ENERGY DEMAND MANAGEMENT PROJECT: MID-TERM EVALUATION

Project No. 608-0193

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EXECUTIVE SUMMARY

The Energy Demand Management (EDM) Project (No. 608-0193), funded by the U.S. Agency for International Development (USAID), is designed to develop and implement the core of a national energy demand management program in Morocco. The goal of the EDM Project as specified in the Project Paper is to save foreign exchange by reducing energy waste and by improving efficiency of energy use in Morocco. The Project Agreement was signed in July 1988, with a Project Assistance Completion Date (PACD) of September 30, 1993. The total funding for the Project is $8 million, including an USAID grant component of $5 million, a Government of Morocco (GOM) contribution of $800,000, and expected contribution from the private sector of $2.2 million. The Project consists of technical support, information dissemination, training, limited commodity procurement and policy analysis.

The USAID contract for technical assistance was signed with RCG/Hagler, Bailly, Inc., (HBI) in May, 1989. The contract was for 36 months, with a 16 month extension subject to results of the mid-term evaluation. The contract calls for the services of two long-term expatriate advisors: the Chief of Party for 50 months, and an Energy Demand Specialist for 24 months. Three Moroccan professional staff have also been hired to work with HBI on project implementation. The Contractor began implementation of the Project immediately after the contract was signed in May, 1989.

The project design in the Project Paper gives primary responsibility for project implementation to the technical assistance contractor. The contractor works directly with private sector firms, trade associations, and educational institutions to further energy demand management. A Steering Committee, consisting of USAID and GOM representatives, meets regularly to review progress and consider policy issues. The focus on the private sector represents a new direction for USAID, and it was hoped that this effort would lead to the development of private energy management services.

Technical assistance was specified in the Project Paper to be targeted initially to agro-industry, construction materials industries and hotels. Expansion to other sectors of the economy is to be reviewed as part of the mid-term evaluation.

PROJECT STATUS

Information and Awareness

To disseminate information and raise awareness about EDM practices and technologies, the Project has organized specialized campaigns, seminars and workshops. The Project has established contacts with and made presentations for a number of trade and professional organizations, and widely distributed a brochure which is aimed at managers with limited prior knowledge of energy management. The first issue of the Project's newsletter, "Gem-O-Gramme", was produced in May 1991 and mailed to 300 people on the Project's mailing list.

The second issue was produced in September 1991 and sent to the approximately 350 persons on the mailing list.

The Project has also financed an annual energy consumption survey to obtain a good information base on energy use within target sectors. This task has been carried out by the Contractor and a Moroccan subcontractor, and the Contractor is responsible for computerized data storage.

Technical Support

Another component of the Project is provided through energy audits, feasibility studies and demonstration projects. The Contractor has also developed two additional activities: 1) a boiler tune-up service; and 2) an electric service analysis.

Ten energy audits have been completed to date, including two in the construction materials sector, four in the agro-industrial sector, and four in the hotel sector. The audits have been detailed and extensive, with a high degree of professionalism. Each audit makes numerous recommendations, with associated energy and cost savings estimates, and estimated implementation costs. Many of the recommended measures have been implemented, and the Contractor estimates the annual energy savings at 3,102.5 tons of oil equivalent (toe), 7.686 million Dh.

The boiler tune-up and the electric service analysis have both been recently developed and "tested" on ten firms. These programs have produced annual energy savings of 185 toe, which is estimated to be 461,500 Dh. The two activities combined yield an annual energy savings of 3,287.5 toe, which is a savings of approximately 8.15 million Dh.

The Project Paper specifies that 45 feasibility studies are to be done. These are to examine specific processes or systems from individual firms and study the energy savings of various recommendations. Implementation costs and simple payback periods are to be calculated. The feasibility studies are part of the Contractor's audit work, and they have completed 111 studies in the first ten audits.

Fifteen demonstration projects are to be implemented during the life of the project. The intent is to identify energy demand reducing technologies and to implement these for demonstration purposes. A "bioclimatic" architectural study was done for the Dounia Hotel in Fez. This was to be the basis for a demonstration project, but has been delayed until 1992. No other demonstration projects have been completed.

On-the-job training of energy auditing is another aspect of the project. Three Moroccan engineers have been hired by the contractor, and have received in-depth audit training. Several subcontractor employees have also had training through participation in project activities. The Contractor has recently proposed to train, on a cost sharing basis, three employees of subcontract firms.

The audits, feasibility studies and demonstration projects are all subject to cost-sharing between participating firms and the Project. This cost share has required the firms to pay 25% for the first two years of the Project, and will rise to 50% the third year, and 75% in the fourth year. At the end of the Project, costs to participating firms will be brought up to market rates.

Training

The Project Paper calls for both in-country and U.S. training to be provided in the Project. The in-country training consists of workshops, seminars, university level curriculum development and vocational training. U.S. training is expected to be short-term technical training and study tours.

The Contractor has made significant progress with in-country training efforts. Two workshops (Boiler Efficiency and Energy Management) have been offered in various parts of the country. A total of 165 people attended the 14 workshops offered in 1990. In 1991, the contractor will offer the same two workshops, plus two others (Steam Systems and Electrical Systems). The Contractor developed in-depth manuals for each of the courses. An intensive three-week energy audit course was offered in 1990 for potential subcontractors to the project. Specialized seminars have been offered for the hotel sector and cement plants.

Plans are in progress to upgrade the curriculum at the Ecole Nationale de l'Industrie Minerale (ENIM) and to assist in the development of vocational training for boiler operators through the Office de la Formation Professionnelle et de la Promotion du Travail.

No U.S. training has taken place in the project to date. Plans are being made for training to begin in the spring of 1992. A two-day study tour to Tunisia took place to learn about the approach to national energy demand management being taken by another country of the Maghreb. In Tunisia, a government agency, l'Agence de Maitrise de l'Energie, is active in implementing energy demand management programs.

Policy Studies

Terms of reference remain to be provided by the contractor. Members of the Ministere des l'Energie et des Mines (MEM) pointed out to the evaluation team that policy studies were an expected output of the project, and an area in which they valued consultants' assistance.

EVALUATION FINDINGS/RECOMMENDATIONS

Information and Awareness

The contractor made a deliberate decision to limit the number of information and awareness activities early in the Project to avoid creating expectations and a demand for

services which could not be met. It was generally stated in interviews that the Contractor's activity in this area had been beneficial in having some impact in raising awareness. It was also frequently stated that awareness of EDM was not widespread, and that the project should be doing more to publicize and implement energy demand management. General dissemination of information and promotion of awareness of energy demand management should be given more emphasis.

The evaluation team found that the level of awareness of EDM ranges from the non-existent to interest in state of the art applications, with the size of a company's assets undoubtedly being one of the most important factors in determining the extent of its consciousness of EDM practices and technologies. Large consumers of energy are typically more ready to implement energy efficiency improvement measures than smaller companies.

The annual energy survey work done by the Contractor meets these requirements, however, the sharing of data between the Contractor and MEM does not appear to have taken place yet.

Major Recommendations

- **The Project's activity in disseminating information and promoting awareness of energy demand management practices and technologies should be intensified. Project publicity should emphasize the services that the Project has to offer.**

- **The promotion of EDM, and broadening of the market for EDM services should do more to attract medium and small enterprises.**

- **The Project should not directly engage in broad energy surveys, but should maintain up to date records of energy use by facilities that have used project audit, boiler tune up, electric bill and any other on-site services.**

Technical Support

While the audits have produced measurable results, it has taken considerable time to conduct the audits and for the audit report to be produced. There is need to streamline this activity to achieve the goal of 40 audits during the life of the Project. The boiler tune-up and the electric bill services have been successful and should be fully developed and marketed through local subcontractors.

On-the-job training for the Moroccan project staff has enhanced their technical and audit skills to the point where they are able to lead an audit independently. To have greater sustainability of the project, it is suggested that more individuals, through local consulting firms, be provided in-depth audit training.

The Project has to date been limited by the Project design to three economic subsectors, but should now be unrestricted. Audit selection criteria should be developed to assist in selecting audit targets. This would not require the contractor to work in all sectors, but would allow more flexibility in selecting facilities to audit, and therefore greater potential for substantial energy savings.

Major Recommendations

- **Audits (and audit reports) of less complex or technical buildings and processes do not need to be as detailed as other audits and reports. These audits can be shorter in scope, taking less time to prepare.**

- **The Project should train more engineers in auditing services, since one measure of the sustainability of the project will be the number of trained people and the quality and depth of their training. The number of individuals receiving on-the-job training through subcontracts should be increased.**

- **All commercial/industrial sectors should be allowed to participate in the project. Audit selection criteria should be developed to determine sectorial preferences.**

Training

The workshops and seminars offered by the Project have been perceived by participants as very appropriate to their needs. In particular, the targeted seminars have been successful in addressing the needs of specific sectors for energy management training. The development of the university level curriculum is progressing; efforts should continue in this area. The vocational training in connection with the Office de la Formation Professionnelle et de la Promotion du Travail (OFPPT) appears to be a promising activity.

U.S. training has not yet begun. The Project must begin this activity soon to provide the level of training specified in the project (60 person months). One barrier to the implementation of U.S. training is the generally poor English language skills of potential trainees. This needs to be overcome by increasing their instruction in the language or by providing interpreters for training programs and study tours.

Major Recommendations

- **The Project should pursue implementation of the U.S. training. A targeted training plan, including estimated levels of resources and trainee selection criteria should be developed. This training should focus on industry-specific study tours.**

- **The seminars held in the Project to date are very effective in reaching the targeted subcontractors, both in terms of energy management training and in designing follow-up activities in each subsector. It is recommended that technical seminars, such as the seminar conducted for the Safir chain, be marketed to similar institutions.**

- **The development of the 6th year curriculum at ENIM should be pursued actively. This appears to be very important to a number of institutions interviewed by the evaluation team.**

Policy Studies

The determination of terms of reference and coordination of the Contractor's implementation of policy studies requires the cooperation of Ministere des l'Energie et des Mines (MEM) and USAID collaboration. The Contractor's resources and work load justify their not having taken the initiative to instigate this aspect of the Project.

Major Recommendation

- **The Contractor should increase the level of effort devoted to working with MEM to jointly determine a short list of areas for policy oriented studies to advise decision-makers in the public sector on steps to be taken to support new EDM activities.**

Private Sector Development and Project Sustainability

A major focus of the Project is market development for the provision of energy services and equipment, and the establishment of the core of a national energy demand management program. This involves building the capabilities and awareness of consulting firms, trade associations and educational institutions. The Project is currently constrained by the amount of human and financial resources available, especially the financial resources available for subcontracting. Devoting additional financial to subcontracting would enhance the Project's sustainability.

Major Recommendations

- **The Project should train more subcontractor engineers in auditing services. The number of individuals receiving on-the-job training through subcontracts should be increased.**

- **The promotion of EDM, and broadening of the market for EDM services should do more to attract medium and small enterprises. For example, auditing services offered through the project should be broadened to provide an array which ranges from the thorough to diagnostic services.**

Conclusion

The evaluation team concludes that the Contractor has made significant progress in many areas of the EDM project. There are a few areas that the rate of achievement must be increased to reach the output identified for the project, while effort in the remaining areas should be maintained. The contract should be extended to 60 months, and an additional $600,000 should be allocated to the project in order to continue the rate of achievement.

I. INTRODUCTION

This report presents the findings, conclusions and recommendations of the mid-term evaluation of the Energy Demand Management (EDM) Project. This is a four-year project funded by the U.S. Agency for International Development (USAID) in co-operation with the Ministere des l'Energie et des Mines (MEM), Government of Morocco (GOM). The Technical Assistance Contractor who is implementing the project is RCG\Hagler, Bailly, Inc. (HBI). The U.S. subcontractor to Hagler, Bailly, Inc. is International Development and Energy Associates, Inc.

The mid-term evaluation was conducted by a team of three consultants from Resource Management Associates of Madison, Inc. (RMA). The team, consisting of an engineer, an economist and a project institutional and training specialist, were in Morocco from September 23 to October 11 to conduct the evaluation. All major participants in the Project were interviewed, including Mission and GOM officials, contractor personnel, subcontractors, participating firms and training institutions. The evaluation team travelled to Rabat, Agadir, Casablanca, Marrakech and Kenitra to interview parties to the Project and make on site inspections of energy management measures.

The organization of the report is as follows. Section II presents the background to the EDM Project, including a discussion of the project design, objectives and implementation plan. Section III describes past and ongoing activities and the status of the Project at the time of the mid-term evaluation. This section is also organized according to the components outlined in the Project Paper. Evaluation findings are contained in Section IV. Finally, Section V presents the evaluation team's recommendations for the remainder of the project. Appendices include the evaluation scope of work, current logical framework, description of the methodology used in the evaluation, bibliography of documents consulted and list of persons contacted by the evaluation team.

II. BACKGROUND OF THE PROJECT

A. History of the Project

The Energy Demand Management (EDM) Project is the result of wide-ranging experience in the energy sector in Morocco and several specific project feasibility studies. Prior to the EDM Project, USAID has had two major energy projects in Morocco, specifically:

1. The Renewable Energy Project; and
2. The Energy Planning Project.

In the fall of 1986, a large delegation from Morocco attended the ANE Bureau Regional Workshop on Energy Conservation and Private Power Generation, which initiated a discussion of a national energy demand management program. Subsequently, a team from Hagler, Bailly, Inc. (HBI), under the Energy Conservation Services Program (ECSP), performed a pre-feasibility study for the Energy Demand Management Project which examined the potential and the barriers for energy demand management in Morocco. The pre-feasibility study was completed in mid-November 1986.

The Project Identification Document (PID), completed in December 1986, envisioned a $20 million project, which would consist of:

1. $5 million grant for technical assistance, training, limited commodity procurement, and policy studies;
2. $10 million loan for capital financing of energy efficiency investment; and
3. $5 million host country contribution.

The specific budget allocations are shown in *Table 1.*

Table 1: PID Summary Financial Plan
($1,000s)

Budget Line Item	USAID Grant	AID Loan	GOM	Total
Tech. Assistance	3,000		800	3,800
Commodities	500		500	1,000
Training	400		400	800
Capital Financing	----	10,000	2,500	12,500
Studies/Action Plans	500		500	1,000
Evaluation/Audit	150		50	200
Contingency	450		250	700
Total	5,000	10,000	5,000	20,000

The PID was approved by USAID/Washington, in February 1987. However, USAID/Washington deferred approval of the capital financing component until further information and analysis identified credit liquidity as a true constraint to the adoption of EDM technology. A feasibility study was then conducted which concluded that liquidity was not a constraint to the application of EDM in Morocco. Thus, the Mission decided to defer the capital financing component of the project.

The Mission Review Committee reviewed and recommended approval of the EDM Project in March 1988. The scope of the Project was reduced, including a narrowing of the focus to three sectors of the economy for technical assistance and training. Project activities are largely directed to the private sector entities in these three sectors. Expansion into other sectors would be based on the recommendations of the mid-term project evaluation. However, discrete project activities in other sectors, as determined by the Project Steering Committee, could be included if warranted.

The staffing of the Project was also changed. The PID identified the technical assistance component to include three long-term resident advisors. The Project Paper and subsequent Request for Proposals (RFP) identifies the technical assistance component as including two long-term resident advisors and three Moroccan professional staff, to be hired by the Contractor.

The Project Agreement was signed with the Ministry of Finance in July 1988, with a Project Assistance Completion Date (PACD) of September 30, 1993. The USAID contribution was set at $5 million. The GOM expected contribution was set at $800,000. In addition, to reflect the private sector orientation of the project, the expected contribution from the private sector during the life of the project was set at $2,200,000. The expected project contributions are detailed in *Table 2.*

Table 2: Summary Financial Plan
($1,000s)

Budget Line Item	AID Grant	GOM	Private	Total
Tech Asst	2,800	400	200	3,400
Commodities	850	50	1800	2,700
Training	500	200	200	900
Policy Analysis	200	50	----	250
Evaluation/Audit	150	----	----	150
Contingency	500	100	----	600
Total	5,000	800	2,200	8,000

The goal of the EDM Project is to save foreign exchange and increase productivity by reducing energy waste and by improving efficiency of energy use in Morocco. The purpose is to develop and implement the core of a national energy demand management program. The Project concentrates on, but is not limited to, three sectors that offer promising energy savings potential, appear capable of absorbing and benefitting from EDM technologies and are important to Morocco's economic base. The sectors are: 1) agro-industry; 2) construction materials; and 3) hotels. The Project is expected to result in savings of 60,000 toe per year by the end of the project.

The RFP was issued in December 1988, two years after the PID. RCG\Hagler, Bailly, Inc. (HBI) was the only firm to submit a proposal. This caused the USAID proposal evaluation committee and the Ministry of Energy and Mines (MEM) some concern as to why there was only one response to the RFP. The Mission Contracts Office conducted an evaluation to determine whether all procedures had been properly followed, and concluded that they had been. The decision was made not to open the project for re-bid.

