control	Nov. 25	32

Finally, the RMA Home Office is preparing Technical Information Notebooks of relevant articles, data, and manufacturer's brochures on U.S. energy conservation equipment for the TTEM staff and other interested professionals. Technical Information Notebooks on waste heat recovery, cogeneration and combustion controls have been completed (see Appendix B), while notebooks on building energy management, lighting and steam system improvement are being developed for delivery in early 1988.

D. Preparation for the Demonstration Loan Fund

Foundation activities were completed for the Demonstration Loan Fund to begin in early 1988.

A planning meeting held in collaboration with Energy Managers of the Philippines (ENMAP) (under RMA subcontract) in April 1987 re-introduced the project to potential participants and discussed key issues relating to its implementation. ENMAP had been contracted in 1985 by USAID/Manila to organize a meeting to introduce the project after the TTEM Project Agreement was signed. However, the project did not proceed until after the amendment to the Project Agreement converted all the USAID funding into a grant. This second ENMAP meeting in April 1987 came shortly after the arrival of the Resident Consultant in Manila. It was attended by thirty-eight participants, with working groups on financing, selection criteria, technical assistance, technical studies and training, and information dissemination.

A two-week mission in May by Mr. Charles Fafard, RMA Director of Engineering, focused on initial technology evaluation and selection, and meeting with potential applicant firms. Mr. Fafard met with the TTEM staff, industry, university and government representatives, and with professional consultants to identify the most appropriate technologies for the project, and to ascertain current interest levels in these technologies and the TTEM Project.

The financial competitiveness of the DLF in comparison with other government and private programs in the Philippines was examined by Price Waterhouse (Philippines), under RMA subcontract. They concluded that the DLF can be attractive to potential participants in the present financial climate. Their study report of August 17, 1987 also offers recommendations

for DLF implementation.

Procedures and scheduling to be used in DLF implementation were developed in detail as a result of the advisory mission in August of RMA consultant, Mr. Michael Roelofs. Mr. Roelofs brought an experience of several years in developing and implementing energy conservation loan and grant programs in the State of Minnesota. The consultant assisted OEA/TTEM staff in drafting the DLF application forms and brochures, developing selection criteria and outlining a schedule of activities for application evaluation and funding. Following from this work, OEA printed the application form and published brochures announcing the DLF to potential applicants and to banks.

The development of databases and analytical methods for estimating the national impacts of the energy conservation technologies to be demonstrated by the TTEM Project was initiated in May by the mission of RMA consultant Mr. Robert Lopez. That work and recommendations were followed up with the assistance of RMA Senior Economist, Dr. Malcolm Lindsay, in September and October. A computer spreadsheet model was established to examine potential conservation impacts of technologies and thus serve in the evaluation of applications for the DLF.

Through letters, presentations, exhibits, site visits, and office discussions, the TTEM project staff have made contact with over five hundred potential DLF participants. The project was displayed at four exhibitions, and the Resident Consultant gave twelve presentations to various professional societies (see Appendix B). The OEA/TTEM project staff is maintaining a list of potential participants, local vendors, and local consultants interested in the project.

In collaboration with the U.S. Embassy Foreign Commercial Service, preliminary plans were made for an Energy Conservation Exposition (ECONEX 88) in Manila in March 1988. Regrettably, the anticipated level of U.S. exhibitor participation did not warrant pursuing the plan at this time. However, the State of California has expressed interest in a more limited trade mission to Manila in 1988, and we are continuing to consider an exposition of US and local equipment suppliers later in 1988.

E. Equipment Purchases

Essential equipment has been purchased for initiation of project activities.

Equipment which has been purchased for the project includes a van, energy audit instruments, two microcomputer systems with software, reference books and journals, and other office equipment. These items are all in the possession of the OEA and are located at the OEA/TTEM Project Office. A detailed listing of the commodities procured can be found in Appendix C.

