

PD-ABE-508  
78418

RMA/GOT-QR-11 (12-85)

**TUNISIAN ENERGY PLANNING PROJECT  
ELEVENTH QUARTERLY REPORT**

December 31, 1985

prepared for:

Republic of Tunisia  
Ministry of National Economy

prepared by:

**RESOURCE MANAGEMENT ASSOCIATES OF MADISON, INC.**  
520 University Avenue  
Madison, Wisconsin 53703  
USA

Submitted by: Wesley K. Foell, President

18

## Table of Contents

1.	Summary of Quarterly Activity	
1.1	Technical Highlights . . . . .	1
1.2	Management Overview . . . . .	2
2.	Project Background and Objectives . . . . .	3
3.	Technical Status	
3.1	Task A - Renewable Energy Technology . . . . .	4
3.2	Task B - Energy Consumption Data and Sectoral Analysis . . . . .	6
3.3	Task C - Energy Demand Forecasting . . . . .	8
3.4	Task D - Conservation Actions (Maitrise de L'Energie) . . . . .	9
3.5	Tunisian Staff Training in the United States . . . . .	11
4.	Level of Effort and Financial Expenditures	
4.1	Direct Effort . . . . .	12
4.2	Financial Expenditures . . . . .	12
5.	Distribution List . . . . .	13



Tunisian Energy Planning Project  
Quarterly Report - December 1985

1. Summary of Quarterly Activity

1.1 Technical Highlights

This eleventh Quarterly Report covers the period from September 1 through November 30, 1985. It summarizes project objectives, accomplishments, and plans for the next quarter.

Short-term advisor trips completed during the quarter were as follows:

\*Hotel Solar Water Heating Demonstration Project - RMA advisors Messrs. Cautley and Caloger, in Tunis between September 2 - 14, reviewed SEREPT Energies Nouvelles (SEN) studies for installing solar energy demonstration projects at three hotels. The advisors' work included participation in a planning session with SME and SEN to discuss presentations to the hotels and subsequent steps to complete the project. The advisors' report (RMA/GOT-TD-34), delivered to SME on October 14, included suggested methods and equipment for monitoring system performance.

\*Hotel Energy Audit Presentations - Mr. C. Fafard was in Tunisia from September 2-13 to assist SME with audit report presentations at two hotels: Sahara Palace at Nefta and Dar Jerba at Jerba. Prior to the presentations, Mr. Fafard reviewed and discussed the audit findings and recommendations with SME personnel. The report (RMA/GOT-TD-35) of these activities was delivered to SME on October 16.

\*Analysis and Forecasting of Industrial and Tertiary Sectors' Energy Use - Models of the Tunisian industrial and tertiary sectors' energy use were set up with SME microcomputers by RMA advisors working collaboratively with SME staff. Working on the industrial sector, Dr. A. Trevino was in Tunis from October 13 to November 1. Mr. Schoengold, who worked on the tertiary sector, was in Tunis from November 11 - 22.

Applications of the models were demonstrated and documented to enhance SME's capacity to analyze and forecast energy use under alternative scenarios.

\*Energy Management Training Program - A program for industrial energy managers and SME staff was conducted from October 21 - November 2. Personnel from SME, CIOK, STIL, STIR, and STEG participated in the program which comprised a seminar series in Madison, Wisconsin, and inspections of plants in the areas of specific concern to the participants. RMA consultants with previous experience in Tunisia presented the seminars.

## 1.2 Management Overview

In Madison, Wisconsin, from October 20-24, Mr. Ounali reviewed and planned project activities with Dr. Foell.

As a result of changes in plans for solar demonstration projects, AID approved contract Amendment Number 4 subject to reductions in the estimated budget for U.S. equipment. RMA now estimates the cost of U.S. equipment for monitoring solar system performance at two sites to be \$10,000. The estimated budget for additional equipment for energy audit work was also reduced, from \$12,000 to \$3,000. A letter from the AID Director requesting Mr. Rabah's signature for MEN approval of these revisions was in his hands at the end of the Quarter.

AID completed review of the RMA "Proposal on Project Extension" in October and in early November discussed questions of project extension with M. Nouri-Ammar, PDG of the Societe de Maitrise de l'Energie (SME). A six-month extension of the project assistance completion date (PACD) and of the RMA contract expiration date was requested by MEN in late November. A Project Implementation Letter (No. 3), approving an unfunded extension of the PACD was drafted by Mr. Karns (AID) for signature by the Director of AID and GOT.

Amendment Number 5 to the RMA/MEN contract to extend its date of expiration from December 31, 1985 to June 30, 1986, and correspondingly,

prolong the term of the resident advisor, was drafted by RMA and reviewed by the AID regional legal advisor at the end of November.

The direct effort charged this quarter was that of the resident advisor, the short-term advisor trips for work noted in Section 1.1, and SME staff and industrial energy managers participating in the energy management training program in the U.S. The amount remaining in the project budget at the end of this quarter was approximately \$200,000. RMA invoices for September, October, and November are summarized in Section 4 of this report.

## 2. Project Background and Objectives

The Government of Tunisia, recognizing the need for a comprehensive policy that addressed all aspects of the energy problem, has undertaken a broad-based program to enhance its capability to conduct energy policy and planning. This program includes the development of an improved data and information base, an increased analytical capability, and an enlarged cadre of trained and experienced professionals for carrying out the requisite policy.

As indicated in the USAID Project Agreement and the RMA contract, the project reported here assists the Government of Tunisia in the following areas of need:

- \* General energy analysis, planning, and policy formulation;
- \* Collection of end-use data in the residential and tertiary (commercial/institutional) sectors; and detailed audits of buildings;
- \* Field testing and assessment of renewable energy technologies; and
- \* Institutional development through staff training in energy analysis, planning policy formulation, and relevant program implementation.

The contract between Resource Management Associates of Madison, Inc. (RMA), and the Republic of Tunisia, represented by the Ministry of National Economy (MEN), was effective 14 January 1983. The Project Commencement Date was 7 March 1983, when the Long-Term Resident Advisory began work in Tunis. The original contract duration was 30 months. This RMA effort is funded through USAID Project No. 664-0326. The contract amendment for the agricultural sector study was funded from the remainder of the now-terminated Ferguson-Bryan contract, supported under the AID/ST/EY centrally-funded Energy Planning Project (36-5703), which expired 30 April, 1984.

This eleventh Quarterly report covers the period through November 30, 1985. The financial data summarized the RMA invoices for September, October, and November.

### 3. Technical Status

#### 3.1 Task A - Renewable Energy Technology

3.1.1 Objectives: This task assists the Government of Tunisia in the development of methods and data for evaluating the technical performance and cost effectiveness of renewable energy systems in Tunisia, specifically solar water heating and wind energy systems. The task emphasizes assessment of potential applications and impacts of the system, including substitution for other energy forms, potential market penetration, and industrial development, to provide information to guide future programs and policies for the implementation of systems, such as testing and certification, performance guarantees, or financial incentives. Demonstrations of solar water heating systems in commercial and institutional buildings will provide realistic experience with system design, installation, and operation. This experience and additional training will also help develop the technical skills of Tunisian staff and other capabilities of the Tunisian solar industry.