USAID and the GOM did a careful evaluation of the HBI technical and cost proposal. The negotiator for USAID was able to reduce the cost of the HBI proposal by over $1 million, with no reduction in the level of effort. However, the cost of the technical assistance component of the Project was substantially higher than USAID had projected. A contract with HBI was signed in May 1989, for a 36 month period, with a 16 month option period. The project budget upon signing of the contract is as shown in *Table 3*.

Table 3: AID Project Budget
($1,000s)

Project Element	ProAg	PIO/T	HB Basic	HB Option	HBTot
Tech Assistance	2,800	3,223	3,047	766	3,813
Commodities	850	260	264	44	308
Training	500	330	278	77	355
Policy Analysis	200	----	----	----	----
Evaluation/Audit	150	----	----	----	----
Contingency	500	187	----	----	----
Total	5,000	4,000	3,589	887	4,476

As can be seen in *Table 3*, the PIO/T was approved for less than the anticipated funding level, due to an error in requesting funds for the project. This was the major reason for the decision to contract for the initial 36 month period with the 16 month option. By limiting the contract period to three years, the projected expenditures would stay within the amount allocated by the PIO/T.

B. Project Objectives

As described in the Project Paper, the project purpose is to develop and implement the core of a national energy demand management program. The strategy for achieving the project purpose involves several elements:

- Develop an understanding, awareness and consciousness of EDM, first within key sectors and then throughout Morocco;
- Intervene with selected firms within key sectors by conducting audits, feasibility studies and demonstration projects;
- Build up a capability within Morocco to conduct energy audits and implement energy demand management techniques; and
- Conduct specific studies to influence policy decisions on energy management issues.

To accomplish the above objectives, the EDM Project has four main components:

- Information and awareness;
- Technical support;
- U.S. and in-country training; and
- Policy analysis.

Expected outputs for each component are shown in the project logical framework contained in Appendix B. The major elements of each component are described in Section III.

C. Implementation Plan

The Project Paper describes the roles of the key actors in project implementation, summarized briefly below:

1. USAID contracts with a technical assistance contractor to implement project activities and interact directly with firm owners. The technical assistance contractor subcontracts directly with Moroccan individuals and firms to help carry out project activities.

2. USAID and GOM establish a Steering Committee to monitor project activities and formulate policy directions for the Contractor. The members of the Steering Committee include representatives from USAID and MEM.

The project design gives primary responsibility for project implementation to the technical assistance contractor and minimal responsibility to both USAID and the GOM. A Project Manager is designated in both USAID and MEM to provide oversight to the Project. The Steering Committee is to meet quarterly to review progress and consider policy issues. The technical assistance contractor is to work with other key actors in project implementation,

including the (ENIM), trade associations (e.g. the American Chamber of Commerce, Confederation Generale Economique du Maroc, and the Federation des Chambres du Commerce et de l'Industrie). The local subcontractors and the three Moroccan professionals hired by the Contractor are key elements of the project's capacity to provide technical assistance.

At the time the project was developed, the design was a new approach by USAID to focus on the private sector. The relationship between the Contractor, responsible for project implementation, and the GOM is indirect, as supported by the project organizational chart shown in *Figure 1* (from the Project Paper). The Contractor is expected to work directly with the private sector to encourage energy demand management activities, and is involved in national energy planning or policy activities only in an advisory capacity.

It should be noted that there is no direct connection between USAID and MEM. This is probably misleading, since in practice USAID and MEM discuss the project informally when required. This relationship should be represented by a broken line between USAID and MEM. The significance of *Figure 1* is the direct connection between the technical assistance contractor and the end users. This is a major departure from typical USAID projects, which generally work with the government directly, or with the private sector through the government.

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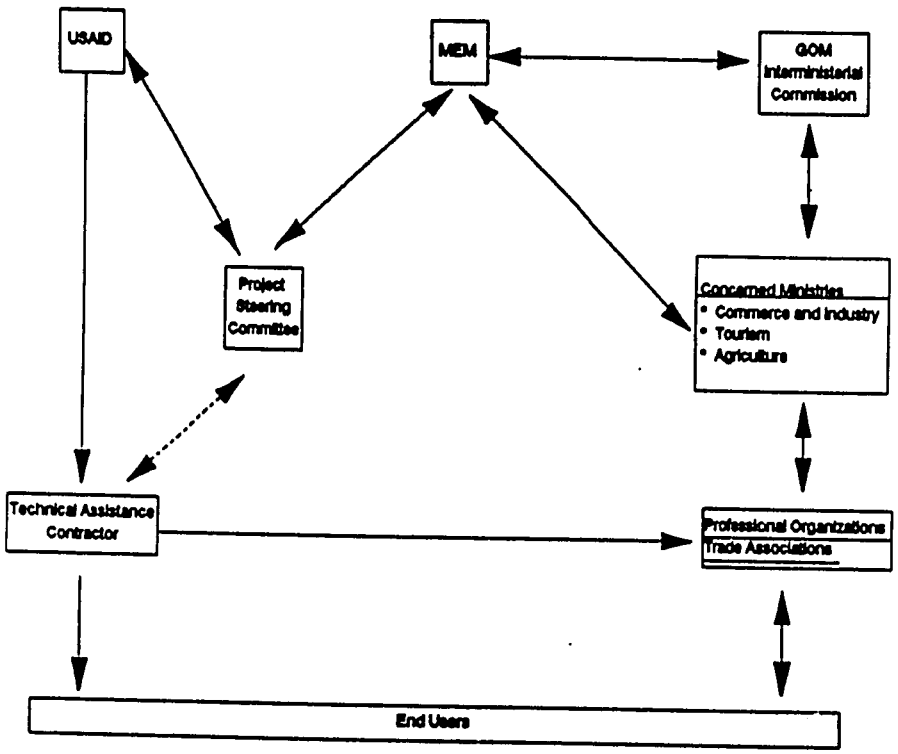
Figure 1. Project Organizational Chart



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III. PROJECT STATUS

A. General Overview

This section reviews the scope of work from the Project Paper and presents the evaluation team's findings. The scope of work covers activities in the four components of information and awareness, technical support, training and policy studies. The last part of this section addresses management support.

It should be noted that the Gulf War crisis had some impact on project implementation. Although the Chief of Party and the Energy Demand Specialist were evacuated, the Moroccan staff continued with project operations. The Chief of Party remained in close contact with the Project staff through phone and fax communications. From what the evaluation team was able to determine, the major impacts of the Gulf War included: 1) the bioclimatic demonstration project was delayed; 2) the planned audit training for ENIM was canceled; 3) the workshops needed to be rescheduled for a later date; and 4) contacting potential audit facilities was postponed until the situation was resolved. The Chief of Party was absent for approximately two months, but estimates that the impact on the Project was to delay activities for 3-4 months.

B. Information and Awareness

The information and awareness component of the project is to organize workshops, seminars and targeted campaigns; promote technical publications; conduct surveys and database development; fund international exchanges and study tours; and establish information centers for EDM technology. In addition, it is expected that the Project will support the establishment of an Energy Manager's Association to encourage the spread of energy efficient practices and information.

1. Information Campaigns, Seminars and Workshops

To disseminate information and raise awareness about EDM practices and technologies, the Project is to organize specialized campaigns, seminars and technical workshops. Information campaigns consisting of posters, brochures, discussions and lectures to sensitize upper level managers to the potential benefits of EDM were initially to target agro-industrial subsectors, followed by construction materials and hotel sectors. The Project is to organize seminars and workshops several times per year, focusing on particular sectors or subsectors and on particular EDM technologies. These seminars and workshops are to be aimed, for the most part, at technical personnel, and plant and energy managers.

Following the arrival of the Chief of Party in September 1989, the Project was effectively launched with a number of activities designed to disseminate information and raise awareness about the Project and about EDM practices and technologies. The official opening of the Project office on November 28, 1989 was attended by the Minister of Energy

and Mines, the USAID Mission Director and some 60 invited guests. The next edition of L'Opinion carried an extensive article describing the Project. The article was partly drawn from a 26 page brochure produced by the Contractor that described the Project, and the origins and purposes of energy demand management. The brochure was aimed at senior managers of middle to small sized companies who may have limited prior knowledge of energy demand management. Initial promotional activities in the last months of 1989 included a presentation on the Project by HBI resident advisors to the American Chamber of Commerce in Casablanca (contacts made at the presentation resulted in the first cost-shared project audit).

The Project has established contacts with the National Association for Canneries and the Safi Region Association of Fish Canneries, which has distributed a mailing of individually addressed letters and questionnaires about recipients' interest project related activities. Contacts with the national association for the sugar industry were established and discussions held with individual companies. Association members expressed interest in possible cooperation on activities that included organizing a workshop for technical directors.

Project personnel have given presentations at seminars organized by the National Hotel Industry Association (FNIH), which has also undertaken to mail to its 200 members publicity for training courses. Contacts with the Casablanca and Marrakech regional hotel associations were also established. The Project in the hotel sector was effectively promoted by organizing a one day seminar for hotel owners, which was held at Agadir in February 1990. The objectives of the seminar were to make hotel owners aware of potential energy savings and to demonstrate the advantages of energy demand management, present the results of two hotel audits and explain the services obtainable through the project.

Sectorally diverse dissemination of information has also been planned and carried out, for example, through meetings with the Director General of the Federation of Chambers of Commerce and Industry. As a result, the Director General agreed to send to the heads of regional chambers of commerce a mailing which introduced the Project, emphasized the training workshops and contained a questionnaire to elicit specific interests, such as presentations by project engineers to periodic meetings of the regional chambers.

Project seminars and workshops aimed primarily at technical personnel, plant and energy managers are covered in Section III.D, "Training".

2. Technical Publications and Brochures

To broaden understanding of EDM concepts and recent advances within hotels and other target interest groups, the Project is to sponsor articles for trade association newsletters and similar publications. At the end of the second year of the Project, after creating a basic demand for EDM information, the Project was to initiate and finance a technical publication targeted to industrial plant managers and engineers. Subscriptions and advertising revenue were expected to eventually sustain the publication.

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Publication of technical material under the Project has been primarily directed towards training (manuals are described below). As previously mentioned, an initial project brochure was aimed at managers with limited prior knowledge of energy management. Not yet published, but with text and art work completed, is a promotional brochure entitled "Bioclimatic Techniques for Hotel Design", which will be available free of charge. Production of a brochure on energy management for the industrial sector was in the 1990 Work Plan but was not carried out; subsequently planned for 1991, the brochure has since been deferred to 1992 due to other priorities for staff time.

The first issue of the project's publication "Gem-O-Gramme" was produced in May 1991. This 4 page newsletter, in which a brief questionnaire on recipients' interests was inserted, was mailed to 300 people and firms with whom the Project had direct contact. The Contractor also distributed the newsletter at an energy seminar (sponsored by the World Bank and the United Nations Development Programme) in Marrakech and at a meeting of the Casablanca Region Hotel Association. The second issue was produced and distributed in September 1991. The goal is to produce two more issues in 1991 and quarterly issues thereafter.

3. Surveys and Establishment of a Database

The Project is to finance an annual energy consumption survey to obtain a good information base on energy use within target sectors. The task is to be carried out by the Contractor or Moroccan subcontractor, and the Contractor is responsible for computerized data storage. The data is to be incorporated by MEM into it's Energy Information and Documentation Center. The Project Paper states that the MEM shares data analysis responsibilities with the Contractor.

The services of a Moroccan company (Sigma Tech Ingenierie) were subcontracted to develop and carry out a survey to obtain an information base on energy use within target sectors. The surveys covered hotels (in classes ranging from 2 star to 5 star), brick works, oil processing plants and canning factories (for fish, fruit and vegetables). Survey work consisted of five phases: 1) determining the basis for a sample survey; 2) determining the sample size; 3) survey instrument and its initial testing; 4) carrying out the actual survey; and 5) compilation and extrapolation of the data. Annual energy consumption for 1985 to 1989 is a significant portion of the five page questionnaire that was addressed to fifty-one hotels, five brick works, seven oil processing plants and twenty-four canneries. The subcontractor's reports, covering the five phases of the work, were completed between April and July 1990.

In the first quarter of 1990, a structure of a computerized database for the Project was designed, tested and documented by a short-term HBI consultant. One of the Project's engineers participated in database development. The database was designed to consist of two structured parts and a set of tables. The primary part is for company and project data, the secondary part for keeping track of project literature, training activities, subcontractor

capabilities, performance and certification. The primary part of the database consists of 16 inter-related main tables and the secondary part has 4 main tables.

Entering data into the computer has been done by project personnel with some assistance by a fifth year student from ENIM. The database is being used by Project staff to support eight identified activities which include analyzing impacts (by comparing energy consumption after EDM intervention with baseline consumption extrapolated from four previous years), supporting statistical analysis and tracking project activities.

4. Information Centers

The Project is to establish information centers at cooperating professional and trade association headquarters and, as warranted, help upgrade the MEM Information and Documentation Center in the field of EDM.

The Contractor has established contacts with a number of professional and trade associations, such as the National Association of Regional Federations of Chambers of Commerce and Industry, with the objective of disseminating information about the Project as a whole, and more specifically to solicit their assistance in publicizing training workshops.

To help upgrade the MEM Information and Documentation Center, the Contractor has subscribed to Energie Plus, Chaud et Froid, Chemical Engineering, Power and the journal of the U.S. Electric Power Research Institute.

5. Energy Managers Association

The Project is to support the establishment of an Energy Managers Association to serve as a forum for private and public sector energy managers and engineers to share EDM information. The contractor's Chief of Party stated that to date this has not been developed because of lack of staff time and higher priorities. Nevertheless, he has discussed the concept informally with a number of companies in the Casablanca area. The Contractor intends to launch the first "Club Energie" by February 1992.

6. Study Tours

The Project is to finance five study tours, each involving four to six persons, to acquaint key Moroccan managers and engineers in government, the private sector, professional associations and educational institutions with recent advances in EDM and familiarize them with U.S. equipment. Study tour activity, which has included a two day tour in Tunisia, is covered in Section III.D, "Training".

C. Technical Support

The technical support component stresses know-how and technology transfer to plant operators and management. The planned activities fall within two main areas: 1) energy audits and feasibility studies; and 2) technology applications. The project is expected to finance approximately 40 audits and 45 techno-economic feasibility studies. The Project Paper specifies a cost-sharing arrangement for both the audits and feasibility studies. The project is expected to fund approximately 15 technology applications with the budget for commodities, which is outside the Technical Assistance contract. The purpose of this activity is to demonstrate the technical, economic, financial and managerial feasibility of using selected EDM technologies in Morocco. Specific criteria are identified in the Project Paper for the selection of technical applications. A cost-sharing formula is also specified for technology applications.

It should be noted that the Contractor has developed two activities which were not envisioned in the Project Paper: Boiler Tuneups and Electric Bill Analysis. These are described below.

1. Audits and Feasibility Studies

The Project Paper indicates that "audits inform the firm of how energy efficient it is in general and identifies areas for further analysis". For feasibility studies, the Project Paper states that "these studies work out the details of specific interventions, including their technical and economic costs and benefits". The conventional definition of an audit includes both the identification and the analysis of energy improvements, rather than separate them as the Project Paper does. The Contractor has followed the conventional definition of an audit, thus the audits include "feasibility studies" for each firm. The delineation in the Project Paper between audits and feasibility studies has caused some confusion, as it was perceived by the Contractor that the feasibility studies are separate from the audit work. The evaluation team interprets the feasibility study requirement to be included as part of the audit work.

Auditing efforts have been in three sectors: 1) hotels; 2) construction materials; and 3) agro-industry. Each of the three staff engineers has been assigned to one sector as his main responsibility. The engineers were hired between October 1989 and December 1989.

The Project provides funds to be used for a portion of the cost of all audits. For the first two years of the Project, the participating firms agreed to pay a percentage of the cost, usually 25%. This cost share portion is to rise during the third and fourth years, based on the ability of the firm to pay. The Contractor is expecting to ask for 50% of the cost during the third year of the Project, with the exception of the hotel sector. The Gulf War in 1991 caused hotel occupancy rates to plummet, and hotels in Morocco are in general still trying to recover from many months of lost revenue. Therefore the hotel sector will still be charged approximately 25%. The cost sharing portion for the facility being audited will rise

to 75% in the fourth year of the Project. The revenues generated from the cost sharing go into a special account, which is to be used to reduce the Contractor's invoices submitted to USAID.

The Project Paper calls for forty audits to be completed during the life of the project. The Work Plans for 1990 and 1991 show a total of fourteen audits planned for this period, as shown in *Table 4*. The Revised Work Plan for 1991 reduced the number of audits to be accomplished in 1991 from six to five, so the total number of completed audits after two years would be thirteen. This reduction was in response to the suspension of activities due to the Gulf War.

Table 4: Planned Number of Audits by Sector, 1990 and 1991

Year	Sector	Number of Audits
1990	Hotels	4
	Agro-Industrial	3
	Construction Materials	1
1991	Hotels	2
	Agro-Industrial	3
	Construction Materials	1
	Total	14

At the time of the mid-term evaluation, eight audits had been completed and three others were in progress. In addition, one audit began on October 7, 1991, and another contract had been signed. The status of the auditing activity as of October 7, 1991 is shown in *Table 5*.