III. FIRST YEAR PROGRESS COMPARED TO INITIAL PROJECT SCHEDULE

It is useful to compare the project's first year progress with what was projected before the project began. Although some of these items have been discussed in other sections of this report, this section brings them together as they were identified in RMA's proposal to USAID. The following major milestones and project elements were identified for the first year:

- hire and begin training of TTEM staff
- prepare detailed work plan
- prepare a loan fund policy manual with the Central Bank
- purchase initial equipment, including computer hardware and software
- install computer equipment and train TTEM staff in its use
- select and define role of advisory panels
- conduct broad-based training, including Philippine architectural and engineering firms
- prepare energy database
- establish working linkages with key Philippine institutions, such as the National Engineering Center
- finalize application guidelines
- identify potential Round 1 demonstration projects
- select and begin Round 1 demonstration projects

Many of these milestones have been achieved in the ten months since Dr. Evans' arrival in Manila as RMA Resident Consultant for the project. The computer hardware and software have been purchased and the TTEM staff trained in their use. Auditing equipment and technical books and journals have been purchased and are in daily use. A project van has been purchased and delivered. Working relationships have been set up with many Philippine institutions, including the UP National Engineering Center, ENMAP and the Banker's Association of the Philippines.

In the area of energy database development, substantial progress has been made. An initial short-term U.S. consultant trip was made to organize and identify the data sources. A followup trip resulted in implementation of a computer spreadsheet model/database which will be used to examine the

potential conservation impacts at the national level of the TTEM target technologies. This model/database will be used in evaluating and selecting technologies and applications for the demonstration projects.

Progress has also been made towards selection of Round 1 demonstration projects. The list of technologies to be targetted by the program has been refined to reflect a collaborative judgement of appropriate technologies in terms of being new to the Philippines, providing large cost savings, and providing widespread opportunities for replication. The Loan Fund Policy Manual and the Loan Fund Implementation Fund had already been prepared by OEA as part of the Conditions Precedent. RMA's role was to assist OEA in satisfying AID concerns. The loan fund application procedures have been established, the evaluation process detailed, and brochures and application forms printed. Actual deadlines and interest rates for demonstration projects await setting and approval by the Steering Committee. A meeting of the Steering Committee to decide these issues is scheduled for late January.

A substantial amount of training for the TTEM staff has also taken place. They have had training in financial and economic evaluation of projects, detailed technical training on waste heat recovery and combustion controls and on computer systems and applications. Some of the staff have also taken courses at UP-NEC which complement the work they will be doing in the TTEM project.

IV. MAJOR ACTIVITIES PLANNED FOR SECOND YEAR (1988)

A. Inauquration of the Demonstration Loan Fund

Readiness to accept applications for the first round of the loan fund's operation will be announced early in 1988. It is anticipated that projects will be selected in the period from April through June, 1988. Applications for the second round will be due approximately six months later, and thereafter annually. Thus, there will be two rounds of project submittals anticipated in 1988, with a goal of selection of at least one project in each technology at the conclusion of each round. The target funding for each round will be set by the Steering Committee in its January meeting.

Additional technical assistance and training in the technologies will be provided by RMA short-term consultants. Assistance will also be provided in the project design, feasibility studies and evaluation phases of the DLF application process. Specifically, likely tasks for which consultants will be provided are:

- application and project design consultation to applicants
- evaluation support to TTEM
- construction administration consultation
- initial operation consultation
- design and implementation of monitoring systems
- establishment of promotional programs
- evaluation of monitored results

B. Training in the United States

The first training trips for the TTEM staff will occur in 1988. A typical trip will be one month in duration, consisting of participation in a specialized course; attendance at a professional meeting, preferably also with a major equipment exhibition; up to one week of work experience in an office doing work similar to that required for TTEM; and a brief but well-orchestrated tour of significant conservation equipment installations in the U.S..

C. Additional Equipment Purchases

In 1988 the project is expected to require additional energy audit instruments, microcomputers, computer accessories, as well as various other office equipment. All of these are within the overall project budget.