3.1.2 Accomplishments: Messrs. Cautley and Caloger, in Tunis between September 2-14, reviewed SEREPT Energies Nouvelles (SEN) studies for using Solar Energy at three hotels, (Sultan at Hammamet, Sahara Beach at Monastir and El Kanta at Sousse). The SEN studies showed their costs of fabricating and installing systems to be much lower than the estimated costs used in Cautley's April study (RMA/GOT-TD-26). Another major difference was that the SEN studies, while considering a range of system sizes, focused on systems larger than those previously considered. SEN indicated that the hotels involved would prefer systems designed to supply more than half the energy required to meet their water heating needs. SEN's explanation of their significantly lower payback periods also shed light on tax provisions and financing possibilities that make solar water heating systems more cost effective than was previously projected. After discussing technical and economic aspects of the SEN studies, the advisors met with M. Nouri-Ammar and attended a meeting with the SME PDG and Mr. Djebali of SEN. During this meeting, SME and SEN agreed to pursue demonstration projects at the Sultan and Sahara Beach, for which SME agreed to provide a subsidy of up to 20 percent, not to exceed a cost of TD10,000 for each system. It was also agreed that SEN would have full responsibility for design, materials procurement, and installation of the systems, and that SME would provide AID-funded equipment for monitoring the performance of the systems. SEN and SME agreed to cooperate on the performance of the systems. They also agreed to cooperate on presentations to the hotel owners at which the hotel owners' commitment to the projects could be obtained. SEN personnel, accompanied by Ms. Troudi of SME, in September presented study findings to the proprietors of Sahara Beach and El Kanta hotels. SEN made further studies to review or verify their data and to refine their costs estimates. As a result, SEN increased the size and scope of the projects under consideration. At the end of the quarter, SEN was ready to go back to the hotel proprietors. A provisional schedule, drawn up on November 15 by Mr. Bouayed of SEN,

showed that after SEN had obtained a prospective client's formal commitment, they would require 9 months to get a system up and running.

**3.1.3 Plans for the Next Quarter:** The provisional SEN schedule indicates that a decision (intention de commande) from the hotels is expected within two weeks of SEN making an offer to them. Making subsequent arrangements for bank credit is projected to take another month, to be completed in mid-January at the earliest. While SEN may begin detailed plans for systems next quarter, the role envisioned for RMA advisors to review final plans is not expected to be called upon before the following quarter. RMA plans to discuss the schedule for procurement of U.S. monitoring equipment, which may be possible to initiate while detailed plans of systems are being drawn up.

An RMA proposal for a team to conduct a cost-benefit analysis of the Hammam Biadha photovoltaic and other solar energy facilities, installed under an aid technical assistance grant in 1983, was submitted for SME decision at the end of November. RMA proposed two advisors, Messrs. Huddleston and Roberts, to work in Tunisia between December 28 and January 8, in collaboration with STEG personnel and Mr. Lindsay.

### 3.2 Task B - Energy Consumption Data and Sectoral Analysis

**3.2.1 Objectives:** This project task assists the Ministry in the collection and analysis of data on energy consumption by sector and by use. The Ministry's studies of the residential and tertiary (commercial/institutional) sectors are being conducted within the period of the RMA contract. The study of the agricultural sector was already underway, but a contract amendment has provided for RMA technical assistance in the completion of the work. The initial study of the transportation sector has been completed, but outside this project. That of the industrial sector was completed in 1982, before the RMA contract began.

RMA technical assistance with the initial sectoral studies includes advice on data collection, development of analytic methods, training of staff, and review of results by outside experts.

With the completion of this first round of sectoral studies, there exists a set of current data on energy consumption by sector and by end use. Combined with other relevant economic data, it can be assembled and presented in a data base useful to analysis in the Ministry and other organizations. Specifically, in this project, the data will be used in energy consumption forecasting and policy analysis (Task C, Section 3.3 below).

It is recognized that the data must be updated periodically, with additional major studies when necessary, but by less elaborate approximate methods surrounding intervening periods. Therefore, a key part of this project is to develop and apply valid techniques for the periodic (for example, annual) updating of the energy consumption data. This work includes consideration of questions such as how frequently surveys or other major studies are needed; what are the key data that must be checked frequently; what approximate methods can be used in interim years, such as extrapolation or simple models based on indices; and how to verify or correct those approximations when more primary data becomes available.

**3.2.2 Accomplishments:** Some further data was compiled for residential, industrial, and transportation sectors by Messrs. Ben Jebara, Majdoub, and Meddeb respectively. Mr. Lindsay also worked with SME staff to improve earlier estimates of energy use by tertiary sector consumers including hotels, schools, and hospitals. An SME compilation of statistics, including estimated energy use by sector and type of fuel, was distributed for review by analysts at STEG, ETAP, and MEN.

**3.2.3 Plans for the Next Quarter:** Further work to achieve internal consistency in sectoral energy use estimates is planned, partly with a view to developing consistent and integrated projections/scenarios of national energy use, as described in the "Proposal on Project Extension".

### **3.3 Task C - Energy Demand Forecasting**

**3.3.1 Objectives:** The forecasting task expands from the sectoral data, which presents a largely static picture of energy consumption by sector and end use, to provide a dynamic and fully integrated view of future energy consumption in relation to other economic variables. Specifically, this project task will develop and apply methods to estimate future energy consumption under certain self-consistent sets of assumptions (scenarios) representing alternative possible futures. The forecasts will be both for individual sectors and integrated to give an overall intersectoral forecast for each scenario. The analysis will evaluate impacts of various energy policy options, including effects of energy efficiency improvement, fuel substitution, or increased use of renewable resources, and will illustrate the relationship and sensitivity of energy consumption to other economic variables, such as industrial output or household formation. The forecasting models will be implemented at an operational level, and Tunisian staff will be trained in their use. One major event proposed in the task is a working/training session of several days' duration in Tunis to present sectoral results, scenarios, and analytical methods.

**3.3.2 Accomplishments:** SME capacity for energy demand forecasting and analysis was enhanced considerably as a result of collaborative work between SME staff and RMA advisors during October and November. Models designed for forecasting industrial and tertiary sectors' energy use were implemented on SME microcomputers. Dr. A. Trevino, in Tunis from October 13 to November 1, worked with Mr. Majdoub of SME to enable him

to set up and apply models of energy use by industry, at the sectoral, subsectoral, and plant level. The emphasis of this mission was on development of analytical and forecasting capabilities rather than on producing specific forecasts. This was followed, as planned, by Mr. Schoengold, in Tunis from November 11-22, applying and developing the same approach for energy use by the tertiary sector and subsectors with Messrs. Ounali, Majdoub, and Meddeb of SME and with Mr. Lindsay who provided energy use estimates resulting from his current work in the area. Applications of the models were demonstrated and documented to enhance SME capacity to analyze and forecast energy use under alternative scenarios, including scenarios addressing the effects of government policies such as promotion of solar energy use.