Table 5: Status of Auditing Activity, October 7, 1991

Facility	Sector	Status
1. Maroc Lait	Agro-Industrial	completed in 1990
2. Europa Safir	Hotel	completed in 1990
3. Co-lait	Agro-Industrial	completed in 1990
4. Conserves (Meknes)	Agro-Industrial	completed in 1990
5. N'Fis	Hotel	completed in 1990
6. SBS Porcher	Construction Materials	completed in 1990
7. ASMAR	Construction Materials	completed in 1991
8. LCC	Agro-Industrial	completed in 1991
9. Lido Salam	Hotel	in progress
10. Sunag	Agro-Industrial	in progress
11. Royal Mansour	Hotel	in progress
12. CIOR	Construction Materials	contract signed
13. Takida	Hotel	contract pending
14. Liwa Chain	Hotel	contract pending

2. Boiler Tune-ups

A boiler tune-up program was initiated in 1990 to demonstrate the importance of energy efficiency for boilers. The activity began with a test phase covering ten facilities. A sub-contractor (Apave) was hired to work on this program and to conduct the actual combustion efficiency testing and adjustments. The participating facilities are shown by sector in *Table 6.*

Table 6: Facilities in Boiler Tune-up Test Phase

Facility	Sector
Inam Provimi	Agro-Industrial
Somadir	Distillery
Good Year	Rubber
Icoma	Textile
Aiguebelle	Food
Frumat	Food
Sopic	Paper
Iboma	Textile
Filroc	Textile
Coca Cola	Food

The Contractor is currently evaluating whether to proceed with a pilot program, or to proceed directly to a commercialization phase. This activity has not been restricted to the three sectors targeted in the Project.

3. Electric Bill Analysis

A local subcontractor, Techni-Controle, was hired in 1991 to implement a program dealing with simple electric principles. This program explained the electric bill details (including rate structure, energy consumption, and costs) to the participating facilities. In addition, the concept of power factor was discussed. The goals of this program are to help the facility match its contract for electricity to its power requirements, and to show the savings due to power factor correction. The program has three phases: test, pilot and commercialization. The ten facilities that participated in the test phase are identified in *Table 7.*

Table 7: Facilities in Electric Bill Analysis Test Phase

Facility	Sector
Moulins de Maghreb	Agro-Industrial
SOCAMAR	Agro-Industrial
Maghreb Tube	Construction Materials
SOMAGAL	Construction Materials
FILATIS	Textiles
MOULITEX	Textiles
SOFT	Textiles
BATA	Footwear
Dounia Plast	Plastics
General Tire	Rubber

4. Combustion Efficiency Measurement Equipment

Forty Bacharach combustion efficiency measuring instruments have been purchased by the Contractor to lease out to the private sector. A two year lease is planned, at a cost of 3,000 Dirhams, which includes training by the staff engineers. This activity has not yet begun.

5. Demonstration Projects

No demonstration projects (technology applications) have been undertaken in the project. These are typically new boilers, a cogeneration system, a heat exchanger, or other equipment which increases the energy efficiency of the firm. This activity is to be financed using the cost sharing formula. A study of "bioclimatic" design for the Hotel Dounia in Fez was completed. This is a generalized study of the potential benefits in new hotel design to

fit the location's climate. A training program on this topic was to be held in 1991. This hotel study was being considered for a demonstration project, but has been set back by the general weakening of hotels' cash flow situation resulting from the impact of the Gulf crisis on tourism and hotel occupancy rates.

D. Training

The training component of the project consists of activities in three areas: 1) U.S. training and study tours; 2) in-country training of energy engineers and technicians; and 3) development of the ENIM capability to offer practical energy management training as part of its curriculum. In addition to formal training programs, the project specified that the technical assistance contractor would hire three Moroccan professionals to work in the project office along with the ex-patriot personnel and be trained in the provision of technical assistance services.

1. In-Country Training

a. Workshops

The Project held workshops on Energy Management (one day) and Boiler Efficiency Improvement (two days) in various parts of the country in 1990, as shown in *Table 8*. Sigma Tech, a local consulting firm, was subcontracted to provide logistical, administrative and promotional support for the workshops, and to compile a summary of participant evaluations. The two workshops were scheduled on consecutive days in each location to encourage attendance at both. The total number of participants in the fourteen workshops was 165, 29 of whom attended both, and the average attendance was 12 participants per workshop. Companies often would send staff to both workshops, but not necessarily the same individual for the complete three day course. Fifty-two companies sent staff to the workshops. The distribution of participants by sector is shown in *Table 9*.

Table 8: 1990 EDM Project Workshops (Oct. through Dec.)

	Energy Management		Boiler Efficiency	
Location	Date	Participants	Date	Participants
Casablanca	Oct. 15	19	Oct. 16, 17	13
Tangier	Oct. 23	5	Oct. 24, 25	5
Agadir	Oct. 30	2	Oct. 31, Nov. 1	6
Marrakech	Nov. 7	13	Nov. 8, 9	14
Meknes	Nov. 13	11	Nov. 14, 15	11
Safi	Nov. 21	14	Nov. 22, 23	22
Casablanca	Dec. 5	17	Dec. 6, 7	13
	Total	81	Total	84

Table 9: Sectoral Distribution of Workshop Participants, 1990

Economic Subsector	Energy Management	Boiler Efficiency
Agro-Industries	23	21
Energy & Mines	19	31
Chemicals	9	3
Hotels	7	12
Administration	6	3
Metals,Electronics	6	5
Cement	6	5
Textiles, Confectionery	5	4

Forty percent of the participants in the workshops were from the Office Cherifien des Phosphates (OCP). Since none of the workshops were filled, participation of non-targeted sector firms (such as OCP) did not displace anyone and, therefore, was acceptable.

The materials used in the workshops were adapted from HBI manuals used on previous projects. Manuals were revised, including making the examples pertinent to the energy situation in Morocco, and translated into French. This work was done by a subcontractor and project staff. Workshops were taught by a combination of HBI short term staff, Moroccan professional staff and local subcontractors.

Plans are well underway for the 1991-92 schedule of workshops. In addition to boiler efficiency and energy management, two-day workshops have been developed in electrical

systems and steam systems. All four workshops will be held once in Fes, Tangier, and Marrakech, and twice in Casablanca. Agadir was dropped from the schedule due to low enrollment in 1990. Meknes and Safi were also dropped because it is assumed that participants from these areas will travel to nearby locations to attend the workshops. Electrical Systems and Steam Systems workshops will be held in late October through mid-December 1991, and Energy Management and Boiler Efficiency will be held in January through February 1992. Announcements of the training workshops were mailed to over 400 persons on the Project mailing list. The manuals for these courses were completed in September 1991.

b. Seminars

In addition to workshops, seminars have been offered by the project in response to specific needs identified in the course implementing the project. These seminars are described briefly below.

Energy Audit Training Course

An energy audit training course was developed for the purpose of training subcontractor engineers to participate in the project audits. The course was based on an HBI audit manual, which was translated into French and adapted for Morocco. The audit course, which took place in March 1990, was attended by a total of 15 engineers and technicians, including 12 from the private sector and 3 from MEM. The course was 15 days in duration, 4.5 hours per day. Twelve additional hours were devoted to using spreadsheet software for energy balance and energy analysis calculations. The manual used in the course is the basic reference document for all audits carried out by the project.

Hotel Energy Management Training Course

As a result of the Europa Safir Hotel audit, the project proposed organizing a training seminar for the Technical Directors of the Safir chain. This two-day seminar was conducted in May 1991. The seminar was designed to disseminate energy management lessons learned from the audit to the rest of the chain. Following the technical seminar, a one-day seminar was conducted in June 1991, for the Directors General of the Safir chain. All of the Safir hotel managers in Morocco participated, along with the chains's central management and the Operations Director of the Tunisian Abou Nawas hotel chain. A similar energy management seminar had been planned for the Dounia/PLM Chain, but has not been scheduled to date. This is primarily due to the non-payment of PLM for services rendered by the project to the Hotel N'Fis.

Construction Materials Seminar

The cement industry accounts for 7% of total national energy demand, and its energy bill is approximately $100 million per year. Because of its high energy consumption, the project

has chosen to focus its efforts in the construction materials subsector on the cement industry. In accordance with this strategy, a five-day technical training seminar was held in Rabat in June 1991. The main objective of the seminar was to instruct participants in the use of an HBI model for calculating the thermal and material balance of a cement kiln. The model is a tool for energy management which permits plant engineers to calculate balances based on measurements taken by plant personnel equipped with the proper instruments. Five of the eight cement companies in Morocco participated in the seminar. The project's Energy Demand Specialist (Y. Gravel) and Senior Engineer (M. Lahbabi) conducted the seminar. Cost sharing for the seminar was set at 3,000 Dh per participant.

c. University Level Curriculum Development

Several discussions have been held between Project staff and ENIM professors concerning the creation of an energy curriculum. The Project had intended to conduct the five-day energy auditing course for 6th year students of ENIM. The seminar was scheduled for early February, but had to be canceled due to the Gulf Crisis. More importantly, according to Project documentation, ENIM has decided to create an energy curriculum in part using some of the training materials developed by the Project. It is also anticipated that the Project will provide some 60 reference books on energy for the department's library, and possibly, some audit instruments.

d. Vocational Training

The Office de la Formation Professionnelle et de la Promotion du Travail (OFPPT) is the national vocational training office. A cooperative activity is being developed under which the Project will assist with the training of instructors who will belong to a new vocational training school being set up by OFPPT to train plant technicians in thermal operations, including boilers. This would be Morocco's first and only formal vocational training school for boiler operators. Discussions are currently being held to determine how the Project could assist in the development of the boiler training program, which would include energy efficiency training.

2. U.S. Training

No U.S. training has taken place in the project to date. Plans are currently being made for training which is to take place in the spring of 1992. According to the Chief of Party, the following opportunities are being considered for U.S. training:

1. Sugar Industry Study Tour (4th Quarter of 1992). The approach being suggested is to send participants to selected plants in the U.S. which have computerized process control, solar drying of beet pulp waste and recovery of process heat for waste pulp drying and pre-process drying. Candidates for training will be solicited from both the Sugar Trade Association and industry leaders, particularly ONA, which owns four of thirteen sugar plants in the country. The tour will have to be accompanied by a

French-speaking HBI engineer, since sugar executives will not have time to learn English.

2. Short courses lasting 3 to 10 days.

   a. OFPPT. It is under discussion that candidates chosen by OFPPT will be sent to the U.S. in 1992 for short-term technical courses. English language instruction will be provided.
   b. Project Engineers. No specific areas have been identified for their training, but it is the intention of the Project to identify training opportunities, once their English language skills have been enhanced. Engineers Benkassi and Guemra are taking courses to improve their English.
   c. ENIM and Ecole Mohammedia. The Project would like to send junior professors, who have not done Masters or PhD's in the U.S., for short term courses.
   d. Individual companies. All of the "Contrats d'Adhesion" mention the possibility of training in the U.S. The obstacles to training individuals from companies were expressed to the Chief of Party as follows: 1) lack of candidates' knowledge of English and lack of time to learn; 2) unwillingness of management to permit key personnel to be absent; and 3) finding areas in the U.S. in which the U.S. is the technical leader when compared with France and other European countries.

The above training plans are in the initial discussion stage.

A two day study tour to Tunisia took place in May 1991. The participants included the Chief of Party, the three Moroccan project staff, and the USAID Project Officer. Although invited, no representatives of MEM attended this tour. The purpose of the study tour was to learn first-hand the approach to national energy improvement being taken by another country of the Maghreb. Visits were made to: 1) Agence de Maitrise de l'Energie (AME); 2) STEG, the national electricity utility; 3) Tunisie Lait; and 4) the Hotel Kuriat Palace.

E. Policy Studies

To advise decision makers in public and private sectors on steps to be taken to support EDM activities, the Project is to provide policy analysis through technical and policy oriented studies. Project outputs in the Project Paper include completion of four such studies. The contractor is to provide the terms of reference for these studies and coordinate their implementation, which for the most part are to be carried out under separate contracts made by USAID and the GOM.

Terms of reference for policy studies remain to be provided by the contractor. Policy studies were not included in Work Plans for 1990 or 1991, nor do they appear in any of the

quarterly reports prepared by the contractor. In the policy area, the Chief of Party noted that in response to a request from MEM, his staff had analyzed the foreign exchange implications of possibly exempting from import duties a chemical additive for use in cement making. He acknowledged that provisions of terms of reference for policy studies had received very little of his attention to date and had been briefly discussed internally, but not with MEM. Policy studies existing in the AID project budget rather than the Contractor's budget was cited as one reason for the contractor giving lower priority to policy studies.

Members of MEM pointed out to the evaluators that policy studies were an expected output of the Project and an area in which they valued consultants' assistance. Thus, they expressed disappointment in the contractor's neglect of this area. However, MEM also appeared to have neglected this aspect of the Project. Although MEM stated they had taken some initiatives for studies under the Project, the initiatives cited pertained to surveys for data gathering rather than policy studies.

F. Management Support

Management support to the project consists of project planning and preparation of work plans, financial monitoring and reporting, commodity procurement, contracting and logistical/administrative support. In addition to the support provided by the Chief of Party, the project administrative staff includes an Office Manager, an Administrative Assistant and a driver.

Outputs of this effort include the annual Work Plans (Plans d'Action 1990, 1991 and 1991 Revised); quarterly project reports; "Contrats d'Adhesion" for the audits; subcontracts for services; and financial reporting. Management support has also been provided in equipment procurement which totals nearly $147,000 to date (not including office supplies). Amounts expended for different categories of equipment are shown in *Table 10.*

Table 10: Equipment Expenses, by Type of Equipment

Category of Expense	Amount ($)
Computer Hardware	$31,100
Audit Equipment	52,300
Other (AV, fax, copiers,misc.)	18,500
Telephone System	5,300
Project Vehicles (2)	26,300
Furniture	13,200
Total	$146,700

All of the above equipment is used by the Project to support its activities, thus it remains in the Project office at the disposal of Project staff.

IV. EVALUATION FINDINGS

A. Introduction

This section contains the findings of the evaluation team, from interviews with participants in the Project, and from review of key Project documents. A description of the methodology used in the evaluation is contained in Appendix C.

B. Information and Awareness

1. Information Campaigns, Seminars and Workshops

In the 1991 Work Plan (January version), it is acknowledged that "very few of the promotional activities planned for 1990 were actually carried out". The plan explains that "one reason for this was that it was quickly perceived that there was considerable demand for the Project's services, and that it would be advisable not to create expectations that could not be satisfied. Hence, promotional activities were limited to the marketing of those services that the Project could actually deliver. The 1991 Work Plan continues that, " aside from promotional efforts for the Workshops and Boiler Tune-Up Service, we will similarly be limiting our promotional activities in 1991".

Hotel and industry representatives interviewed by the evaluation team generally had an active interest in project activities, and frequently expressed the view that their companies were more energy conscious than others in Morocco. Virtually all persons interviewed attached major importance to the necessity to disseminate information and promote greater awareness of the advantages, practices and technologies of energy management. Personal contact between project personnel and company decision-makers was cited frequently as a requisite for effective dissemination of information. It was generally expressed that the Contractor's activity in this area had been beneficial in having some impact in raising awareness; it was also frequently stated that awareness of EDM was not widespread, and that the Project should be doing more to publicize (and implement) energy demand management. Since personal contact is a rather labor intensive activity, there have clearly been limits to the extent to which project personnel could undertake effective energy consciousness raising, and this is reflected in the promotional strategy of the Work Plan. As the Project has progressed, it has developed opportunities for bringing interested parties together, in seminars for example, which should enable personal contact to operate more efficiently as the network of energy professionals develops.

From discussions and observations at many companies, the evaluation team has found that the level of awareness of EDM ranges from the nonexistent to interest in state-of-the-art applications, with the amount of a company's assets undoubtedly being one of the most important factors determining the extent of its consciousness of EDM practices and technologies. Large companies in targeted sectors and subsectors are interested in applications, and the same is evidently true of large companies in other sectors such as

textiles and mining. Within key sectors and subsectors, large consumers of energy, such as sugar mills, are typically more ready to implement energy efficiency improvement measures than smaller companies, such as Conserves de Meknes whose interest in EDM is a result largely of the Project's initiative. Our sources and general observations in Morocco indicate that smaller enterprises here are typically no more energy conscious than the Meknes plant prior to its audit under the Project. Since the Meknes plant is classed as a medium sized enterprise, there are undoubtedly many medium sized and small businesses that have very little awareness of energy management practices and benefits.