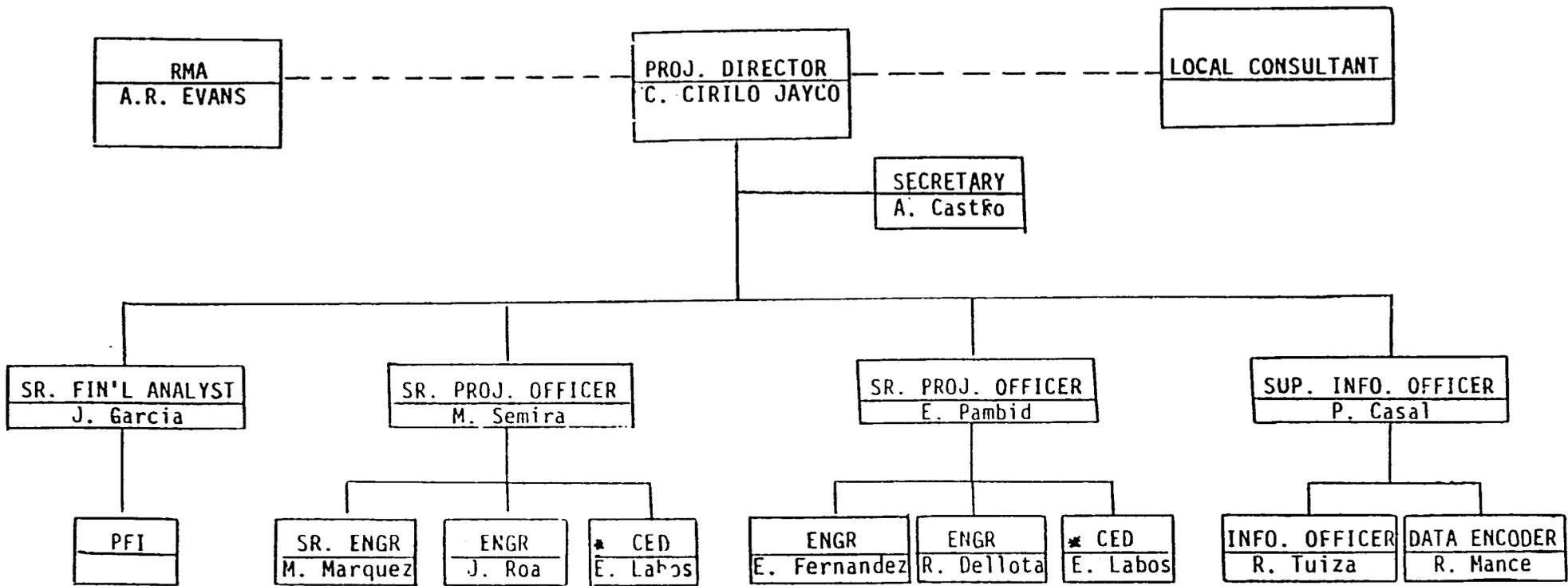
APPENDIX A: Project Staff in Manila

OEA Conservation Division

Charisse B. Tablante	Officer-in-Charge, Conservation Division
C. Cirilo Jayco, Jr.	Project Director
Ernesto Pambid	Senior Project Officer
Marcial Semira	Senior Project Officer
Jose Garcia	Senior Financial Analyst
Maximino Marquez	Senior Mechanical/Electrical Engineer
Ruth Dellota San Diego	Chemical Engineer
Eduardo Fernandez	Mechanical Engineer
Jaime Roa	Civil Engineer
Maria Patria Casal	Supervisory Information Officer
Rowena Tuiza	Information Officer
Edgar Labos	Draftsman
Antonina Castro	Clerk/Secretary
Remely Mance	Clerk/Data Encoder
Jesus Anunciacion	Foreign Assistance Project Coordinator
Esther Pura	TTEM Project Coordinator
Charlie Quirante	TTEM Technical Coordinator

RMA

Allan R. Evans	RMA Resident Consultant
----------------	-------------------------



NOTES:

* SAME PERSON.

THIS ORGANIZATIONAL CHART DEFINES THE WORKING RELATIONSHIP AND REPORTING SYSTEM ONLY

APPENDIX B: Project Outreach and Information Dissemination

Exhibits

- Department of Energy, Environment, and Natural Resources Anniversary Exhibition, Quezon City, May 15-17.
- Metal Wood 87, Second International Metalworking and Woodworking Equipment Show, Philcite, Sept 22-26.
- OEA/NCRD Conference on Nonconventional Energy Technologies, Manila Hilton, Sept 29-30.
- ENMAP Annual Meeting, Manila Garden, December 1-4.