A training trip for Mr. Majdoub to continue industrial sector work with Dr. Trevino in Madison, Wisconsin, was proposed by RMA for November 23 - December 14, and accepted, subject to postponement by one week, by SME.

Development of a model of residential energy use was pursued by Mr. Ben Jabara of SME during the course of a 5 week training program in November at Argonne National Laboratories. (No project funds were used in this training program which SME financed from other sources).

**3.3.3 Plans for the Next Quarter:** Following discussions with SME concerning the status of residential sector forecasting capability as a result of Mr. Ben Jabara's training program, RMA plans to revise an earlier proposal (of August 9) for residential sector energy use modeling and forecasting. A mission with the goal of coordinating the sectoral work in an integrated scenario of national energy use will be pursued, for scheduling in the quarter of March-May, 1986.

**3.4 Task D - Conservation Actions (Maitrise de l'Energie)**

**3.4.1 Objectives:** This project task assists the Ministry in the development and implementation of programs to promote the realization of

energy conservation in all sectors of the economy. Possible activities include:

- \* Public information;
- \* Training and program development in energy management;
- \* Efficiency improvement campaigns;
- \* Development of norms and standards related to energy consumption or use of renewables;
- \* Provision of technical services (such as building energy audits).

The project discussion of October and the resulting protocol give a plan for addressing conservation actions in the industrial, residential, tertiary, and transportation sectors.

**3.4.2 Accomplishments:** Results of energy audits of the two hotels - the Sahara Palace at Nefta, and Dar Jerba, Jerba - were presented orally and in SME reports delivered to the proprietors in September. The audits had been performed in March by an RMA/SME team headed by Mr. Fafard. The presentations were led by Mr. Nouri-Ammar, assisted by Messrs. Bahri (SME) and Fafard (RMA). The audit reports were well received at both hotels by their directors who expressed eagerness to implement recommended measures for saving energy.

Representatives of CIOK, STIL, STIR, and STEG, along with Ms. Troudie and Mr. Bahri of SME, participated in the energy management training program conducted by RMA from October 21 - November 2. The major part of the program comprised a seminar series in Madison, Wisconsin, organized by Mr. Tom Smith who, with other RMA consultants with previous experience in Tunisia, led the seminar presentations and discussions. The program also included inspections of plants in the industries pertinent to the participants.

**3.4.3 Plans for the Next Quarter:** SME has requested RMA to propose an advisor for further investigation of energy conservation

FB

opportunities in the operations of the Compagnie de Navigation Tunisienne (CTN). The SME request pertains to investigation of a different class of vessel from those previously examined by RMA consultant Dr. Reid (June 23 - July 20), and calls for the advisor to sail over a longer route, from Tunisia to Northern Europe. RMA has contacted several qualified candidates and plans to submit a proposal to SME next quarter. RMA further plans to submit in the next quarter a proposal for CIOK cement plant audit work.

### 3.5 Tunisian Staff Training in the U.S.

A two-week seminar on Industrial Energy Conservation and Management was held in the U.S. from October 21 to November 1 for Tunisian plant engineers and energy managers, and SME engineers. The participants were: Mme. Valeria Troudi (SME), M. Mounir Bahri (SME), M. Adel Ammar (STEG), M. Salah Chtiou (STIL), M. Abderrazek Faiz (STIR), and M. Khemias Bezrati (CIOK). The seminar was a follow-up to previous educational efforts in Tunisia, including a one-week seminar on industrial energy management in May, 1985. Classroom lecture and discussion was combined with plant visits to give participants maximum exposure to U.S. energy management techniques. Field trips were made to two dairy processing plants in Wisconsin, Stanley Consultants in Muscatine, Iowa, to the Tenneco Refinery in Chalmette, Louisiana, and to Electec, Inc., an electric power services organization in New Orleans, Louisiana.

A two-week program in the U.S. from October 20 to November 2 for Mr. Ounali, Head of the SME Department of Economic Studies, was funded under the project. Mr. Ounali spent three days in Madison, to review and plan project developments and to visit state agencies dealing with energy policy issues. Mr. Ounali went on to Washington, D.C., where meetings with Department of Energy and World Bank personnel had been arranged.

#### **4. Level of Effort and Financial Expenditures**

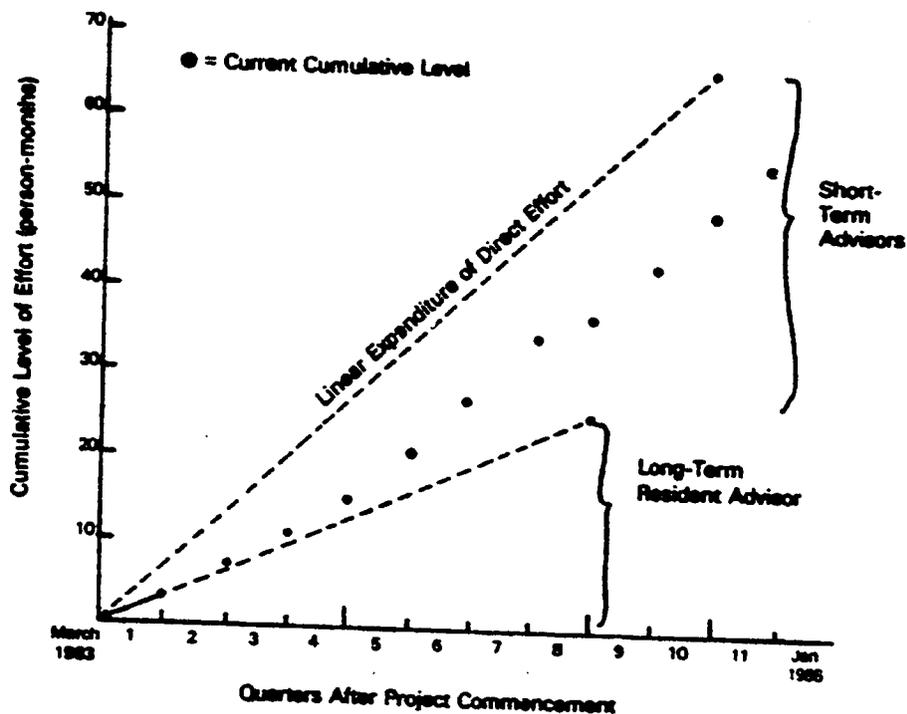
##### **4.1 Direct Effort - Original Contract**

Table 1 gives the quarterly and cumulative direct effort (person-months) of RMA project staff. The associated figures shows cumulative direct effort in comparison to hypothetical linear expenditures of total direct effort. Table 2 lists current and planned trips by short-term advisors.