The advisability of not creating expectations that could not be satisfied, in the evaluation team's view, should not apply to general dissemination of information and promotion of awareness of energy demand management. Creating a market for private enterprise to flourish in the business of providing energy management services is vital to the sustainability of such activities following the end of the Project. While the MEM is the primary force for promoting energy awareness, the private sector slant and technical information resources of the contractor are a valuable complement to public sector publicity. The Project should explore the possibilities of the MEM publicizing the EDM services and technical brochures that the Project has to offer, as well as other interested and capable entities, such as the "Energie Club".

Discussion of seminars and workshops is in Section IV.D, "Training".

2. Technical Publications and Brochures

The Project has sponsored a number of articles specifically for publication by other organizations (including the press). However, there appear to be few trade association newsletters and similar vehicles that might carry technical articles. The manager of one hotel expressed the view that trying to raise awareness of EDM by means of such channels would be much less effective than personal contact with hoteliers. Press releases, or short articles, describing results of EDM measures carried out as a result of project audits is one channel that warrants further consideration.

3. Surveys and Establishment of a Database

The work done by the subcontractor to obtain an information base on energy use within target sectors meets the Contractor's responsibilities to finance an annual energy consumption survey and implement its computerized storage. The sharing between the Contractor and MEM of data analysis responsibilities does not appear to have taken place as yet. In MEM's view, the survey data remains to be explained by the Contractor and reviewed with them before they can incorporate it in the MEM Energy Information and Documentation Center.

The survey results appear to have been of limited use to date in providing an adequate baseline for determining the impact of EDM measures. The effort to determine sectoral- or subsectoral-wide impacts seems likely to give results with a wide margin of error, given the numerous factors that affect on energy use. Consequently, it would be most useful for the Project to concentrate on determining EDM impacts on a case-by-case basis, which is the direction Project staff are currently pursuing, (aware that isolating impacts of measures from other factors typically is problematic even on a case-by-case basis). Annual energy use surveys are not part of the Project Work Plan and extensively monitoring energy use in all the sectors is beyond the Contractor's scope of work.

4. Information Centers

The scope for establishing information centers at cooperating trade association headquarters is difficult to gauge. Clearly, the Contractor has taken the initiative to use trade associations to disseminate information and to put association members in contact with the Project office when they want information about the Project or energy management in general. This is a case in which it would be advisable not to create expectations (of numerous free books, for example) that could not be satisfied by the Project.

With regard to helping upgrade the MEM Information and Documentation Center, the Contractor noted that the journal subscriptions by the Project were made on its own initiative, rather than in response to a request from the Ministry. HBI's Chief of Party also pointed out that one of the major tasks of the previous USAID Energy Planning Project was to equip the MEM Center with personal computers and database software. In regular monthly meetings, instituted last July between HBI's Chief of Party and MEM, it is likely that MEM will be taking some initiative in requesting further help to upgrade the Center. The evaluation team believes that some further help from the Project is warranted.

5. Energy Managers Association

Project activities have served to develop a sense of shared concerns among managers, engineers and others with a practical interest in energy management in both private and public sectors. The project newsletter, "Gem-O-Gramme", reaches a broad audience of persons most likely to be interested in having a regular forum for sharing EDM information. Consequently, the evaluation team believes that the Contractor's intention to launch the first "Club Energie" in the beginning of 1992 is likely to be successful, and be a significant development towards the eventual emergence of a nationwide association of energy managers.

6. Study Tours

Evaluation of study tour activity is covered in Section IV.D, "Training".

7. Recommendations

General recommendations to improve the work in the Informational and Awareness area include:

1. The project's activity in disseminating information and promoting awareness of energy demand management practices and technologies should not be limited by the possibility of creating expectations that might not be satisfied. Project publicity should emphasize the services that the project has to offer. Possible excess demand for project services should be dealt with by prioritizing demands according to criteria which need to be established or formalized.

2. The promotion of EDM, and broadening of the market for EDM services, should do more to attract medium and small enterprises. For example, auditing services offered through the project should be broadened to provide an array which ranges from the thorough to diagnostic services.

3. The extent of project resources available to help upgrade the MEM Information and Documentation Center should be clarified. The Contractor, MEM and USAID should jointly establish the priorities and extent to which Project assistance is warranted.

4. Project staff should work with MEM to interpret the Project's sample survey data on targeted sectors' annual energy consumption (and the other data from the survey) and facilitate its incorporation in the MEM Information and Documentation Center.

5. The Project should not directly engage in broad energy surveys, but should maintain up-to-date records of energy use by facilities that have used project audit, boiler tune up, electric bill and any other on-site services. This recommendation is not intended to preclude the possibility of the Project supporting public sector work in this area by assisting with terms of reference for policy studies. Studies could include sectoral or subsectoral sample surveys pertaining to energy demand management.

C. Technical Support

1. Audits and Feasibility Studies

Prior to this Project, few energy auditing activities had taken place in Morocco. The Project has trained its own staff of Moroccan engineers, in addition to providing varying amounts of training to other engineers and consulting firms. Other energy related activities have also helped to spread energy awareness to numerous firms in Morocco.

The quality of the audits generally appears to be very good. The audits are very technical, and have attempted to quantify existing energy consumption. Energy improvements are identified; the savings, estimated cost of the improvement, and simple payback periods are calculated (the Project Paper refers to this analysis of recommendations as feasibility studies). The audit recommendations typically focus on short term payback items which are most likely to be implemented by the facility. The audit staff has spent a considerable amount of time in performing professional energy audit analyses and preparing reports.

Interviews with facility personnel who have participated in the audit program indicate that, in general, they are very happy with the audits. Most of the companies have installed many of the recommended items, although one hotel has not installed any of the recommendations due to financial constraints. Although some of the individuals interviewed thought that the energy saved has not been large, they still were very positive about the quality of the audit and the focus on saving energy. When discrepancies or errors in the audit report were found, the report was corrected and then presented to the customer a second time. These discrepancies could be due to many reasons, including incomplete or inaccurate information given to the audit team.

The idea of cost sharing helps the Contractor ensure that the client has a serious interest in saving money, and that the recommendations of the audit will be considered for implementation. To date, 71.2% of the client share has been collected. The list of facilities, audit costs, and amount paid is shown in *Table 11* (the Lido Salam Hotel is not shown since the audit was not complete at the time of the evaluation).

Table 11: Total and Facility Share of Audit Costs (Dirhams)

Facility	Total cost	Facility share	Amount paid by facility
Maroc Lait	200,000	50,000	45,000
Co-Lait	180,000	50,000	45,000
Cons. Meknes	60,000	20,000	12,000
Europa Safir	300,000	30,000	30,000
SBS Porcher	110,000	45,000	45,000
Hotel N'Fis	90,000	30,000	0
ASMAR	375,000	100,000	100,000
LCC-Safi	200,000	32,000	6,000
Total	1,515,000	357,000	283,000

The list of audit clients that have not yet paid their full share includes some very large firms, which should not have any difficulty in paying. Incomplete payment may become more of an issue in the future as the facility share rises to 50% in 1992 and 75% in 1993.

Overall, the aggregate cost to clients of audits has been less than the anticipated 25%. At 25%, the total cost should have been 1,428,000 Dh. The difference between this value and the total cost of 1,515,000 Dh (87,000 Dh) is most likely due to the audits taking longer to complete than originally estimated and to a problem with the capabilities of a previous employee. This is especially noticeable in the Hotel Europa Safir and LCC audits, in which the facility's share turned out to be 10% and 16% respectively. These values are somewhat offset by other facilities with higher cost shares. To date, payments by the facilities amount to 18% of the total cost. The concept of cost sharing is valid, and helps to ensure that the participating firm is serious about the EDM concept. The Contractor should continue with the cost sharing requirement, and make every effort to collect the funds. To facilitate collections, the Contractor should insist on a payment schedule with each facility and not release the final report until payment is complete.

Staff Activities

The first eight audits required 745 person days to complete. This includes the time of HBI short term personnel, project staff, and subcontractors. Of this amount, there were 70 person days of HBI short-term personnel, and 75 days of subcontractor effort (48 days taking measurements and 27 days assisting with report writing and analysis). Therefore, the project staff had a total of 600 person days of effort on the first eight audits, for an average of 75 days per audit. It is assumed that the amount of time to perform the audits should decrease as the staff becomes more experienced. Due to the differences between sectors and types of facilities audited, it is difficult to determine if there is a trend towards the audits taking less time to complete. *Table 12* shows when the first eight audits were conducted. The number next to the facility is the total number of person days taken to perform the audit. This figure includes the project staff, HBI home office staff, and subcontractors.

Table 12: Time Period and Duration of Audits, 1990-1991

Sector	Time Period (quarter)						
	1989	1990				1991	
	4th	1st	2nd	3rd	4th	1st	d2
Hotels		Eurpoa Safir		N'Fis 45		GULF	
	STAFF	150					
Const. Matls.				SBS Porcher 55	Asmar 175		
	HIRED						
Agro-Ind'l		Maroc Lait 100	Conserves De Meknes 30	LCC Safi		WAR	
		Co-Lait 90			100		

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The time taken for the audit of the Europa Safir Hotel is due to work that had to be redone, and therefore should not be considered typical. In general, hotel audits are not very complicated, and thus should be able to be accomplished more quickly than those for the other sectors. The construction materials and agro-industrial sectors can be very specialized and very technical, and thus the audits of these sectors would generally take longer than hotel audits. The audit of the Conserves de Meknes (30 person days) is also not typical, in that only a portion of the facility was audited. Although a time improvement trend does not appear obvious in the chart, it does appear to indicate that most of the technical audits (non-hotel) are taking approximately 100 person days to complete. At the average cost of 2,000 Dh per person day, the typical cost is then 200,000 Dh. This figure appears to the evaluation team to be quite costly, and indicates that the Contractor should attempt to complete the audits in less total time.

In the remaining two years of the project, the three staff engineers have a total time availability of 1,584 work days (at 22 work days per month minus vacation and holidays). Since ten of the 40 audits had been completed by the end of September 1991, accomplishing the remaining 30 audits can involve at most 45.6 (1,368/30) person days per audit of their time. This is assuming that the engineering staff does nothing but work on audits, which is unrealistic. Since many of the audits have taken over 90 person days to complete, at this rate achieving the 40 audit goal appears questionable. However, the evaluation team has recommended that additional technical resources be made available to the Project through extension of the EDM specialist and increased use of subcontractors. With the addition of these resources, we believe that the goal of 40 audits is attainable.

The Project Paper identifies that 45 feasibility studies will be completed in the Project. These studies are to include details of the recommendations, and the economic costs and benefits. The Contractor is performing feasibility studies as part of the audit work. In the first ten audits, 111 energy improvements had been analyzed, far surpassing output of 45 specified in the Project Paper.

Another area of interest is the level of training that has taken place. The three staff engineers have been in place for approximately two years, although start up activities and the Gulf War have made the period of their participation in on-site audits closer to one and a half years. On-the-job auditing, as opposed to subsequent analysis and report writing, appears to be the most important factor in their experiential training. They are now at approximately the level where they can individually conduct or lead a full-scale audit. In addition, five other individuals have assisted on the audits, either as individuals or representing subcontracting consulting firms. These five have spent a total of 75 person days assisting on audits, compared to the 1-1/2 years of activity for each of the three staff engineers. The training received by the non-project engineers is obviously less in-depth than the training received by the three staff engineers.

A proposal for the Project to bring more individuals (from subcontractors such as Sigma Tech, Experdata and Techni-Controle) into the Project office on a temporary basis has

recently been approved. The Project would pay their salaries in full for the first six months, and then at a 50% level for the next six months. The first of these three individuals has been hired by Experdata, and began working with the HBI staff on October 7, 1991 on the Royal Mansour Hotel audit. They will receive approximately one year of training (the Experdata employee will work with HBI for 17 days of every month, with the remaining time being with Experdata) from the Project. At the end of this time, it appears likely that while these individuals will not be as well trained as the three staff engineers, they should be able to begin developing audit services for their companies.

This same arrangement is being considered by the Project in 1993, in order to train three additional engineers. With this arrangement, the Project will have thoroughly trained the three staff engineers, while providing another six engineers with on-the-job training, but to a lesser degree. Without expanding the training aspects of the Project, the sustainability of energy services and the development of an energy services market is questionable. By training more subcontractor engineers, the effects of the Project are spread over a larger resource base, and the subcontractor firms can begin marketing energy audit services themselves.

If the current three staff engineers remain with HBI until the end of the Project, they could potentially form a highly skilled consulting firm which would have a competitive advantage in Morocco. The potential exists for this firm to become an HBI affiliate or subsidiary, which could raise some contractual questions. This concern was expressed by a number of people interviewed.

In fact, the engineering staff have started to receive employment offers from private companies. In addition, they expressed clear dissatisfaction with their salary level, and may leave prior to the end of the Project. From working closely together, they have developed some mutual interdependence, so that if one leaves they may all leave. Their leaving before the end of the Project would impair the Project's progress, as new staff would have to be trained before they could be as productive as the present team of engineers. However, if they leave to create their own firm, or to join other firms, the sustainability of EDM may actually be enhanced.

The Project calls for follow-up visits to be made by the Contractor to assess the implementation of audit recommendations, and to assist in responding to any questions or concerns resulting from the audit. Interviews with managers at some of the audited facilities indicated that they had not yet had the follow-up visits that they had expected. Contractor's comments in reviewing the draft report indicated that there has been difficulty in scheduling the follow-up visits (see Appendix G).

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Hotels

Three hotels have been audited:

1. Europa Safir, Agadir
2. N'Fis, Marrakech
3. Lido Salam, Casablanca

The audit team recommended numerous EDM measures for each hotel. Payback periods for recommended measures at each hotel averaged approximately 7 months for both the Europa Safir and the N'Fis, and 13 months for the Lido. The Lido Salam audit results are included in *Table 13*, but results of the audit had not been presented to hotel management at the time of the evaluation since the audit report was not yet complete.

Table 13: Hotel Audit Results

Hotel	Items Recommended	Estimated Savings(toe)	Implemented		
			Number	Estimated Savings(toe)	Percent of Total Energy
Europa Safir	22	161	15	117.5	20.4
N'Fis	13	179	0	0	0
Lido Salam	15	189	Audit report has not been completed		
Total	50			117.5	

The estimated monetary savings from the implementation of audit recommendations is 223,250 Dh, based on a cost of 1900 Dh/toe for #2 fuel.

A decline in tourism due to the Gulf War in 1991 reduced hotel occupancy rates in Morocco. Being financially strapped, the hotel industry has had to cut back in many ways, from postponing construction of new hotels to simply reducing expenditures. This is apparent in the energy estimates shown in the table above, where all expenditures for the PLM chain (of which the N'Fis is a member) have been frozen. Therefore, additional hotel audits may not be a good target until the hotels can recover financially from the War.

The visit to the Europa Safir Hotel included a walk through the facility to observe what has been implemented. During this walk, a couple of items were noted that probably should have been included in the audit, but were not. These include insulation of the hot water

piping for heating of the swimming pool in winter, and potential heat recovery from the boiler exhaust. An additional item to be considered for hotels is energy management control of the guest rooms. Since the nature of this technology is based on electronic devices, vendors and experienced service technicians are required. Even though this technology is not currently widely available in Morocco, the hotel structure is a perfect sector to integrate the technology into the country. If one of the hotel chains can be convinced to use the equipment, the potential exists for rapid development through the other hotels in the chain. This would be a highly desirable demonstration project, where one of the hotel chain's employees could be trained to service and maintain the system.

Construction Materials Industry

Two facilities in the construction materials industry have been audited. These are:

1. SBS Porcher (ceramics); and
2. ASMAR (cement).

The audits for these facilities contained three recommendations for the ceramics plant and eight for the cement facility. These have a 36 month and a 15 month payback period respectively.

The audit cost of 375,000 Dirhams for ASMAR included a $25,000 contract with Holderbank, a Swiss consulting company, for their technical expertise in the cement industry. A summary of the audit results is shown in *Table 14.*

Table 14: Construction Material Industry Audit Results

Facility	Items Recommended	Estimated Savings(toe)	Implemented Number	Implemented Estimated Savings(toe)	Implemented Percent of Total Energy
SBS Porcher	3	413	2	143	8.4
ASMAR	8	2,700	5	1,918	3.7
Total	11			2,061	

The estimated monetary savings for implementation of the audit recommendations is 5,152,500 Dirhams, assuming a cost of 2500 Dh/toe for #7 fuel.

Audits in construction materials industries tend to be very specialized, with each product potentially requiring specialized techniques or processes. This increases the need for specialized auditing skills and possibly the use of outside firms as was done with Holderbank at ASMAR. These large companies typically are financially more stable than those of other sectors. Annual energy savings in these two facilities has been estimated at 2,016 toe. However, there are probably few opportunities to replicate such savings, since there are only a few cement plants within Morocco.

Agro-Industries

Four facilities in this sector have been audited, either in part or in whole. These four are:

1. Maroc Lait (milk and dairy products);
2. Co-Lait (milk and dairy products);
3. Conserves De Meknes (fruit and vegetable canning); and
4. Les Conserves Cherifiennes (fish processing and canning).