Presentations by Resident Consultant

- ENMAP Quarterly Meeting, March 14
- TTEM Working Group Meeting (with ENMAP), April 10
- Philippine Chamber of Commerce and Industry, Committee on Industry, April 23
- UP-NEC Basic Energy Management Training Course, May 4
- OEA/Nonconventional Resources Division, May 8
- Philippine Society of Mechanical Engineers, May 30
- OEA/Nonconventional Energy Resources Division, Implementor's Meeting, July 23
- UP-NEC, Technology and Risk Assessment and Management Program, July 25
Manila Stanford Club, August 26
- OEA/Conference on Nonconventional Energy Technologies, Sept 30
- UP-NEC/UNIDO Course on Powerplant Design, Operation, and Maintenance, November 20 (with William Liegois)
- ENMAP Annual Meeting, December 1-4

RMA and Contractor Reports

- A. RMA Monthly Project Reports
- B. RMA Trip Reports - Series RMA/GOP-TD
 1. "Technology Transfer for Energy Management Project Demonstration Loan Fund," Fafard trip report, RMA/GOP-TD-1, June 29.
 2. "Industrial Sector Energy Use Data Consolidation and Analysis," Lopez trip report, RMA/GOP-TD-2, July 10.
 3. "Technology Transfer for Energy Management Project Demonstration Loan Fund," Roelofs trip report, RMA/GOP-TD-3, September 30.
 4. "Industrial Energy Use and Targets: Analysis and Modelling," Lindsay trip report, RMA/GOP-TD-4, November 4.
- C. RMA Technical Information Notebooks - Series RMA/GOP-TIN
 1. "Heat Exchangers/Heat Recovery - Manufacturer's Information", October 27, 1987, Report RMA/GOP-TIN-1A.
 2. "Heat Exchange/Heat Recovery - Manufacturer's Information Diversified Industrial Products, Inc.", October 27, 1987, Report RMA/GOP-TIN-1B.
 3. "Heat Exchange/Heat Recovery - Manufacturer's Information Des Champs Laboratories, Inc.", October 27, 1987, Report RMA/GOP-TIN-1C.
 4. "Heat Exchange/Heat Recovery - Manufacturer's Information General Resources Corporation", October 27, 1987, Report RMA/GOP-TIN-1D.

5. "Heat Exchangers/Heat Recovery - Journal Articles", November 13, 1987, Report RMA/GOP-TIN-1E.
 6. "Heat Exchangers/Heat Recovery - Manufacturer's Information Exothermics-Eclipse, Inc.", December 9, 1987, Report RMA/GOP-TIN-1F.
 7. "Combustion Controls - Manufacturer's Information", December 9, 1987, Report RMA/GOP-TIN-2A.
 8. "Combustion Controls - Journal Articles", December 18, 1987, Report RMA/GOP-TIN-2B.
- D. Price Waterhouse Work Order Reports (under subcontract to RMA)
1. TTEM Senior Staffing Options, July 22.
 2. Study of Proposed Lending Policy to Govern the TTEM-Demonstration Loan Fund and lecture series on these issues, August 17.

APPENDIX C: Commodity Procurements

A. Project Vehicle

1. 1987 Dodge B-150 Van
2. Rustproofing
3. (5) Air Filters
4. (5) Oil Filters

B. Energy Audit Equipment

1. (2) Volt/Ohm Amp Meter
2. (2) Gas Burner Kit
3. (4) Cartons CO2 Fluid
4. (4) Cartons O2 Fluid
5. (5) Cartons CO Tubes
6. (2) Sling Psychrometer
7. (1) Watt Probe
8. (200 ft.) Tcouple Wire Type K14 Gauge
9. (200 ft.) Tcouple Wire Type K16 Gauge
10. (2) Fuse
11. (2) Probe
12. (1) Non-Contact Infrared Thermometer
13. (2) Interchangeable Jaw
14. (2) Alligator Clip Probe
15. (8) Thermometer
16. (2) Fused Probe
17. (8) Wick Replacement Kit
18. (1) Velometer
19. (2) Multi-Purpose Pyrometer
20. (1) Duplex Kit - Gas Analyzer
21. Industrial Safety Equipment

C. Microcomputers and Accessories

1. (2) IBM PC-Compatibles
2. (2) Canon Printers
3. Diskettes
4. Computer paper
5. Outlet strips