##### **4.2 Financial Expenditures - Original Contract**

Table 3 gives the quarterly and cumulative financial expenditure. The associated figure shows the cumulative project expenditures in comparison to a hypothetical linear financial expenditure.

**AID Project 664-0326**  
**DIRECT EFFORT OF PROJECT STAFF**



**Table 1**  
**DIRECT EFFORT OF PROJECT STAFF\***  
**(Person-Months)**

	Quarters after Project Commencement										
	1	2	3	4	5	6	7	8	9	10	11
Long-Term Resident Advisor	3.2	3.0	3.0	3.0	2.2**	3.0	3.0	1.0	3.0	3.0	3.0
Short-Term Advisors	0.0	1.0	1.0	1.1	3.5	3.0	2.2	2.1	4.0	3.5	2.5
Total in Current Quarter	3.2	4.0	4.0	4.1	5.7	6.0	5.2	3.1	7.0	6.5	5.5
Cumulative	3.2	7.2	11.2	15.4	21.0	27.0	32.2	35.3	42.3	48.8	54.3

\* This table has been revised from previous Quarterly Reports to exclude efforts under the Agricultural Task (Contract Amendment).

\*\* Portions of Resident Advisor's time in March-April 1984 charged to Agriculture Task (936-5703).

X  
146

**Table 2**  
**Short-Term Advisors**

**Note:** Per the RMA contract, all short-term advisors are jointly selected by RMA and GOT, and formal approval by GOT must be granted before a trip begins.

**Quarter 11 (Completed)**

**Name:** Charles Fafard  
**Date:** 2-13 September  
**Task:** Follow-up of Hotel Audit

**Name:** Dan Cautley  
**Date:** 2-13 September  
**Task:** Preparation of Design Report for Solar Hotel Systems

**Name:** Ion Caloger  
**Date:** 9-13 September  
**Task:** Preparation of Design Report for Solar Hotel Systems

**Name:** Andres Trevino  
**Date:** 14 October - 2 November  
**Task:** Analysis and Forecasting in the Industrial Sector

**Name:** David Schoengold  
**Date:** 11-22 November  
**Task:** Analysis and Forecasting in the Tertiary Sector

**Training Trips to the U.S.**

**Name:** Nabil Meddeb  
**Organization:** Societe de Maitrise de l'Energie (SME)  
**Date:** 10 August - 1 September  
**Task:** Transport Energy Conservation and Analysis

**Name:** Ahmed Ounali  
**Organization:** Societe de Maitrise de l'Energie (SME)  
**Date:** 21 October - 1 November  
**Task:** National Energy Planning and Analysis

**Name:** Valeria Troudi  
**Organization:** Societe de Maitrise de l'Energie (SME)  
**Date:** 21 October - 1 November  
**Task:** Industrial Energy Conservation and Management

Name: Mounir Bahri  
Organization: Societe de Maitrise de l'Energie  
Date: 21 October - 1 November  
Task: Industrial Energy Conservation and Management

Name: Adel Ammar  
Organization: Soceite Tunisienne d'Electricite et du Gaz (STEG)  
Date: 21 October - 1 November  
Task: Industrial Energy Conservation and Management

Name: Salah Chtioui  
Organization: Societe Tunisienne d'Industrie Laitiere (STIL)  
Date: 21 October - 1 November  
Task: Industrial Energy Conservation and Management

Name: Abderrazek Faiz  
Organization: Societe Tunisienne des Industries de Raffinage (STIR)  
Date: 21 October - 1 November  
Task: Industrial Energy Conservation and Management

Name: Khemias Bezrati  
Organization: Cimenterie Oum Khelil (CIOK)  
Date: 21 October - 1 November  
Task: Industrial Energy Conservation and Management

Name: Mounir Majdoub  
Organization: Societe de Maitrise de l'Energie  
Date: 1 - 21 December  
Task: Industrial Energy Conservation and Analysis

#### Quarter 12

Name: Allen Roberts  
Date: 27 December - 8 January  
Task: Cost/Benefit Analysis of the Hammam Biadha Photovoltaic Facility  
Status: Approved by AID and SME

Name: Jack Huddleston  
Date: 27 December - 8 January  
Task: Cost/Benefit Analysis of the Hammam Biadha Photovoltaic Facility  
Status: Approved by AID and SME

Name: Gregory Krohm  
Date: Being rescheduled  
Task: Development of Residential Sector Energy Use Model  
Status: Requested by SME

**Name:** To be Identified  
**Date:** January/February 1986  
**Task:** Audit of Cimenterie Oum Khelil  
**Status:** Requested by SME

**Name:** To be Identified  
**Date:** January/February 1986  
**Task:** Second Stage Audit of Compagnie Tunisiennr de Navigation  
**Status:** Requested by SME

**AID Project No. 664-0326**  
**CUMULATIVE PROJECT EXPENDITURES**

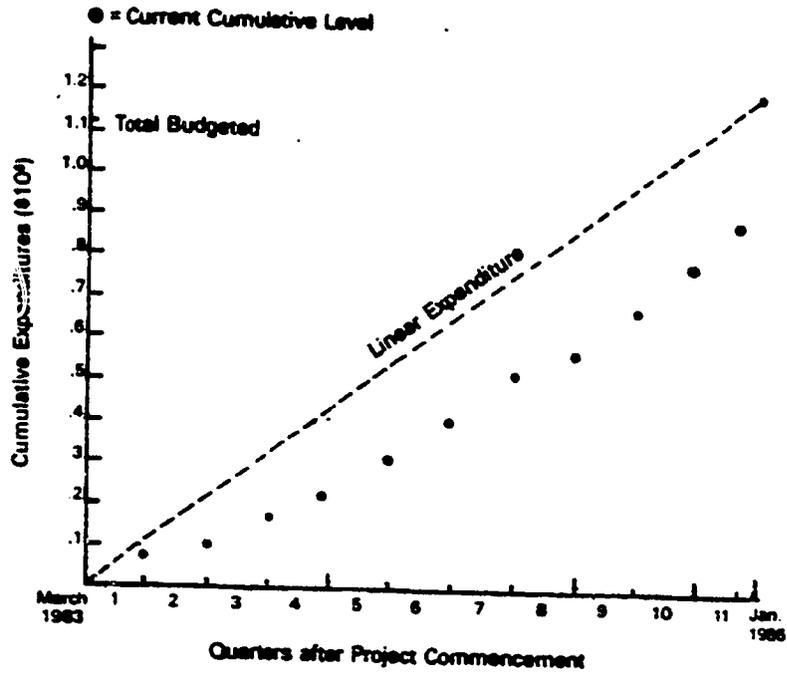


Table 3  
 FINANCIAL EXPENDITURES

Level of Effort	1	2	3	4	5	6	7	8	9	10	11
(10 <sup>6</sup> \$)											
Total in Quarter	.059	.055	.053	.062	.079	.096	.105	.044	.094	.142	.107
Cumulative	.059	.114	.167	.229	.308	.404	.509	.553	.647	.789	.896