The estimated payback period for these facilities ranged from a low of 5-1/2 months at Conserves de Meknes to 17 months at Co-Lait. The evaluation team visited the Maroc Lait facility in Casablanca.

Table 15: Agro-Industrial Sector Audit Results

Facility	Items Recommended	Estimated Savings(toe)	Implemented Number	Implemented Estimated Savings(toe)	Implemented Percent of Total Energy
Maroc Lait	18	450	12	405	11.9
Co-Lait	18	485	12	389	19.8
Conserves De Meknes	5	130	5	130	17.5
LCC	9	290	NA	NA	NA
Total	50			924	

The estimated monetary savings in the agro-industrial sector for implementation of the audit recommendations is 2.31 million Dh (assuming 2500 Dh/toe for #7 fuel). The total

estimated monetary savings for the three subsectors from implementation of the audit recommendations is 7,685,750 Dh.

Energy using systems in the agro-industrial sector vary due to the many different types of facilities within the sector, but many of the facilities rely on steam and refrigeration. Therefore, in general these facilities should not require as much time to audit as the construction materials sector.

Inclusion of Other Sectors

Several other facilities have become interested in having an energy audit conducted. However, because these facilities are outside of the three sectors within the existing Project, they have to date been excluded from receiving an audit. The Steering Committee has the authority to extend the Project to additional sectors. The evaluation team recommends that this be considered. Expansion of the Project into additional sectors would not require additional resources (other than recommended in Section V.). Facilities that have expressed an interest include the mining division of ONA and Good Year Rubber Company.

In selecting future audit sites, several factors should be considered. In the hotel sector, the major hotel chains have already participated in the audit program. Many of the hotel audit recommendations can be passed from one facility to another, since the energy-using systems are typically the same. A brief site visit could assist each hotel, but a full-scale audit is probably not needed for all of the hotels. Also, since many hotels are suffering financially, audits of these facilities should be delayed until the hotel sector is stronger (possibly until 1993). Since there are eight cement plants and two ceramics plants in Morocco, auditing all of these facilities may not be productive. If the audit activities are opened up to other sectors, the Contractor will need to be selective in determining which facilities to audit.

In general, written audit selection criteria should be established, since it appears that the number of requests for audits may soon exceed the ability to perform the audits on a timely basis. If written audit selection criteria were established, criteria could include the following:

1. magnitude of potential savings;
2. replicability;
3. maximum impact on energy supply;
4. proven results of technology application;
5. anticipated time to complete the audit; and
6. ability of firm to finance audit on its own.

Audit criteria should provide a standardized means of selecting facilities, which will yield the greatest impact in energy savings. The current procedure includes an informal list of criteria, which is used internally in selecting facilities. The Contractor should prepare a summary sheet for each facility applying, and keep a record of it.

2. Boiler Tune-Ups

The following table summarizes the results of the test phase of the boiler tune-up program.

Table 16: Results of Boiler Tune-Up Program Test Phase

Facility	Boiler #	Annual Usage (toe)	% Improvement	Annual Savings (toe)
Inam Provimi	#1	54	1.13	0.61
	#2	54	0.7	0.378
	#3	273	2.2	6.006
Somadir	#1	1250	3.25	40.625
Good Year	#1	500	1.13	5.65
Icoma	#1	1200	0.08	0.96
Aiguebelle	#1	100	0.22	0.22
Frumat	#1	1000	0.75	7.5
Sopic	#1	24	9.0	2.16
Iboma	#1	450	*	*
Filroc	#1	NA	*	*
Coca Cola	#1	50	1.82	0.91
			Total:	65.019
			(161,900 Dh)	

* Unable to adjust boiler combustion

The average efficiency improvement for these boilers is 2.03%. It is assumed that these boiler systems are typical of the majority of the equipment within Morocco, and that this energy efficiency improvement can be replicated many times throughout the country. Since most of the companies that were in the test phase are not large energy users, the potential for greater energy savings is possible. After seeing the results of this program, many of these companies became interested in regularly tuning up their boilers.

The original subcontractor for this activity (Apave) is normally associated with boiler safety work, not energy efficiency. Their interest in performing this work and developing the market was less than what was hoped for by the Contractor, and another subcontractor is being sought. The revised Work Plan for 1991 calls for 50 companies to participate in this activity, but it is highly unlikely that this will occur. This appears to be a very cost-effective program with the ability to reach many facilities. Although individual savings are small, the overall impact could be very positive.

3. Electric Bill Analysis

For most of the facilities surveyed, power factor improvement was recommended. This was done not to avoid a potential penalty cost but to reduce overall power demand. If these facilities were to implement power factor correction, it is estimated that 120 toe per year (299,600 Dh) could be saved. This would produce a typical payback period of 6-1/2 months. The subcontractor (Techni-controle) reported that the response from these ten companies was good, and that this program could contribute substantially to energy awareness in Morocco. This activity should be enhanced to include measurement and analysis of the participating facilities' power factor and a general estimate of the cost and monetary savings to implement capacitor corrections.

4. Demonstration Projects

The Project Paper specifies that fifteen demonstration projects or technology applications be completed. None had been completed at the time of the mid-term evaluation (see Contractor's comments in Appendix G and response to comments in Appendix H). The Contractor needs to focus attention on this activity in the next two years.

5. Overall Energy Savings

The three direct energy activities have produced the estimated annual savings shown in *Table 17.*

Table 17: Annual Energy Savings from Project Activities

Activities	Annual Savings Energy (toe)	Dollars
Audits	3,102.500	($887,500)
Boiler Tune-up	65.019	(18,700)
Electric Bill Analysis	120.000	(34,600)
Total	3,287.519	($940,800)

Note: $ savings calculated using 2500 Dh/toe; 8.66 Dh/$

The Project Paper indicates that total energy savings impact from the Project for 1991 would be 6,717 toe. According to the information gathered during the mid-term evaluation, direct energy savings resulting from audits, boiler tune-ups, and the electric bill program is 3,287.5 toe. Estimating the indirect savings from greater energy awareness, training and seminars

is much more difficult. However, it would be reasonable to expect that the indirect savings could be of the same magnitude as that of the direct savings. If this is the case, the Project has kept pace with the general energy savings values in the Project Paper, and has shown a very positive energy savings impact.

6. Recommendations

General recommendations to improve the work in the Technical Support area include:

1. The rate of activity for audits needs to be accelerated to achieve the goals of the Project Paper. The Contractor has produced audits on a scope and thoroughness beyond what is described in the Project Paper. It is recommended that the Contractor adjust efforts to meet the output levels of the Project. Shorter, more focused audits should be emphasized, while maintaining a high quality analysis. Forty audits is a very obtainable output, and it is the evaluation team's conclusion that this output should not be reduced.

2. Audits (and audit reports) of less complex or technical buildings and processes do not need to be as detailed as other audits and reports. These audits can be shorter in scope, taking less time to prepare.

3. The three staff engineers should be given more responsibility to do audits independently. Currently, most audits are done by two of the three staff engineers, the energy conservation specialist, and one or more subcontractors. These staff engineers should now be able to conduct an audit individually, with minimum assistance from others.

4. The project should train more subcontractor engineers in auditing services, since one measure of the sustainability of the project will be the number of trained people and the quality and depth of their training. The number of individuals receiving on-the-job training through subcontracts should be increased.

5. A written audit selection criteria should be established and used to select facilities to audit. In order to achieve the maximum output from the resources available, it is suggested that a method be devised to assist in selecting firms to audit. This will help when more than one firm simultaneously requests an audit, and will also help to allocate resources with respect to time availability. Currently, the selection method is informal, and not available to interested participants.

6. All commercial/industrial sectors should be allowed to participate in the project. Audit selection criteria should be developed to determine sectoral preferences.

7. The boiler tune-up service should be fully developed so that subcontractors can continue this work independently. This project has the potential to reach many private sector firms, both large and small. This activity also has a positive environmental impact, in that energy efficient boilers discharge less particulate matter into the atmosphere.

8. The electric service analysis should be fully developed so that subcontractors can proceed directly to the private sector. While the energy savings are more indirect than with the boiler tune-up service, there are significant benefits in developing awareness and promoting better use of electricity.

9. Demonstration projects should be completed to illustrate energy saving technologies or techniques that are not in wide spread use. To date, only one project has been worked on, for new hotel architectural design techniques. It is suggested that additional projects (such as high efficiency boilers, heat exchangers, etc.) be developed, particularly projects with greater replicability and short term benefits.

10. The role of the Energy Demand Management Specialist has been very beneficial and productive. Due to increased workloads in audits, feasibility studies, demonstration projects, private sector training, and in-house training, it is strongly recommended that this position be extended to the end of the Project. This position will be fundamental in maintaining the gains that have been made, as well as developing the feasibility studies and demonstration projects. In addition, in-house training of subcontractor personnel will continue to require guidance from an experienced energy engineer.

11. A specified number of audits (for instance 10 audits) should be assigned to subcontractors, for which the Contractor would provide support while allowing the subcontractor to perform all phases of the audit and feasibility study work.

D. Training

1. In-Country Training

The evaluation team met with a number of people who had participated in the training programs. In general, the comments were very favorable. In addition, the participant evaluation forms were reviewed. The evaluation team found that HBI consistently conducted course evaluations and reviewed course content and materials based on the participants' evaluations. This section presents the results of the training evaluation.

a. Workshops

The participants' evaluation of the workshops indicated a high degree of satisfaction. In general, participants rated the content good (65%) to very good (31% for Boiler Efficiency and 35% for Energy Management). The content of the course was judged to be balanced between theoretical and practical by 51% of Boiler Efficiency workshop participants and 60% of energy management participants. Over 70% of the participants were satisfied with the course materials. Finally, the cost of the workshops, at 1,000 Dh for Boiler Efficiency and 600 Dh for Energy Management, appeared to be acceptable to the attendees.

From the results, and comments made during interviews, the evaluation team concluded that the Project has successfully met the interests of workshop attendees. However, in terms of the number of workshops held to date, the Project appears to be behind schedule. The Project Paper identifies the training workshop output to be 62 person months of training to be provided by the Project. The Contractor pointed out in review of the draft Evaluation Report that the funds for training had been reduced in Contract Modification I, and that this output should be revised. The Project has to date provided 249 person days of training (11.3 person months). The second round of workshops were earlier planned for October through December 1991, but had to be postponed due to the Gulf Crisis.

b. Seminars

Energy Audit Training Course

Participant evaluations indicated a high degree of satisfaction with the course - all ratings were either good or very good. Over 80% of participants would have liked a five week course instead of the three weeks provided. Boilers, steam systems and refrigeration were ranked highest in terms of interest to participants. The practical on-site measurements were also considered to be very useful.

A second objective of the audit course was to evaluate participants in terms of their ability to assist the project with audit activities as subcontractors. Seven of the fifteen were evaluated as being well-qualified to begin working on energy audits with a minimum of supervision. After 2 or 3 audits, it was expected they would be able to work without supervision and would require only a review of their work by project staff.

Regarding the above evaluation of potential auditors, this turned out to be overly optimistic. The evaluation team was told that the subcontractor engineers were not experienced enough to take the lead in the audits, even after having participated in a number of audits with Project personnel. To date, the subcontractor engineers have participated in the audits to a very limited extent, primarily in taking measurements and assisting with the sections of the audit report. In order to develop subcontractor capabilities to a greater extent, it will be necessary to give them more responsibility in the audits (see recommendations under Technical Support).

The project has made preliminary contact with the Ecole Mohammedia, but cooperative plans have not yet been finalized. Ecole Mohammedia is to provide the project with a written statement of its needs for the plans to progress.

d. Vocational Training

This activity was undergoing further definition at the time of the evaluation. In general, it appears that the potential impact is great. OFPPT has been requested by the Ministry of Energy and Mines to develop courses which focus on industrial thermal operations, of which the boiler operators course is one component. The high quality training which can be provided by the Project will enhance the capabilities of the instructors in the curriculum. One drawback to this activity is that the program will not be underway until 1994, so the EDM Project will not have a chance to follow-up on its efforts to evaluate the effectiveness of the training being provided.

2. U.S. Training

To date, little training has taken place outside Morocco. The study tour to Tunisia appears to have offered some valuable lessons to the Project, particularly in terms of the appropriateness of public and private sector roles in energy management. Conclusions drawn from the study tour include: 1) the advisability that energy auditing, energy management analysis and advice be left in the private sector, which provides incentives for quality performance; 2) the importance of fiscal incentives for energy efficiency; and 3) the usefulness of an agency such as AME in promoting energy awareness and information, training programs, and establishing energy efficiency labelling. However, it would have been preferable to have had public sector participation (MEM) on the study tour as well to balance the perspectives. This was offered to MEM, but fell through due to a lack on MEM's part.

It is recommended that the Project begin defining a U.S. training program and identifying the participants who will be trained, so that enough time will be available to complete training prior to the end of the Project. In general, it is expected that the training will focus on technologies or processes in which the U.S. has a comparative advantage. Since the project is offering considerable general training through the conduct of regular workshops and seminars, the training outside of Morocco should be narrowly focussed to meet specific industry needs. If the U.S. does not have a comparative advantage in a particular industry, consideration should be given to third country training, e.g. Holderbank in Switzerland for the cement industry.

It is highly recommended, however, that the project make every effort to look for areas where the U.S. can offer technological expertise. The benefits which can accrue from an exchange of ideas between U.S. and Moroccan enterprises are great, including identification of potential export opportunities for U.S. firms. The evaluation team was told that, in

general, U.S. technology is highly regarded, but that vendor support capability was not generally available for U.S. products. If the market for specific products is expanded, this will justify the establishment of training and support capability on the part of U.S. vendors.

One barrier to U.S. training is the general lack of English language skills. Many potential private sector participants will not have sufficiently developed skills to be able to pass the TOEFL. As mentioned in Section III.D.2, Status of U.S. Training, the Project is considering plans to provide an interpreter for the training of sugar industry executives. This strategy should be considered for other public and private sector executives being considered for U.S. training.

It would also be advisable to give some thought to the selection process for trainees. Since this is primarily a private sector project, and the participating firms must share in the cost of the training, firms should be made aware of the specific options for training long before the training is to take place. One of the participating firms interviewed expressed disappointment that, although the opportunity for training had been included in the "Contrat d'Adhesion", no training had yet been proposed. They wanted to be informed about the content and the cost of training programs under consideration before deciding on whether to participate. The Project will also want to evaluate each potential participant for appropriateness for the specific program being offered.

Another possibility is to bring the "experts" to Morocco to provide technical training in-country. This proposal has advantages and disadvantages. Advantages include a much larger audience, and the ability to have extended one-to-one discussions in Moroccan facilities. By the same token, the Moroccans will not be able to visit operating facilities in the U.S., and see new technologies in use. Also, all too often, when an employee is nearby (such as at local training seminars), they are many times requested to come to work or to the office in the middle of the training. This potential interruption can be a serious flaw to the students.

A targeted training plan, complete with estimated levels of resources, and evaluation criteria should be established to select participants for training. In general, the training should focus on industry-specific study tours rather than the general theoretical course work. This type of training would be more appropriate to private sector participants. Trainees should be required to submit an evaluation or training report based on their experiences which can be used by USAID and the project to sharpen training objectives.

3. Recommendations

General recommendations to improve the work in the area of Training include:

1. The Project should pursue implementation of the U.S. training. A targeted training plan, including estimated levels of resources and trainee selection

criteria, should be developed by the Project. A plan for evaluation of the training program should also be established.

2. The workshop component of the Project appears to be progressing quite well and should be continued as planned. Periodic evaluation is recommended to ascertain the frequency and preferred locations for the workshops. The content of each workshop should continue to be evaluated and adjusted to meet the needs expressed by participants.

3. The seminars held in the Project to date seem to be very effective in reaching the targeted subsectors, both in terms of energy management training and in designing follow-up activities in each subsector. It is recommended that technical seminars, such as the seminar conducted for the Safir chain, be marketed to similar institutions.

4. The development of the 6th year curriculum at ENIM should be actively continued. This appears to be very important to a number of institutions interviewed by the evaluation team. The one-week audit course planned for February 1991 should be rescheduled.

5. The support being offered to OFPPT (primarily "training the trainers") for the new vocational program specializing in industrial thermal operations appears to be worthy of continuation.

E. Policy Studies

The level of effort required from the contractor to provide terms of reference and coordinate policy studies will depend on the extent, quality and commitment of effort brought to the task by other interested parties, especially MEM. The determination of terms of reference and coordination of the implementation of appropriate policy studies requires the full backing of MEM and USAID's collaboration. The contractor's resources and work load provide reasonable justification for their not having taken the initiative to instigate this aspect of the project. There is nothing to indicate that the contractor would not have been responsive to any initiatives in this regard from MEM or USAID.

1. Recommendations

A general recommendation to improve the work in the area of Policy Studies includes:

1. The Contractor should increase the level of effort devoted to working with MEM in this area. The Contractor and MEM should jointly determine a short list of areas for policy studies to advise government decision makers on steps to be taken to support EDM activities.