D. Technical Reference Books

1. HVAC Controls for Energy Conservation
2. Cogeneration, Fuels and Combustion
3. Energy Performance Analysis and Calculations
4. Thermal Storage
5. ASHRAE Handbook -- HVAC Systems and Applications
6. Energy Recovery Equipment and Systems Air-to-Air, Sheet Metal and Air Conditioning Contractors' National Association Brochure
7. Water Manual for Boiler Operation
8. Steam Efficiency Improvement
9. Energy Economics and Technology
10. Energy Management and Control Systems Handbook
11. Compressed Air Systems
12. ASHRAE Handbook: 1985 Fundamentals
13. Advanced Technologies: Improving Industrial Efficiency
14. Energy Engineering
15. The Cogeneration Sourcebook
16. Efficient Boiler Operations Sourcebook

17. Handbook of Energy Systems Engineering: Production and Utilization
18. Managerial Finance
19. 1987 Service Manual for Rear Wheel Drive Van
20. Pacific Gas & Electric Notes
21. Practical Process Engineering: A Working Approach to Plant Design
22. Control Systems for Air Conditioning and Refrigeration
23. Heating, Ventilating, and Air Conditioning: Design for Building Construction
24. Industrial Process Control Systems
25. Power Generation Calculations Reference Guide
26. The Energy Management Systems Sourcebook
27. (19) Useful Tables for Engineers and Steam Users
28. Strategies for Energy Efficient Plants and Intelligent Buildings
29. Boiler Water Requirements and Associated Steam Purity for Commercial Boilers
30. Boiler Water Limits and Steam Purity Recommendations for Watertube Boilers
31. Guidelines for Industrial Boiler Performance Improvement
32. Thermal Shock Damage to Hot Water Boilers
33. Heat and Power Industry Brochure
34. Miscellaneous computer reference books
35. Miscellaneous technical reference books

E. Journals

1. Energy - The International Journal
2. Energy Systems and Policy
3. Energy Engineering
4. The Journal of Energy and Development
5. Energy Journal
6. Alternative Sources of Energy
7. Energy User News
8. Computer Magazine
9. Association of Energy Engineers (Included subscriptions to Strategic Planning and Management)

F. Other Office Equipment

1. Air Conditioner
2. Electrical hardware
3. Fans

APPENDIX D: RMA Short-Term Consultant Trips

The following RMA short-term consultant trips took place in the first year of the project.

1. Consultant: Mr. Charles Fafard
Dates: May 11-26
Trip Objectives: The broad objective was to meet with TTEM staff, industry, university and government representatives and with professional consultants to identify the most appropriate technologies for the project, and to ascertain current interest levels in these technologies and the TTEM project.
2. Consultant: Mr. Robert Lopez
Dates: May 11-26
Trip Objectives: The major objective was to work with the TTEM staff to identify, locate and structure data on industrial energy utilization for use in evaluating conservation impacts and replicability of the DLF technologies. A secondary objective was to provide training for the TTEM staff in computer and database skills.
3. Consultant: Mr. Michael Roelofs
Dates: August 9 - September 4
Trip Objectives: The primary objectives were to finalize the DLF application procedure and form, selection criteria, and publicity materials for applicants and participating financial institutions, and to establish a timetable for TTEM activities over the next twelve months.
4. Consultant: Dr. Malcolm Lindsay
Dates: September 28 - October 10
Trip Objectives: Objectives for Dr. Lindsay's work included development and implementation of a computer model to quantify potential conservation impacts of the technologies, and training the TTEM staff in its use.
5. Consultant: Mr. William Liegois
Dates: November 14 - December 4
Trip Objectives: The primary objective for this trip was training for the TTEM staff in waste heat recovery techniques (one of the Demonstration Loan Fund (DLF) technologies). Secondary objectives included publicizing the TTEM program at the annual ENMAP meeting, and conducting training in this technology for potential applicants.
6. Consultant: Mr. Steven Warner
Dates: November 14 - December 4
Trip Objectives: Scheduled concurrently with Mr. Liegois' trip, Mr. Warner provided training for the TTEM staff in combustion control techniques and in the evaluation of Demonstration Loan Fund proposals in this technology.