*9/12*

5. Distribution List

Ministry of National Economy

Direction Generale de l'Energie (4 copies)

USAID

Mr. Karns, AID/Tunis, S&T

Ms. Coleman, AID/Washington, NE/TECH/HRST

RMA

For 11

Hanson

Lindsay

Schuller

Worzala

Eggen

21

RMA/GOT-QR-10 (9-85)

**TUNISIAN ENERGY PLANNING PROJECT  
TENTH QUARTERLY REPORT**

September 30, 1985

prepared for:

Republic of Tunisia  
Ministry of National Economy

prepared by:

**RESOURCE MANAGEMENT ASSOCIATES OF MADISON, INC.**  
520 University Avenue  
Madison, Wisconsin 53703  
USA

Submitted by: Wesley K. Foell, President

W. K. Foell

## Table of Contents

1.	Summary of Quarterly Activity	
1.1	Technical Highlights . . . . .	1
1.2	Management Overview . . . . .	2
2.	Project Background and Objectives . . . . .	3
3.	Technical Status	
3.1	Task A - Renewable Energy Technology . . . . .	4
3.2	Task B - Energy Consumption Data and Sectoral Analysis . . . . .	6
3.3	Task C - Energy Demand Forecasting . . . . .	8
3.4	Task D - Conservation Actions (Maitrise de L'Energie) . .	10
3.5	Tunisian Staff Training in the United States . . . . .	11
4.	Level of Effort and Financial Expenditures	
4.1	Direct Effort . . . . .	12
4.2	Financial Expenditures . . . . .	12
5.	Distribution List . . . . .	17



Tunisian Energy Planning Project  
Quarterly Report - September, 1985

1. Summary of Quarterly Activity

1.1 Technical Highlights

This tenth Quarterly Report covers the period from June 1 through August 31, 1985. It summarizes project objectives, accomplishments, and plans for the next quarter.

Short-term advisor trips completed during the quarter were as follows:

- \* Residential Sector Analysis - Mr. G. McGranahan's mission of May 25 to June 16 was to work with M. Ben Jabara of the Societe de Maitrise de l'Energie (SME) to analyze survey data of household energy use. The advisor's report (RMA/GOT-TD-30), delivered to SME on August 6, includes sectoral energy use estimates, conservation potential, price subsidies, and recommendations for further research.
  
- \* Industrial Energy Audits - An energy audit of the Societe Tunisienne de L'Industrie Laitiere (STIL) dairy products facility in Tunis (Bab Saadoun) was conducted by an RMA/SME team from July 8-12. Data collected during the audit, evaluation of tests and measurements made, and resulting recommendations are presented in the trip report (RMA/GOT-TD-31), delivered to SME on September 4. Operations at the STIR oil refinery at Bizerte were reviewed by Messrs. Tunnah and Sloan who, with SME staff, visited the refinery on July 15 and 17. This review resulted in a number of recommendations, mostly concerned with potential follow-up studies for energy conservation.

21-

21-

- \* Ship Performance Monitoring and Energy Conservation - Between June 23 and July 20, Dr. R. Reid made two voyages in vessels of the Compagnie de Navigation Tunisienne (CTN) to make tests and measurements of the ships' performance with regard to energy use and conservation potential. CTN and SME staff accompanied Dr. Reid to learn about ship auditing methods. The analyses and recommendations are presented in Dr. Reid's trip report (RMA/GOT-TD-32), delivered to SME September 10.
- \* SME Staff Training in the U.S. - Mr. N. Meddeb of the SME Department of Economic Studies was in the U.S. August 9 to September 2, to gain experience and training in analyzing and forecasting Tunisian transportation energy use.
- \* Project Review and Planning - RMA President Dr. W. Foell was in Tunis from June 30 to July 6, to review the project status with SME PDG Mr. Nouri-Ammar and with USAID, and to develop a protocol of project tasks to be undertaken during the rest of the year.

## 1.2 Management Overview

The protocol, which was written during the course of Dr. Foell's planning and review mission in July, indicated the estimated level of project effort through December 31, 1985. In addition to leaving unexpended funds in the budget, the protocol discussed three areas in which there would be difficulty accomplishing desired objectives by December 31. After further meetings with AID Director Mr. J. Phippard and Project Officer Mr. M. Karns, Dr. Foell undertook to develop and submit hypothetical scenarios of project effort and resources for 6 and 12 month periods beyond the project termination date (December 31, 1985). The RMA "Proposal on Project Extension" (September 3) is now subject to AID review and decision.

2  
22

J5

The next meeting for project review and planning is scheduled to take place in Madison, Wisconsin, between October 20 and November 1 (concurrent with a training seminar described in Section 3.4.3).

On July 16, Draft Amendment 4 to the GOT/RMA contract was reviewed by AID legal counsel. Minor revisions were advised, which RMA subsequently incorporated. Signed on July 23 by Dr. Foell, Amendment 4 was signed by Mr. Rabah (DGE) on August 14 and delivered to AID on September 4. This amendment allows project funds to be used for the purchase of monitoring equipment for solar system demonstration projects and other specific items for industrial energy management and audit training. It also provides for more home office work by RMA consultants, when authorized by SME.

The direct effort charged this quarter was that of the resident advisor, the project planning and review trips of Dr. Foell, and the short-term advisor trips for work noted in Section 1.1. Costs of Mr. Meddeb's training program in the U.S. were also charged this quarter. The amount remaining in the project budget at the end of this quarter was approximately \$347,500. RMA invoices for June, July, and August are summarized in Section 4 of this report.

## 2. Project Background and Objectives

The Government of Tunisia, recognizing the need for a comprehensive policy that addressed all aspects of the energy problem, has undertaken a broad-based program to enhance its capability to conduct energy policy and planning. This program includes the development of an improved data and information base, an increased analytical capability, and an enlarged cadre of trained and experienced professionals for carrying out the requisite policy.

As indicated in the USAID Project Agreement and the RMA contract, the project reported here assists the Government of Tunisia in the following areas of need:

- \* General energy analysis, planning, and policy formulation;

8  
23

→  
Jeg

- \* Collection of end-use data in the residential and tertiary (commercial/institutional) sectors; and detailed audits of buildings;
- \* Field testing and assessment of renewable energy technologies;
- \* Institutional development through staff training in energy analysis, planning policy formulation, and relevant program implementation.

The contract between Resource Management Associates of Madison, Inc. (RMA), and the Republic of Tunisia, represented by the Ministry of National Economy (MEN), was effective 14 January 1983. The Project Commencement Date was 7 March 1983, when the Long-Term Resident Advisory began work in Tunis. The contract duration is 34 months. This RMA effort is funded through USAID Project No. 664-0326. The contract amendment for the agricultural sector study was funded from the remainder of the now-terminated Ferguson-Bryan contract, supported under the AID/ST/EY centrally-funded Energy Planning Project (36-5703), which expired 30 April, 1984.