F. Management Support

Management support to the project appears to be about the right level. Project management and financial deliverables are being produced in a timely manner or according to requested specifications. The Project Paper identified only one administrative support person, however a decision was made to produce all project documents and publications in-house, which requires additional staff.

The project office seems to be well-equipped for efficient operation. Documents requested by the evaluation team were made available immediately, demonstrating a well-organized project management system. The performance of the Chief of Party is highly commendable. His efforts are responsible for much of the Project success.

V. PRIVATE SECTOR DEVELOPMENT AND PROJECT SUSTAINABILITY

The EDM Project was designed with certain institutional features which are unusual for USAID projects. First, the primary objective of the Project is to develop technical capability within the private sector, rather than the government. Major aspects of the Project are to develop the market for the provision of energy services and equipment, and to establish the core of a national energy demand management program. This involves expanding and increasing the role of a number of participants in energy management, including private sector consulting firms, equipment suppliers, trade associations and educational institutions.

The means for achieving market development objectives put the Contractor in direct connection with the private sector through direct contact with the participants. This approach focusses the project on the plant or company level. The Project is initially narrowed by concentrating on three subsectors of the economy. The Contractor works directly with private sector firms, trade associations and educational institutions to achieve the objectives of the project.

Minimal oversight of day-to-day implementation of the project is provided by USAID and MEM. Both have a designated Project Officer, but in practice, the MEM Project Officer has had little contact with the project, while the USAID Project Officer meets regularly with the Contractor to discuss progress. In practice, the contractor has a high degree of independence, and decisions tend to be made informally between the Chief of Party and the USAID Project Officer.

In the Project design, a Steering Committee, consisting of USAID and MEM members, is to meet regularly (quarterly, or more often as necessary) to review and monitor Project activities, formulate and discuss strategy and action plans, and act as a conduit for decisions taken by the GOM to promote EDM. The Steering Committee has met four times since the technical assistance contract was signed (November 1989; April 1990; July 1990; and July 1991). It appears to be the joint responsibility of the USAID and MEM Project Officers to schedule and to set the agendas for the Steering Committee meetings.

This small number of meetings brings up the question of whether the Project is functioning so well that oversight is not necessary, or whether other factors are hindering an active Steering Committee. The evaluation team found some indication of a difficult relationship with MEM, which questioned the way in which the Project was proceeding with almost complete detachment from the public sector. As explained by M. Bouahali, Director of Energy, the EDM Project was a take it or leave it proposition for MEM. USAID insisted on a private sector orientation, with little involvement from the Ministry. There still appeared to be some resentment of this design approach. MEM also expressed concern about the real results of the Project, given the level of resources expended. It was felt by MEM that if all that remained of the Project after the PACD was a small group of well-trained engineers, that the Project would have wasted its resources. The MEM is also very much in favor of fostering development of a sustainable market for EDM.

The evaluation team found a similar concern expressed by a number of people interviewed. The Project has succeeded in establishing itself as a provider of a high quality product, but it has not yet extended sufficient technical expertise beyond its own engineers. If all that remains at the end of the Project is a few well-trained individuals, then the project will not be viewed as successful by most of the persons interviewed by the evaluation team.

The primary constraint to increasing the number of institutions involved in providing technical expertise is financial. Specifically, the Project is constrained by the amount of resources available for subcontracting. All subcontractors interviewed, and the Chief of Party, believed that the Project would fall short of disseminating technical expertise to a wider group without additional resources being made available for subcontracts.

The recent development to have subcontract staff work with project staff while having their salary subsidized (with no overhead) is an innovative approach to living within the financial constraints. This approach demonstrates a commitment on the part of the consulting firms to hire engineers who will be trained by the Project in energy auditing. At the end of the training period, these engineers should presumably be able to market their services for the consulting firms.

The market for energy services will only develop if private sector institutions are capable of providing the services, and can effectively market them. Subcontractors also need to be involved in the market development activities of auditing services. One subcontractor expressed a desire to be involved in all aspects, from initial contact through payment of the final invoice. Efforts to involve subcontractors to date have been focussed on the technical aspects of conducting audits, and have generally not included writing the audit report. If more funds were available in the Project for subcontracts, a greater effort could be made to involve them in the Project which would enhance the sustainability of EDM in Morocco.

VI. CONCLUSIONS AND MAJOR RECOMMENDATIONS

The EDM Project has been successful in identifying energy savings potential by means of audits, surveys, boiler tune-ups, and electric analysis. The Project has gained momentum and has produced several successful activities. In addition to the technical assistance activities, the Project has contributed to increased awareness of energy demand management through its information dissemination activities. The training activities of the Project have enhanced the technical capability of over 50 private sector firms. These activities have direct and indirect energy savings attributable to them, and should be continued.

The HBI contract should be extended to 60 months to make up for time lost due to the Gulf War and to allow sufficient time to maximize project sustainability. In addition, our recommendations include extending the services of the Energy Demand Specialist for the full project period, and to include additional funds for local subcontracts. The additional resources would fund subcontractor trainees in the Project office (on a cost share basis) for 1993, and greater participation of subcontractors in the auditing, training and information dissemination activities. The evaluation team believes that the inclusion of additional funds for local subcontractors will enhance the development of the market for EDM services.

The estimated resources required for the above recommendations are specified below:

1.	Extend Energy Demand Specialist	$[illegible],000
2.	Subcontractor Engineers (3)	50,000
3.	Subcontract Funding	300,000

The $300,000 specified for subcontract funding is based on the rate of expenditure for subcontractors in the Project to date. In addition, if the Project is extended to 60 months, the HBI contract will need to be increased to sustain project activities at their current staffing levels.

The following recommendations address specific actions that can be taken to improve the Project, based on the evaluation.

Information and Awareness

1. The Project's activity in disseminating information and promoting awareness of energy demand management practices and technologies should not be limited by the possibility of creating expectations that might not be satisfied. Project publicity should emphasize the services that the Project has to offer. Possible excess demand for project services should be dealt with by prioritizing demands according to criteria which need to be established or formalized.

2. The promotion of EDM, and broadening of the market for EDM services, should do more to attract medium and small enterprises. For example, auditing services offered through the project should be broadened to provide an array which ranges from the thorough to diagnostic services.

3. The extent of Project resources available to help upgrade the MEM Information and Documentation Center should be clarified. The Contractor, MEM and USAID should jointly establish the priorities and extent to which Project assistance is warranted.

4. Project staff should work with MEM to interpret the Project's sample survey data on targeted sectors' annual energy consumption (and the other data from the survey) and facilitate its incorporation in the MEM Information and Documentation Center.

5. The Project should not directly engage in broad energy surveys, but should maintain up to date records of energy use by facilities that have used project audit, boiler tune up, electric bill and any other on-site services. This recommendation is not intended to preclude the possibility of the Project supporting public sector work in this area by assisting with terms of reference for policy studies. Studies could include sectoral or subsectoral sample surveys pertaining to energy demand management.

Technical Support

1. The rate of activity for audits needs to be accelerated to achieve the goals of the Project Paper. The Contractor has produced audits on a scope and thoroughness beyond what is described in the Project Paper. The Contractor needs to adjust its efforts to meet the output levels of the Project. Shorter, more focused audits need to be emphasized, while maintaining a high quality analysis. Forty audits is a very obtainable output, and should not be reduced.

2. Audits (and audit reports) of less complex or technical buildings and processes do not need to be as detailed as other audits and reports. These audits can be shorter in scope, taking less time to prepare.

3. The three staff engineers should be given more responsibility to do audits independently. Currently, most audits are done by two of the three staff engineers, the energy conservation specialist, and one or more subcontractors. These individuals should be able to conduct an audit individually, with minimum assistance from others.

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4. The Project should train more engineers in auditing services, since one measure of the sustainability of the Project will be the number of trained people and the quality and depth of their training. The number of individuals receiving on-the-job training through subcontracts should be increased.

5. A written audit selection criteria should be established and used to select facilities to audit. In order to achieve the maximum output from the resources available, it is suggested that a method be devised to assist in selecting firms to audit. This will help when more than one firm simultaneously requests an audit, and will also help to allocate resources with respect to time availability. Currently, the selection method is informal, and not available to interested participants.

6. All commercial/industrial sectors should be allowed to participate in the project. Audit selection criteria should be developed to determine sectoral preferences.

7. The boiler tune-up service should be fully developed so that subcontractors can continue this work independently. This Project has the potential to reach many private sector firms, both large and small. This activity also has a positive environmental impact, in that energy efficient boilers discharge less particulate matter into the atmosphere.

8. The electric service analysis should be fully developed so that subcontractors can proceed directly to the private sector. While the energy savings are more indirect than with the boiler tune-up service, there still are significant benefits in developing awareness and promoting better use of electricity.

9. Demonstration projects should be completed to illustrate energy saving technologies or techniques that are not in widespread use. To date, only one project has been worked on, for new hotel architectural design techniques. It is suggested that additional projects (such as high efficiency boilers, heat exchangers, etc.) be developed, particularly projects with greater replicability and short term benefits.

10. The role of the Energy Demand Management Specialist has been very beneficial and productive. Due to increased workloads in audits, feasibility studies, demonstration projects, private sector training, and in-house training, it is strongly recommended that this position be extended to the end of the contract. This position will be fundamental in maintaining the gains that have been made, as well as developing the feasibility studies and demonstration projects. In addition, in-house training of subcontractor personnel will continue to require guidance from an experienced energy engineer.

11. A specified number of audits (for instance 10 audits) should be assigned to subcontractors, for which the Contractor would provide support while allowing the subcontractor to perform all phases of the audit and feasibility study work.

Training

1. The Project should pursue implementation of the U.S. training. A targeted training plan, including estimated levels of resources and trainee selection criteria, should be developed by the Project. A plan for evaluation of the training program should also be established.

2. The workshop component of the Project is progressing quite well and should be continued as planned. Periodic evaluation is recommended to ascertain the frequency and preferred locations for the workshops. The content of each workshop should continue to be evaluated and adjusted to meet the needs expressed by participants.

3. The seminars held in the Project to date seem to be very effective in reaching the targeted subsectors, both in terms of energy management training and in designing follow-up activities in each subsector. It is recommended that technical seminars, such as the seminar conducted for the Safir chain, be marketed to similar institutions.

4. The development of the 6th year curriculum at ENIM should be actively pursued. This appears to be very important to a number of institutions interviewed by the evaluation team. The one-week audit course planned for February 1991 should be rescheduled.

5. The support being offered to OFPPT (primarily "training the trainers") for the new vocational program specializing in industrial thermal operations appears to be worthy of continuation.

Policy Studies

1. The Contractor should increase the level of effort devoted to working with MEM in this area. The Contractor and MEM should jointly determine a short list of areas for policy studies to advise government decision makers on steps to be taken to support EDM activities.

Management

1. A more concerted effort should be made to involve and inform MEM of Project activities, directions and accomplishments. Although the Project is focused on the private sector, there are aspects of the Project, such as policy studies, that would benefit from greater collaboration with MEM.

List of Appendices

APPENDIX A
Evaluation Scope of Work

Attachment #1 Terms of Reference

1. Activity to be Evaluated

The evaluation is to cover the Energy Demand Management Project (608-0193). The Project Agreement (ProAg) was signed on 7/22/88 with USAID life-of-project funding for $5,000,000. USAID has fully obligated the project. Two evaluations are called for in the Project Agreement. This is the mid-term evaluation and it is coming just over half-way through the length of project.

2. Background

The frame of reference for assessing to what extent project purposes have been achieved will be the Project Agreement and proposals submitted by the contractor.

The evaluation will place particular emphasis on the implementation modality - that of using the private sector as the main means of project implementation. Sources of information during the evaluation will include the Project Paper, Project Agreement, periodic reports prepared by the contractor, interviews with government officials (particularly the Ministry of Mines and Energy), USAID, the contractor, and private enterprises associated with the project. To the extent possible, interviews should be undertaken with other relevant individuals and groups and other relevant documentation researched. The Evaluation Team will be responsible for determining the overall effectiveness of project activities to date.

3. Evaluation Process

The evaluation will take place over a five week period. It should be completed no later than November 1, 1991. An evaluation debriefing shall be completed and the draft evaluation report submitted to USAID by October 20, 1991. Prior to departure for Morocco, the team will be allotted two days in Washington for briefings in AID/W and to discuss terms of reference and for technical interviews with Robert Ichord and Robert Archer, ENE/TH/ENR.

An illustrative schedule follows:

Week 1: Discussions with AID/W and other technical interviews. Discussions related to scope of work and project status. Team flies to Rabat and, after meeting with USAID Mission officials, holds planning meetings with the Institutional contractor and government counterparts to further specify approach to evaluation.

Weeks 2-4: Team members travel to project sites. (At a minimum, the team should visit the ASMAR Cement Plant and the PLM Dounia Hotel in Marakech, the Porcher Ceramic Plant and La Colaitin in Kenitra, the Conserverie de Meknes, the central

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dairy in Casablanca, the Safir Hotel in Agadir, and other small and large businesses throughout Morocco that have participated in various aspects of the [illegible] and conduct on-site interviews and meetings with clients and participants in the project. During this period, the team will make weekly reports of progress to the USAID Project Officer.

Week 4-5: Draft report is completed and oral presentation made to USAID. Oral presentations also made to government counterparts and to Institutional Contractor. Revisions to report will be made based on USAID Mission review of presentation. A final draft of the report will be left with the USAID Project Officer prior to departure.

The contractor for the evaluation is responsible for all logistical support for the evaluation team. Office space, transportation (vehicle rentals), printing,, typing, transformers, word processing, translation,, etc. will not be provided by USAID. Team members are advised to carry with them their own word processing equipment. The evaluation contractor is authorized to use funds provided in the PIO/T to assume adequate word processing and micro-computer support.

4. Evaluation Objectives

This mid-term evaluation will be undertaken with two basic objectives in mind: 1) to determine the efficiency of project implementation and to recommend ways for improvement, if necessary; and 2) to determine the impact of project activities on the energy sector in Morocco. The following are the broad areas for analysis:

1. state of awareness and consciousness of energy demand management, first within key sectors, and then throughout Morocco;

2. impact of technical assistance with selected firms through energy audits, technical and economic feasibility studies, and demonstration projects;

3. level of capability within Morocco to conduct energy audits and implement energy demand management techniques;

4. status of energy studies to influence policy decisions on energy demand issues in Morocco;

5. private sector role and sustainability of project;

6. effectiveness and impact of the training program, both in Morocco and in the U.S.; and,

6. other issues regarding project implementation and impact.

5. Evaluation Team

The Evaluation Team will consist of two experts. The Team Leader will be a PhD in economics and will have at least ten years experience in policy analysis regarding private sector and energy use. Much of this experience should have been in developing countries. The second team member will be an energy engineer/conservation specialist, with a minimum of six years experience in energy audits, preferably in the developing world. There is a strong preference for team members who have worked in North Africa and who are familiar with the energy problems, and solutions, of the area.

In order to function effectively, team members must have sufficient command of the French language to be able to work independently in the language. French language proficiency at the Foreign Service Institute Level S3/R3 is necessary.

6. Detailed Scope of Work

For each major area of project implementation, there will be several specific questions that will need to be answered during the course of the evaluation. The Final Report will set the context of energy cost and use in Morocco, how the project fits into this context, and, through answering the listed questions, and others that will arise during the evaluation, determine the efficiency and impact of the project within this context.

1. Increased awareness and consciousness:

   - What specific actions have been undertaken in this area? What are some of the actions that had the most impact? Are they continuing? can they be improved? How?

   - How can activities in this area be improved?

   - In agreement with the contractor, it was decided to build up the credibility of the project before embarking on increasing awareness and increasing energy consciousness campaigns within the country. Was this decision the correct one? Is now the correct time to put more resources into this part of the project? Could it have been done another way more efficiently? If so, how?

2. Technical assistance:

   - What has been the overall quality of the short-term technical assistance provided

to the project to date?

- What have been the most effective activities provided by short-term technical assistance? Can this be improved? How? What has been the over all impact on the energy sector in Morocco of short term technical assistance?

- Have feasibility studies lead to action? What action? How? Why? Why Not?

- What are the demonstration projects? How do they fit in with the over all project? What has been their impact on the energy sector in the country? Can they be improved? How?

- How are energy audits administered? What has been the response to them? Can they be improved? How? Were energy audit recommendations followed? For those that were followed, what hat been the savings in terms of dollars and in terms of energy and non-quantifiable areas? Is this the most efficient way of determining energy requirements/use in Morocco? If not, why? how can the process be improved?

- What is the method of technology transfer between RCG/HBI and RCG/HBI Moroccan engineers and other professionals associated with the project? Are there demonstrated ways in which new, relevant technology is being put into practice in the country, among the private sector, and/or the public sector?

- During Project Paper design, the number of RCB/HBI expatriate engineers/advisors was to be three - there are currently only two. Does the lack of the third person penalize the implementation of the project? If so, how and why?

- Should the energy conservation specialist's assignment in Morocco be extended? Why, Why not?