### 3. Technical Status

#### 3.1 Task A - Renewable Energy Technology

3.1.1 Objectives: This task assists the Government in the development of methods and data for evaluating the technical performance and cost effectiveness of renewable energy systems in Tunisia, specifically solar water heating and wind energy systems. The task emphasizes assessment of potential applications and impacts of the system, including substitution for other energy forms, potential market penetration, and industrial development, to provide information to guide future programs and policies for the implementation of systems, such as testing and certification, performance guarantees, or financial incentives. Demonstrations of solar water heating systems in commercial and institutional buildings will provide realistic experience with

system design, installation, and operation. This experience and additional training will also help develop the technical skills of Tunisian staff and other capabilities of the Tunisian solar industry.

3.1.2 Accomplishments: The "Solar Heating Feasibility Study and Site Selection" report (RMA/GOT-TD-26) was received by SME on May 27. SME examined the report and requested that RMA provide supplementary information which would elaborate the economic analysis for two selected sites--the Hotel Sultan at Hammamet and the Hotel Sahara Beach at Monastir. RMA responded with the supplementary information in mid-June. Dr. Foell, at his meeting with Mr. Nouri-Ammar in July, agreed to prepare separate reports for the two hotels to assist SME to present the feasibility studies to the hotel proprietors. After the contents of these reports was determined and contract amendment 4 was approved (which enabled RMA home office effort), RMA prepared the documents. The reports were delivered to SME on September 4. An RMA consultant trip was proposed for Messrs. Cautley and Caloger to complete designs of systems for the Sultan and Sahara Beach. It was approved by SME for September 2-14. In the meantime, SME had distributed copies of the RMA report to SEREPT Energies Nouvelles (SEN), manufacturers of solar collectors. SEN had visited the two selected hotels (and Hotel El Kanta, near Sousse) in July and August, and examined the costs of installing systems covering a range of each hotel's energy requirements for heating water.

3.1.3 Plans for the Next Quarter: Reports of the SEN preliminary studies are to be completed during the first week of September and made available to SME for review by Messrs. Cautley and Caloger. The consultants, together with SME personnel, will meet with SEN to discuss all aspects of the work. Mr. Nouri-Ammar is to meet with SEN management to finalize presentation of the costs to hotel proprietors (and extent of SME subsidy) of variously sized systems. SME/SEN joint presentations

81  
25

and discussions with hotel proprietors are planned to take place in the second half of September. SME expects decisions from the Sultan and Sahara Beach, and working agreements ("conventions") to be drawn up and signed by early November. It is planned that SEN will prepare final designs of systems after the hotel proprietors have selected system size. SME will call upon RMA to review the final designs and to provide system monitoring equipment and related components which have been included in the project budget.

It is planned that RMA advisors will conduct a cost-benefit analysis of the Hammam Biadha photovoltaic and other solar energy facilities installed under an AID technical assistance grant in 1983. RMA intends to propose an advisor for this task next quarter.

### 3.2 Task B - Energy Consumption Data and Sectoral Analysis

3.2.1 Objectives: This project task assists the Ministry in the collection and analysis of data on energy consumption by sector and by use. The Ministry's studies of the residential and tertiary (commercial/institutional) sectors are being conducted within the period of the RMA contract. The study of the agricultural sector was already underway, but a contract amendment has provided for RMA technical assistance in the completion of the work. The initial study of the transportation sector has been completed, but outside this project. An initial study of the industrial sector was completed in 1982, before the RMA contract began.

RMA technical assistance with the initial sectoral studies includes advice on data collection, development of analytic methods, training of staff, and review of results by outside experts.

With the completion of this first round of sectoral studies, there exists a set of current data on energy consumption by sector and by end use. Combined with other relevant economic data, it can be assembled and presented in a data base useful to analysis in the Ministry and other organizations. Specifically, in this project, the data will be

26

R

used in energy consumption forecasting and policy analysis (Task C, Section 3.3 below).

It is recognized that the data must be updated periodically, with additional major studies when necessary, but by less elaborate approximate methods surrounding intervening periods. Therefore, a key part of this project is to develop and apply valid techniques for the periodic (for example, annual) updating of the energy consumption data. This work includes consideration of questions such as how frequently surveys or other major studies are needed; what are the key data that must be checked frequently; what approximate methods can be used in interim years, such as extrapolation or simply models based on indices; and how to verify or correct those approximations when more primary data becomes available.

3.2.2 Accomplishments: Continuous progress in analyzing and understanding the nature of Tunisian energy use was given impetus by the three week mission, May 25 - June 16, of RMA consultant Mr. G. McGranahan, who worked in the domain of the residential sector, closely collaborating with Mr. Ben Jabara of SME and an analyst from STEG. This work resulted in detailed tabulations of residential energy use in 1984, by type of fuel and end use. Changing fuel use patterns, such as LPG's increasing proportion of aggregate energy consumption, were examined with regard to petroleum product price subsidies. Energy consumption by household appliances is also discussed in the advisor's report.

In July, RMA converted the STEG survey data from mainframe to microcomputer format, and provided SME with the STEG survey data on diskettes, which facilitated continuous SME work to refine estimates of residential energy use in 1984 and in previous years. Further data on numbers of STEG customers for electricity was compiled by SME at the end of the quarter.

Annual energy use by each major economic sector (residential, tertiary, etc.) was estimated by type of fuel for 1980-1984 by M. Lindsay, the resident advisor.

Transportation sector energy consumption data and analysis was the focus of Mr. Meddeb's training program in the U.S. from August 10 through September 1. At Oak Ridge National Laboratory, M. Meddeb worked in collaboration with Dr. David Greene to develop and implement on microcomputer a vehicle stock efficiency model applicable to personal transportation in Tunisia. At RMA in Madison, Dr. M. Hanson assisted M. Meddeb in developing and programming on Lotus 1-2-3 the Tunisian Transportation Model, which was produced as a result of the collaborative project work between RMA and SME personnel in 1984, (see RMA/GOT-TD-18).

3.2.3 Plans for the Next Quarter: Assisting SME staff to compile and analyze data pertaining to energy consumption by hotels, and other branches of the tertiary sector, is planned to be one of the resident advisor's major activities over the next quarter. The scheduling of an RMA proposal for a consultant trip to assist in developing and implementing on the microcomputer a model of tertiary sector energy use is to be determined. SME has requested the trip be scheduled for November. Sectoral analysis proposals directed towards residential and industrial energy consumption forecasting are described in Section 3.3.3.

### 3.3 Task C - Energy Demand Forecasting

3.3.1 Objectives: The forecasting task expands from the sectoral data, which presents a largely static picture of energy consumption by sector and end use, to provide a dynamic and fully integrated view of future energy consumption in relation to other economic variables. Specifically, this project task will develop and apply methods to estimate future energy consumption under certain self-consistent sets of assumptions (scenarios) representing alternative possible futures. The

forecasts will be both for individual sectors and integrated to give an overall intersectoral forecast for each scenario. The analysis will evaluate impacts of various energy policy options, including effects of energy efficiency improvement, fuel substitution, or increased use of renewable resources, and will illustrate the relationship and sensitivity of energy consumption to other economic variables, such as industrial output or household formation. The forecasting models will be implemented at an operational level, and Tunisian staff will be trained in their use. One major event proposed in the task is a working/training session of several days' duration in Tunis to present sectoral results, scenarios, and analytical methods.

3.3.2 Accomplishments: Conditional forecasts of natural gas and petroleum product demand at the national, non-sectoral level were made by the resident advisor in June and July, extending work briefly described in the ninth quarterly report. Transportation modeling work in the U.S. by M. Meddeb (see 3.2.2) was largely directed towards developing simultaneous forecasting and policy analysis technical capability and expertise.

3.3.3 Plans for the Next Quarter: RMA has proposed a consultant trip, October 20 - November 2, to implement a model for industrial energy demand forecasting. The proposal is under review by SME. SME has requested a three-week trip for a consultant to advise on the development of a residential energy use model and its implementation for forecasting purposes. RMA is in the process of selecting an advisor for a planned residential sector forecasting mission before the end of the year. An RMA consultant trip proposal submitted at the end of August was not accepted by Mr. Ounali, who preferred trying to arrange a longer trip at a later date.

29

X

37

### 3.4 Task D - Conservation Actions (Maitrise de l'Energie)

3.4.1 Objectives: This project task assists the Ministry in the development and implementation of programs to promote the realization of energy conservation in all sectors of the economy. Possible activities include:

- \* Public information;
- \* Training and program development in energy management;
- \* Efficiency improvement campaigns;
- \* Development of norms and standards related to energy consumption or use of renewables;
- \* Provision of technical services (such as building energy audits).

The project discussion of October and the resulting protocol give a plan for addressing conservation actions in the industrial, residential, tertiary, and transportation sectors.

3.4.2 Accomplishments: An energy audit of the Societe Tunisienne de l'Industrie Laitiere (STIL) dairy products facility in Tunis (Bab Saadoun) was conducted July 8-13, by RMA consultants Messrs. Olsen, Stielstra, and Tunnah, accompanied by Messrs. Ben Jamaa and Ben Hassen of SME. Data collected during the audit, evaluation of tests and measurements made, and resulting recommendations are presented in the report (RMA/GOT-TD-31) delivered to SME on September 4. Operations at the STIR oil refinery at Bizerte were reviewed by RMA consultants Messrs. Tunnah and Sloan, who were accompanied by Mr. Ben Hassen during visits to the refinery on July 15 and 17. This review resulted in a number of recommendations mostly concerned with potential follow-up studies for energy conservation. Recommendations are presented in the report (RMA/GOT-TD-33), submitted to SME in September.

Between June 23 and July 20, RMA consultant Dr. R. Reid made two voyages in vessels of the Compagnie de Navigation Tunisienne (CTN) to make tests and measurements of the ships' performance with regard to

energy use and conservation potential. Dr. Ghannouchi of CTN and Mr. Zid of SME accompanied Dr. Reid to learn about his methods, which are presented with the results of his analysis and recommendations in the report (RMA/GOT-TD-32) delivered to SME September 10. Extensive supporting documentation and related papers were appended to the report.

3.4.3 Plans for the Next Quarter: At the beginning of September, RMA consultant Mr. C. Fafard will spend ten days in Tunisia to assist in presenting to the proprietors of the Sahara Palace and Dar Jerba hotels the results of energy audits conducted in March. SME plans to finalize terms of reference for an agreement to perform work for CIOK, for which RMA has proposed a consultant trip.

A training program for Tunisian industrial and hotel energy managers and staff of the SME Department of Technical Studies (Ms. Troudie and Mr. Bahri) is planned for October 21 - November 2, in Madison, Wisconsin. The program is aimed at plant managers and engineers, particularly those involved with SME/RMA energy audits. It is planned for a minimum of ten participants. The course will review the results of audits conducted and solutions proposed in Tunisia and compare them with similar situations in the U.S. It will also present technical and institutional approaches to industrial energy management in the U.S. Various plants have been selected for inspection visits. RMA is in the process of finalizing the program with SME.

### 3.5 Tunisian Staff Training in the U.S.

In addition to the energy management and audit training program described above (3.4.3), RMA is arranging project sponsored training programs in the U.S. for members of the SME Department of Economic Studies (DEE). The program for Mr. Ounali, Head of the DEE, is planned to follow his participation in the SME/RMA project review and planning session in late October. A program in the area of industrial energy analysis is being arranged for Mr. Mejdoub in November and December.

SME has also arranged other training programs (not funded by the project). These include the participation of Mr. Ben Jabara in a one month program on energy demand analysis at Argonne National Laboratory, beginning October 20.

#### 4. Level of Effort and Financial Expenditures

##### 4.1 Direct Effort - Original Contract

Table 1 gives the quarterly and cumulative direct effort (person-months) of RMA project staff. The associated figures shows cumulative direct effort in comparison to hypothetical linear expenditures of total direct effort. Table 2 lists current and planned trips by short-term advisors.

##### 4.2 Financial Expenditures - Original Contract

Table 3 gives the quarterly and cumulative financial expenditure. The associated figure shows the cumulative project expenditures in comparison to a hypothetical linear financial expenditure.



**AID Project 664-0326  
DIRECT EFFORT OF PROJECT STAFF**

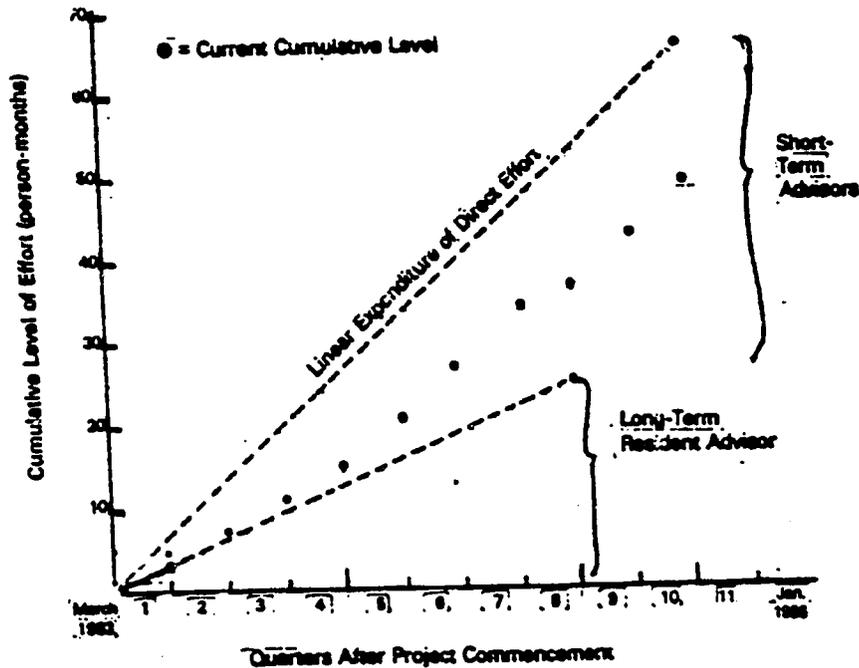


Table 1  
**DIRECT EFFORT OF PROJECT STAFF\***  
(Person-Months)