- In general, have the results of technical assistance been positive or negative (How, Why);

3. Moroccan capability:

- What has been the role of the Ministry of

Mines and Energy in the project?

- Is there evidence of increased ability on the part of the public sector and/or the private sector to undertake energy audits without external assistance? How, Where, Who?

- Is more Moroccan capability an important part of the project? If so, should more thought be given as to how transfer of technology can be made more efficient?

4. Policy recommendations:

- Have there been studies that have resulted in policy change recommendations? What have the studies been? How have recommendations been made? To whom? Have they been implemented? What is the over all reception bye GOM to this project? Can this be improved? How?

5. Private sector and sustainability:

- Has there been a market created in Morocco for the services provided by the project? Will the product "Energy Conservation" sell in Morocco? If not, what can be done through the project to ensure that this concept will sell in the country? If so, can implementation with this objective in mind be improved? Is the market demand sufficient to make this type of activity sustainable in the country?

- How well-known is the project and its activities amongst the private sector? How can the project become better known? What would be an assessment of the difference between running this project through the private sector instead of through the government? Is centralized energy demand management more efficient than that run and managed by the private sector? If so, how? If not, can it be completely turned over to the private sector?

6. Training (U.S. and in-country)

- What have been the actions in this area?

- Has training responded to the needs of private enterprise in the country?

- How many people have been trained abroad and in Morocco? What have been the content of the courses?

- To the extent possible, what has been the impact of the training on the GOM and private enterprise?

- Has training resulted in the creation of new businesses or extension of existing services to include energy-related services to the GOM and Moroccan private enterprise?

5. Other issues

- Does the project provide energy-use recommendations for the public sector? Have they been followed? Should the project increase activities in this area?

- What has been the over all environmental impact of the project in terms of saving natural resources through increased savings of energy? Can environmental impact be increased?

- How is the project administered? Are there ways in which the project can be administered in a more efficient way? What are they?

- The Project Agreement reduced funding, staffing levels, and the length of project from those of the Project paper. To what extent does the Evaluation Team believe that the project should return to Project Paper levels? Why? How?

- What is the recommended course of action over the next two years for the project? Why?

7. Reporting Requirements

The Evaluation team will be responsible for producing an evaluation report which responds to the terms of reference in this scope of work. Seven days prior to departure the team will submit to the USAID Project Officer a draft evaluation report with copies and make an oral presentation to USAID and to the GOM. Based on comments from review of the draft report, the team will make appropriate revisions. The team leader will submit four copies of a final report to the Project Officer prior to departure from Morocco.

Mines and Energy in the project?

- Is there evidence of increased ability on the part of the public sector and/or the private sector to undertake energy audits without external assistance? How, Where, Who?

- Is more Moroccan capability an important part of the project? If so, should more thought be given as to how transfer of technology can be made more efficient?

4. Policy recommendations:

- Have there been studies that have resulted in policy change recommendations? What have the studies been? How have recommendations been made? To whom? Have they been implemented? What is the over all reception bye GOM to this project? Can this be improved? How?

5. Private sector and sustainability:

- Has there been a market created in Morocco for the services provided by the project? Will the product "Energy Conservation" sell in Morocco? If not, what can be done through the project to ensure that this concept will sell in the country? If so, can implementation with this objective in mind be improved? Is the market demand sufficient to make this type of activity sustainable in the country?

- How well-known is the project and its activities amongst the private sector? How can the project become better known? What would be an assessment of the difference between running this project through the private sector instead of through the government? Is centralized energy demand management more efficient than that run and managed by the private sector? If so, how? If not, can it be completely turned over to the private sector?

6. Training (U.S. and in-country)

- What have been the actions in this area?

- Has training responded to the needs of private enterprise in the country?

Fifteen copies of the final, printed report will be delivered by air express to the USAID Project Officer within two weeks of the team's departure from Morocco.

The French translation of the report will be done in Rabat and ten copies will be delivered to the USAID Project Officer within two weeks of the departure of the team from Morocco.

The team will provide USAID with computer diskettes containing both the French and English versions of the final report in Word Perfect 5.1.

The report format should conform to the (ex) Europe/Near East Bureau Guidelines for Evaluation. The report will contain the following sections:

1. Basic Project Identification Sheet (one page)

2. Executive Summary (3-5 pages single spaced)

3. Contents: Description of the context in which the project was designed, developed, and implemented. Include evidence and analysis which form the basis for conclusions and recommendations. The evaluators will clearly distinguish between their findings and their conclusions and the recommendations that follow. (maximum 40 pages single spaced - appendices may include additional supporting analyses)

4. A short and succinct statement of conclusions and recommendations which are mutually supporting. When possible, recommendations should indicate who should take responsibility and when for the recommended action.

5. Appendices: Appendices should include the following:

   a. Evaluation scope of work;
   b. Current logical framework;
   c. Description of the methodology used in the evaluation (e.g. indicators used for measurement of impact);
   d. Bibliography of documents consulted;
   e. List of persons contacted;
   f. Other

A french translation of the executive summary, conclusions, and recommendations will be submitted to USAID at the time the final report is submitted.

APPENDIX B
Current Logical Framework

ENERGY DEMAND MANAGEMENT 698-0193

PROJECT LOGICAL FRAMEWORK

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	Means of Verification	Important Assumptions
Program or Sector Goal:	**Measures of Goal Achievement:**		
Save foreign exchange & increase productivity by reducing energy waste and by improving efficiency of energy use.	- Energy savings of 5-10% in target sectors (60,000 toe saved). - Improved energy intensity index in target sectors (3% from 1988 base).	World Bank figures Oil price indicators Industry records	- Energy prices do not drop below $12 per barrel. - GOH maintains positive growth policies.
Project Purpose:	**End of Project Status:**		
To develop and implement the core of a national energy demand management program.	- National energy demand management program in place. - Total EDM investments reach $20 million. - GOH policy to encourage EDM in place.	Independent review Investment records	- GOH is willing and able to provide adequate incentives. - That sufficient demand for energy audits and investments can be generated to support private energy auditing and engineering business. - Pay back period on EDM investments reasonable and acceptable. - Technology available and transferable.
Outputs:	**Magnitude of Outputs:**		
Information and Awareness of Energy Demand Management concepts and techniques.	- 3 information packages (by sector) - Technical Publication (10 issues) - 45 seminars and workshops - Annual energy consumption survey (5) - 3 Information Centers established - International Exchanges (25 invitees) - Energy Manager Assn. established	Public record	GOH decides internal coordination of policies is important and practicable.
Technical support and tech transfer to identify five specific EDM actions and applications.	- 40 Energy Audits performed - 45 Feasibility studies - 15 Technical applications	Company (sector) records On-site monitoring	Users amenable to audits, demonstration projects, and special projects. Auditing and engineering skills provide sufficient payoff.
Training on energy managers, energy auditors, engineers, technicians, students, and faculty.	- Curriculum upgraded at EDIH - 40 p/m U.S. short courses and internships (30 participants). - 45 p/m in-country EDM (130 parts) - 120 p/m in-country 'hands on' (400 parts).	Financial records	
Policy analysis and advice to GOH on EDM issues.	- 4 studies completed		
Inputs:	**Implementation Target:**		
USG $3.0m (ESF grant)	- Technical Assistance, Training, Audits, Studies, Commodities, Engineering, Technology transfer	Project agreement	Approval of project by GOH/AID. Appropriate TA and training available.
GOH $ .8m	- Counterparts, Facilities, Offices, Equipment	Contracts	

APPENDIX C
Methodology Used in the Evaluation

The mid-term evaluation was carried out by a three-person team from Resource Management Associates of Madison, Inc. (RMA). The team was led by an engineer, supported by an institutional specialist and an energy economist. Prior to their departure for Morocco, two members of the team received briefings on the background of the Project and terms of reference for the evaluation from the Chief and Deputy Chief of ANE/Energy at USAID/Washington. The evaluation team was in Morocco from September 23 to October 11 to conduct their investigations and prepare a draft copy of their report.

In Morocco, the team covered all aspects of the Project by interviewing persons involved with the Project at the USAID Mission, Rabat, officials of the Ministry of Energy and Mines, Contractor personnel, subcontractors, participating firms and training institutions. (A complete list of persons contacted is given in Appendix E.) The evaluation team was based in Rabat and travelled to Agadir, Casablanca, Marrakech, and Kenitra to interview parties to the Project and make on site inspections of energy management measures. All three evaluators participated in the majority of interviews. However, on two days the team's engineer and economist conducted interviews at participating firms in Casablanca while the institutional specialist researched Project documentation filed at USAID, Rabat offices. A large quantity of documents covering all aspects of the Project were reviewed by all three evaluators. The specific documents are listed in Appendix D.

The team prepared a draft report and delivered 12 copies to the USAID Project Officer on the morning of October 8. An evaluation debriefing meeting with the Project Review Committee was held on the following afternoon. The evaluation team made an oral presentation of their findings and recommendations which were discussed with the Committee members. The team revised the report to address points that the Committee members had made either orally or in their written comments on the first draft report. Four copies of a final draft of the report were left with the Project Officer prior to the team's departure from Rabat.

APPENDIX D
Documents Consulted

Documents Consulted

Energy Demand Management in Morocco, A Pre-feasibility Analysis, Hagler, Bailly & Co., Nov. 10, 1986.

Morocco Energy Demand Management (EDM) Project Identification Document, USAID, December 8, 1986.

Energy Demand Management in Morocco, Institutional Analysis, RCG/Hagler, Bailly, Inc., May 29, 1987.

Project Paper, Morocco: Energy Demand Management, U.S. Agency for International Development, Washington, D.C., July 22, 1988.

Project Grant Agreement Between the Kingdom of Morocco and the United States of America for Energy Demand Management Project, July 22, 1988.

Energy Demand Management Project for Morocco, Technical Proposal (Vol. I), RCG/Hagler, Bailly, Inc. and International Development and Energy Associates, Inc., January 31, 1989.

Award Contract (608-0193-C-00-9002), Contracts Office, USAID/Rabat, May 1, 1989.

Project GEM Energy Demand Management Work Plan, RCG/Hagler, Bailly, Inc., 22 December 1989.

Evaluation des Besoins d'Assistance Technique de l'Industrie Cimentiere au Maroc dans le Cadre du Project GEM, Consistance de l'Offre, Sigma Tech Ingenierie S.A., 22 Janvier 1990.

GEM Database, RCG/Hagler, Bailly, Inc., February 1990.

Safir-Societe Marocaine de Gestion Hoteliere, Contrat d'Adhesion au Project GEM, Mars 1990.

Manuel d'Audit Energetique, Project GEM, RCG/Hagler Bailly, Inc., March 1990.

Enquetes Sur la Consommation Energetique dans les Secteurs Hotelier et Industriel, Phase 1, Sigma Tech Ingenierie, Avril 1990.

Enquetes Sur la Consommation Energetique dans les Secteurs Hotelier et Industriel, Phases 2 & 3, Sigma Tech Ingenierie, 7 Mai 1990.

Enquetes Sur la Consommation Energetique dans les Secteurs Hotelier et Industriel, Phase 4, Sigma Tech Ingenierie, 11 Juin 1990.

Enquetes Sur la Consommation Energetique dans les Secteurs Hotelier et Industriel, Phase

5, Sigma Tech Ingenierie, Juillet 1990.

Contrat d'Adhesion au Project GEM, ASMAR Cimenterie de Marrakech, RCG/Hagler Bailly, July 1990.

Programming for the 1990's: A Concept Paper, USAID Morocco, July 1990.

Audit Energetique de la Cimenterie ASMAR de Marrakech, RCG/Hagler Bailly, March 1991.

Rapport d'Audit Energetique Hotel Europa Safir, Agadir, RCG/Hagler, Bailly, Inc., Mai 1990, Rev. Nov. 1990.

Techniques de gestion de l'energie et amelioration des performances energetiques des chaudieres, Rapports sur les ateliers de Casablanca, Tanger, Agadir, Marrakech, Meknes et Safi et Rapport d'evaluation, Sigma Tech Ingenierie, Oct. 1990 et Dec. 1990.

Morocco Country Profile 1990-91, The Economist Intelligence Unit, 1990.

Morocco Country Report No. 2 1991, The Economist Intelligence Unit, 1991.

EDM Project Quarterly Reports, 4th Quarter 1989 through 2nd Quarter 1991, RCG/Hagler, Bailly, Inc.

Enhancing National Energy Efficiency, A USAID Approach in Morocco, Stephen Klein, December 26, 1990.

Energy Demand Management Project 1991 Work Plan, RCG/Hagler, Bailly, Inc. 14 January 1991.

O.F.E. (Operation Facturation Electrique) Rapport de Synthese (Phase Test), July 1991.

L'Efficacite Energetique Dans les Systemes Electriques, RCG/Hagler, Bailly, Inc., Sept. 1991.

Operation Reglage Chaudieres, RCG/Hagler, Bailly, Inc.

Compte Rendu des Societes Controlees, (operation Reglage Chaudieres), CETE Apave international.

Gem-O-Gramme, Issue Numbers 1 and 2, RCG/Hagler, Bailly, Inc., Mai 1991 and Sept. 1991.

EDM Project Subcontract No. FL-1-90, Subcontractor: Experdata, RCG/Hagler Bailly, Inc., May 4, 1990.

Rapport d'Audit Energetique de la Cooperative Laiterie CoLait, RCG/Hagler Bailly, Inc., May 1990.

Un Rapport Technique sur l'Efficacite de l'Energie de Hotel Dounia au Fes, Maroc: Une Approche "Design Bilclimatique", RCG/Hagler Bailly, Inc.

Brochures

Techniques de gestion de l'energie, RCG/Hagler, Bailly, Inc., Amelioration des performances energetiques des chaudieres, RCG/Hagler, Bailly, Inc.

Programme de Formation 1991-1992, RCG/Hagler Bailly, Inc.

L'Efficacite Energetique dans les Systemes Electriques, RCG/Hagler, Bailly, Inc.

L'Efficacite Energetique dans les Systemes Vapeur, RCG/Hagler, Bailly, Inc.

Notices de Presse sur le Project GEM, various dates

Project Files Consulted

USAID - Mission Project Files

- EDM Contract File
- Steering Committee, Project Memos
- Project Correspondence

Contractor - RCG/Hagler Bailly, Inc.

- Office and Audit Equipment Procurement
- Participant evaluations for workshops
- Steering Committee agendas
- ENIM Project file
- Trip Report: Project Study Tour to Tunisia
- Letters of interest in EDM Project

APPENDIX E
List of Persons Contacted

USAID, Morocco

Mr. Dennis Chandler, Mission Director
Mr. James Lowenthal, Mission Deputy Director
Mr. Richard Warin, Mission Controller
Mr. Richard Burns, Division Chief, Project Development and Private Enterprise (PDPE)
Mr. Alexander Shapleigh, Private Sector Officer
Mr. Rick Scott, Project Development Officer and Project Officer (PDPE)
Mr. Mohamed Oubnichou, Project Officer (PDPE)
Ms. Monique Bidaoui, Mission Training Officer

USAID Morocco, Ex Mission

Mr. Stephen Klein, former Chief, Energy and Natural Resources Division

USAID, Washington D.C.

Mr. Robert Ichord, Chief, ANE/Energy
Mr. Robert Archer, Deputy Chief, ANE/Energy

RCG/Hagler, Bailly, Inc., Washington, D.C.