	Quarters after Project Commencement									
	1	2	3	4	5	6	7	8	9	10
Long-Term Resident Advisor	3.2	3.0	3.0	3.0	2.2**	3.0	3.0	1.0	3.0	3.0
Short-Term Advisors	0.0	1.0	1.0	1.1	3.5	3.0	2.2	2.1	4.0	3.5
Total in Current Quarter	3.2	4.0	4.0	4.1	5.7	6.0	5.2	3.1	7.0	6.5
Cumulative	3.2	7.2	11.2	15.4	21.0	27.0	32.2	35.3	42.3	48.8

\* This table has been revised from previous Quarterly Reports to exclude efforts under the Agricultural Task (Contract Amendment)

\*\* Portions of Resident Advisor's time in March-April 1984 charged to Agriculture Task (936-5703).

13  
33

x  
*[Handwritten signature]*

Table 2  
Short-Term Advisors

Note: Per the RMA contract, all short-term advisors are jointly selected by RMA and GOT, and formal approval by GOT must be granted before a trip begins.

Quarter 10 (Completed)

Name: Gordon McGranahan  
Date: 26 May - 14 June  
Task: Analysis and Forecasting in the Residential Sector

Name: Robert Reid  
Date: 23 June - 20 July  
Task: Initiation of Task on CTN Audits/Energy Management

Name: Harold Olsen  
Date: 7-13 July  
Task: Audit of STIL Dairy Plant

Name: Phil Stielstra  
Date: 7-17 July  
Task: Audit of STIL Dairy Plant

Name: Barry Tunnah  
Date: 7-18 July  
Task: Audit of STIL Dairy Plant and Inspection of STIR Refinery

Name: Charles Sloan  
Date: 14-24 July  
Task: Inspection of STIR Refinery

Name: Wesley K. Foell  
Date: 1-6 July  
Task: Project Review and Planning

Quarter 11

Name: Charles Fafard  
Date: 2-13 September  
Task: Follow-up of Hotel Audit  
Status: In Progress

Name: Dan Cautley  
Date: 2-13 September  
Task: Preparation of Design Report for Solar Hotel Systems  
Status: In Progress

Name: Ion Caloger  
Date: 9-13 September  
Task: Preparation of Design Report for Solar Hotel Systems  
Status: In Progress

24  
34

Name: Hoke Garrett  
Date: Undetermined, proposed for August 1985  
Task: Audit of CIOK Cement Plant  
Status: Proposed by RMA

Name: Peter Portanova  
Date: Undetermined, proposed for August 1985  
Task: Audit of STEG Plant  
Status: Proposed by RMA

Name: Glenn Phillips  
Date: Undetermined; proposed for August 1985  
Task: Audit of STEG plant  
Status: Proposed by RMA

Name: Andres Trevino  
Date: 14 October - 2 November  
Task: Analysis and Forecasting in the Industrial Sector  
Status: Approved by SME

Name: David Schoengold  
Date: 11-22 November  
Task: Analysis and Forecasting in the Tertiary Sector  
Status: Approved by SME

Name: Gregory Krohm  
Date: Proposed for August; rescheduled  
Task: Development of Residential Sector Energy Use Model  
Status: Tentatively scheduled for December

Name: Being chosen by RMA  
Date: November or December 1985  
Task: Cost-benefit Analysis of the Hamman Biadha Photovoltaic Facility  
Status: Requested by AID and SME

25/  
35

x



AID Project No. 664-0326  
**CUMULATIVE PROJECT EXPENDITURES**

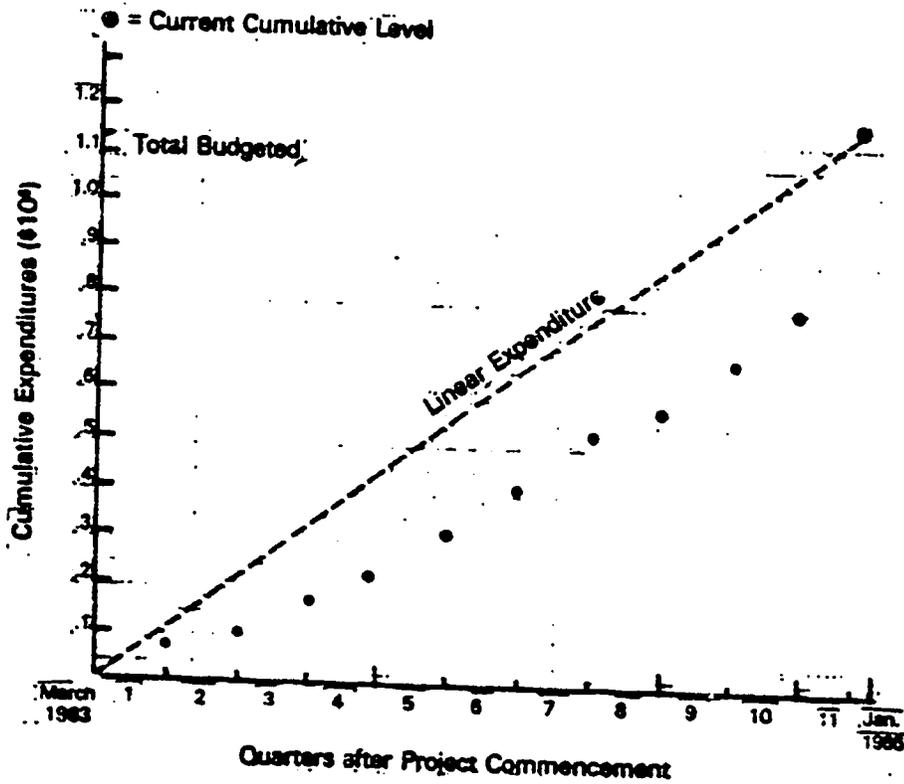


Table 3  
 FINANCIAL EXPENDITURES

Level of Effort	1	2	3	4	5	6	7	8	9	10
(10 <sup>6</sup> \$)										
Total in Quarter	.059	.055	.053	.062	.079	.096	.105	.044	.094	.142
Cumulative	.059	.114	.167	.229	.308	.404	.509	.553	.647	.789

5. Distribution List

Ministry of National Economy (DGE)

Mr. Rabah

USAID

Mr. Karns, AID/Tunis

Ms. Coleman, AID/Washington, NE/TECH/HRST

Societe de Maitrise de l'Energie

Messrs. Nouri-Ammar

Ounali

RMA

Messrs. Foell

Hanson

Lindsay

Eggen

Ms. Schuller

Worzala

27  
-31