Mr. Alain Streicher, Senior Vice President
Mr. Mark Oven, Principal

RCG/Hagler, Bailly, Inc., Rabat

Mr. Neils de Terra, Chief of Party
Mr. Yvan Gravel, Energy Demand Specialist, (IDEA, Inc. under subcontract to RCG/Hagler, Bailly, Inc.)
Mr. Abdelmourhite Lahbabi, Chief Engineer
Mr. Mustapha Benkhassi, Chief Engineer
Mr. Said Guemra, Principal Engineer

Ministry of Energy and Mines, Government of Morocco

Mr. Ahmed Bouhaouli, Director of Energy
Mr. Bencheqroun, Deputy Director of Energy
Mr. Mohamed Adyel, Head of Planning and Documentation Services

Subcontractors

Mr. Abdelhanine Benallou, Vice President, Sigma Tech Ingenierie Professor Chaoui, ENIM
Mr. El Khyari Mostapha, Director General, Sud Clime
Mr. Hassan Rifki, Director General, Experdata
Dr. Mustapha Ait Bassidi, Chief of Engineering

Mr. Ali Acha, Senior Engineer

Participating Firms

Mr. Naim Lahlou, Director, Dept. of Industrial and Thermal Activities, Sococharbo
Mr. Abou Tarik, SOFT
Mr. Kettani Mounsif, Technical Director, SOFT
Mr. Rene Baiada, Director General, Salam Lido Hotel
Mr. Wahid, Director, Salam Lido Hotel
Mr. Bouchaid, Technical Director, Lido Salam Hotel
Mr. Naciri, Director, Salam Hotels
Mr. Balary, Technical Coordinator, Salam Hotels
Mr. Driss Traki, Director General, Mining Division, ONA Group
Mr. Abderrahim Oumanni, Director General, Europa Hotel Safir
Mr. Omar Bousri, Technical Director, Europa Hotel Safir
Mr. Director General, Hotel N'Fis
Mr. Nourri, Technical Director, Hotel N'Fis
Mr. Abdellah Ikasarghid, Director General, ASMAR Cement
Mr. Ali Aghdouz, Chief Engineer, General Tire and Rubber Co. of Morocco
Mr. Abdellaziz Khaldane, Director General, Centrale Laiterie Maroc Lait
Mr. Mohamed Karfa, Associate Director, Centrale Laiterie Maroc Lait
Mr. Nassib, Technical Director, Centrale Laiterie Maroc Lait
Mr. David Toledano, Director General, SBS Porcher
Mr. Vrytcheff, Technical Director, SBS Porcher

Training Institutions

Mr. Abdelhak Moutawakkil, Director of the National Institute of Training and Teaching Research (INFRP), Office de la Formation Professionnelle et de la Promotion du Travail (OFPPT)
Mr. Said Slaoui, Director of Services, INFRP, OFPPT

APPENDIX F
Acronyms

AME	Agence de Maitrise de l'Energie
ANE	Asia Near East Bureau
Dh	Dirham
ECSP	Energy Conservation Services Program
EDM	Energy Demand Management Project
ENIM	Ecole Nationale de l'Industrie Minerale
FNIH	National Hotel Industry Association
GOM	Government of Morocco
HBI	Hagler, Bailly, Inc.
LCC	Les Conserves de Meknes
MEM	Ministere des l'Energie et des Mines
OFPPT	Office de la Formation Professionnelle et de la Promotion du Travail
OCP	Office Cherifien des Phosphates
PACD	Project Assistance Completion Date
PDPE	Project Development and Private Enterprise
PID	Project Identification Document
PIO/T	Project Implementation Order/Technical
RFP	Request for Proposals
STEG	Société Tunisienne d'Electricite et du Gaz
TOEFL	Test of English as a Foreign Language
toe	Tons of oil equivalent
USAID	United States Agency for International Development

APPENDIX G
Draft Report Comments

UNITED STATES OF AMERICA
AGENCY FOR INTERNATIONAL DEVELOPMENT
RABAT, MOROCCO

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November 26, 1991

Ms. Mary Worzala
Resource Management Associates, Inc.
5230 University Avenue
Suite 300
Madison, Wi 53703

Dear Mary:

We have gathered the following comments regarding the second draft of the Morocco Energy Demand Management Project from the members of the USAID/Morocco Project Committee (both in the meeting of October 9, 1991, and, subsequently as edits to your second draft in writing), the Ministry of Energy and Mines, and the prime contractor. As we have discussed, we would appreciate it if you would consider these notes while putting together the final report.

The draft evaluation report covered a lot of ground and contained valuable insights. We want to ensure that the final version can be used as a practical guide to the design of our Project Paper Supplement which will in essence detail what is to be done over the next period of project activities. The constructive ideas for project improvement presented in the draft report are very much appreciated. Any further suggestions for project improvement in terms of administration, activities, or other areas, leading towards greater and more sustainable impact are welcome.

In addition, the verbal debriefings given by the team to the Project Committee and the Director prior to its departure from Morocco stressed many positive aspects of the project. We hope that the final report is as forthright in terms of the positive opportunities it accents as were the verbal debriefings.

The following are more specific comments:

Substance:

The Evaluation Team might consider expanding its views on the adequacy of the objectives and plans as detailed in the current PP. The feasibility study targets, for example, have been surpassed and the project is behind on the audits. You state on Page 36 that the project, "has kept pace with the general energy savings values in the Project Paper..." Were these amounts in the Project Paper reasonable, given what we now know? What is missing is an up front analysis of whether or not the targets and objectives in the PP were realistic given lessons learned, the budget and, hence, the staffing pattern, and, if

-91

not, what would be reasonable alternatives both in terms of numbers and types of activities?

Given the contractor's position on audits (i.e. that the market in Morocco demands high quality, in-depth, lengthy audits), do you still hold to your position regarding types of audits and their number? Can you suggest alternative and specific ways in which the number of audits specified in the PP (40) could be met? Given that the audits are a primary mechanism for training Moroccan specialists and expanding local capacities for skilled EDM professionals, what would be your recommendation in terms of numbers of audits for the PP Supplement?

You have recommended that the project increase funding levels by $600,000. You indicate that the there is a strong demand for the project's services and that there is great potential for this demand to grow. If the project was given even more funds and the PACD was extended, what would be your recommendations for priorities for use of these expanded resources?

Regarding your remarks about sustainabilty, if funding for the project stops after a maximum 4 month extension as you recommend, will the project have created enough of a demand to support such a service in the Moroccan marketplace? Do you have any specific recommendations about project activities that will help ensure this?

Page 24 suggests that a large portion of "getting the word out" lies with the MEM. What would the evaluation team's position be on the suggestion that some of this burden also be shifted to the private sector, through such entities as an Energy Club or through associations, a model of which would be the National Hotel Association? Should the project find ways to gradually shift the burden for many of these types of activities from the contractor? If so, any recommendation?

The Evaluation Team suggests throughout the draft report that the project should be reaching a wider audience - are there specific recommendations as to how this can be done (subcontracting all work - hiring more engineers, etc...) It is important to ensure comparative advantage, but, what about maximum impact? What about the idea of bringing US (or third country) experts here to hit a wider audience? Or, is that unreasonable?

<u>Editorial:</u>

The report might read better if the background on project plans was shortened, and reference to specific numbers or targets made in the relevant sections...

Recommendations might be included in the Executive Summary and in each corresponding section of "findings"... That is, this is what we have found, therefore, these are the recommendations...

Recommendations could be **prioritized** into those which are the most important (ie **must be done**), and those which are less important (**should get done**). If so , please note...

Recommendations, if listed in the "findings" sections, might be highlighted with boldface... when listed here, and/or in Executive Summary, or in Section V, might be bulleted...

Perhaps the final report could include a page in the front that lists all acronyms (for instance, ENIM, AME, STEG, etc.)...

The Ministry of Mines and Energy would like to point out that (p 25), the Energy Planning Project provided only computers and software, and, not reference materials and other materials...

The MEM also suggests that (p 27) there were auditing activities going on before this project began, including some completed under the Energy Planning Project. There were, however, not many they could tell me (without documentation) that there had been at least 73 done in the few years leading up to the EDM Project...

Please spell out APAVE on p 35...

What is power factor?...

The Evaluation Team is invited to develop ideas as to how it would see the project implemented as a result of this evaluation and the PP Supplement in order to reach more people, and provide a sustainable activity, while not constraining itself to the parameters of the current project, keeping in mind that all recommendations may not be implemented...

I have enclosed a marked-up copy of the second draft of the Evaluation, and a copy of the Project paper, as you requested.

Once again,the evaluation team is to be commended for a job well done. We expect that the final evaluation report will be in Rabat on the 16th of December (giving an extra two days for the Thanksgiving break). If you have any questions, please do give me a call.

With best regards for a Happy Holiday season.

Sincerely,

Rick Scott

MEMORANDUM

TO: Frederic Scott, EDM Project Officer, PDPE

CC: Richard Burns, Chief, PDPE
Mohamed Oubnichou, PDPE
Charles Fafard and Mary Worzala, Resource Management Associates
Alain Streicher, Senior V.P./ RCG/HBI
Tom King, V.P./IDEA

FROM: Niels de Terra, COP

DATE: 23 October 1991

OUR REF: ND/M155/91

SUBJECT: RCG/Hagler, Bailly Comments on Draft EDM Project Evaluation Report

While the attached comments may seem extensive we feel that it is essential to set out a comprehensive response that will contribute to completing the work of the Evaluation Team. We believe that the climate has never been better for a U.S. funded activity intended to assist the Moroccan private sector to become more efficient by improving its use of energy. Developments in U.S. - Morocco relations during the month of October will, in our view, greatly increase the receptivity of industry to the services that the EDM Project can offer. The successes of the project over the past two years have opened the possibility for considerably greater and lasting achievements if the resources can be found to build on what has been done.

We think that the Evaluation Team has done well given the inherent difficulties of grasping the complex, pioneering nature of this project. The draft Evaluation Report does not fully answer the question as to what could be done to maximize the sustainability of this project in the Moroccan private sector, including all the areas where additional resources could contribute to sustainability.

COMMENTS BY RCG/HAGLER, BAILLY, INC. ON DRAFT EDM PROJECT MID-TERM EVALUATION REPORT DATED 11 OCT 1991

OVERALL COMMENTS

We would like to congratulate the Evaluation Team with respect to their response to an assignment that was particularly challenging because of the nature of the EDM project. At the beginning of 1990 the EDM Project started from scratch to create a national brand image for energy management consulting services in the private sector in a business climate that was fundamentally sceptical. A coherent brand image of "Projet GEM" has been successfully established, and it is an image founded on the fundamental principles of quality and of adapting services to meet the requirements of Moroccan businessmen in the three target sectors. This success has been achieved with far less financial resources that would normally have been available to a fully capitalized private company establishing a new market. For us the single most important issue of the evaluation is now sustainability, including the fact that owing to the lack of subcontracting resources, the project has not yet been able to develop energy management capabilities in local consulting firms.

SPECIFIC COMMENTS

The comments below refer to the indicated sections and pages in the draft report.

EXECUTIVE SUMMARY

p. (i)

1 st para. 2nd sentence. "The goal of the EDM Project is to save foreign exchange....". To this goal (from the Project Paper) must be added the underlying and ground-breaking objective of creating a new market directly in the private sector by establishing a credible brand image for energy management services.

p. (iv) Exec. Sum.

TECHNICAL SUPPORT

In para. 3, the impression is given that by being limited to three sectors, the project is constrained, that it is running out of potential clients. As we point out below on p. 7, the project is far from having exhausted the potential of the three target sectors, where a great deal of work remains to be done if sustainability is to be achieved.

p. (iv) Exec. Sum.

TRAINING

We would not agree that "the development of the university level curriculum has been slow". Given the normally slow pace of achieving changes in university level curricula, we believe that the progress to date has been quite remarkable. The fact that ENIM has created an entirely new "Option Energie" - an "energy major" - is due to interaction with the EDM Project. Regrettably, there was not sufficient time for the Team to meet with ENIM and examine the course content of the new "energy major", but from our experience in other countries, we have not seen such an early and major impact on a high level educational institution as we have seen with ENIM.

In discussing the level of training that remains to be provided, the evaluation report should note the fact that as a result of Contract Modification No. 1, the Total budget for training was reduced from $419,000 to $270,000 and that the budget for U.S. training was reduced from $270,000 to $190,000. It might also be noted that while the RFP and the original contract called for the hiring of an "EDM Training Specialist", this position description was subsequently changed to call for an "EDM Specialist" at the time that the Contractor was directed not to hire the candidate originally proposed for this position.

RECOMMENDATIONS

p.(v) Exec. Sum.

The report states "The evaluation team concludes that the EDM Project is achieving reasonable success in meeting the objectives of the project." We understand the term "reasonable success" to be synonymous with "modest" or "limited" success, and we believe that the phrase will be generally interpreted in this way. If, indeed, the evaluation team so intends to qualify its overall opinion of the project, we believe that it should provide specific information at this point as to why the "success" is limited. If the evaluation team did not intend such a judgement, then we feel that the word "reasonable" should be dropped.

I. INTRODUCTION
p. 1

At the end of the first paragraph it would be appropriate to state that Hagler, Bailly's U.S. subcontractor is I.D.E.A.

III.C.e Demonstration Projects

Owing to lack of sufficient discussion time with the Evaluation Team, it was not possible to fully go over the area of Demonstration Projects. In our view, a "Demonstration Project" is defined as the adoption by one or more Moroccan firms of an

energy efficiency technology, or set of practices and techniques not yet used widely in the country, and which stand a good chance of been copied by other firms. As far as we are concerned, five demonstration projects have been undertaken that meet this test. (One has been blocked by circumstances beyond our control and the other four have been or are in the process of being implemented.)

1. **Installation of Shower-Pressure Limiters in Hotels.** One of the projects proposed in our audit report of the Hotel Europa Safir in Agadir was the installation in all rooms of a simple shower head attachment that uses substantially less hot water than the conventional shower head, but without any reduction in "shower quality". These "douchettes" were ordered and installed in all bathrooms during the renovation of the hotel. This was the first installation of these devices in Morocco, and we are optimistic that other hotels can be persuaded to follow the example of the Safir.

2. **Use of Boiler Efficiency Combustion Measurement Equipment.** In all our contacts with Moroccan companies we have only found one instance of a company having a boiler efficiency measurement instrument. In order to demonstrate the value of such equipment, we have bought 40 U.S.-made Bacharach kits, and have begun leasing these. The first five kits have already been ordered, and we anticipate brisk demand for the others.

3. **Bioclimatic Hotel Design for the PLM/Dounia Hotel in Fez.** An agreement was signed between the project and the management of the Dounia/PLM hotel to carry out this major demonstration project. A consultant architect/engineer based in Phoenix carried out a detailed analysis of 20 architectural drawings for the hotel and submitted a report proposing and justifying changes to the plans in order to lower the hotel's energy consumption. However, owing the economic impact of the Gulf War on the hotel industry, the PLM management deferred construction of the hotel. Thus, the project did conceive and implement its part of the project.

4. **Hotel Energy Demand Monitoring System.** The Europa Safir Hotel in Agadir has instituted at our proposal an energy management monitoring system, which we regard and have used as a demonstration project to promote energy management in other hotels. This involved (i) the installation of sub-metering; (ii) the appointment of an energy manager and (iii) the development and use of a system of daily readings and data analysis. This monitoring system is fully operational, and we refer to it in our hotel promotional work. It was also used as a focal point for the Safir group training seminar that we gave to disseminate energy management techniques throughout the ten hotels of the Safir chain.

5. Cement Kiln Thermal and Mass Balance Model. In this case the project developed an energy management tool for the Moroccan cement industry, and is now in the process of disseminating and customizing the model for all interested companies.

In our view the number of "15" demonstration projects should not be regarded as a firm target for the EDM project. Much of Moroccan industry is quite aware of technological options such as cogeneration, condensate recovery, process heat recovery, etc. (e.g. ONA's Zemamra sugar plant has better energy performance characteristics than the U.S. industry average). It is often the case that if these "new techniques" have not been applied it is not because they are unknown. The project is constantly on the lookout for opportunities to demonstrate new technologies or procedures, but these must make sense from an economic and process standpoint. It seems more appropriate to regard number "15" as being indicative, and subject to the identification of (i) projects that make economic sense and (ii) technologies that have vendors able to provide sales and maintenance in Morocco.

p. 11 3rd para. last line. Please note that GEM-O-GRAMME is published quarterly.

p. 13
III.C. Technical Support
a. Audits and Feasibility Studies

In discussing the target of 40 energy audits in the Project Paper, it is important to note that the Project Paper did not set targets for Boiler Tune-ups or for the Electric Service Analysis visits - two activities initiated by the project that are intended to reach large numbers of firms that cannot be reached for in-depth audits. Given the very limited staff resources of the project, the likely impact of these "quick analytical" activities that were not foreseen in the Project Paper should be taken into account when stating that the project has "only" achieved 13 audits as of late 1991.

Hotel Energy Management Training Courses
p. 18

The first sentence should be revised to indicate that it was the project that proposed to the Safir management the idea of a two-day training seminar for Technical Directors as a way of disseminating energy management and demonstration project lessons throughout the chain. It was the second seminar, for all Safir General Managers, which was done at the request of the Safir chain.

b. Technical Publications and Brochures
p.24

In fact, a number of the articles that have appeared in the Moroccan press resulted from press releases or texts prepared specifically for the purpose of handing to journalists. Two articles (on the Safir seminars) resulted from press releases distributed by the Safir management.

IV.C.a. Audits and Feasibility Studies
p.27

3rd para, last sentence. We would be interested to know which audit this sentence refers to? We are aware that in the Maroc Lait audit there was a calculation error, but this resulted from incorrect data supplied to EDM Project staff by the plant engineers.

Staff Activities
p.28-

The following observations:

1. We fully agree that one objective of the audit process must be to reduce the amount of time needed to carry out audits. Part of this should be achieved by becoming more productive in delivering high quality, in-depth audits, and part by evolving more limited audit formulas where the energy savings or other factors dictate less expenditure of time. However, these are two trends that are working in opposite directions. Our project engineers are becoming more proficient, and are able to do more in less time. This is one trend. The other involves the training aspect in every audit. The productivity of subcontractors in the first few audits is quite low, and this naturally results in a situation where we are "losing" the productivity gains among our own engineers. As the Evaluation Team correctly points to the need to increase the amount of training of Moroccan engineers (i.e. subcontractors), and as this training component of audits will continue to the very end of the project, we do not see major scope for reducing the number of person-days actually used for any given type of audit.

2. On p. 29 3rd para. the total project engineers' time available has been calculated as 12 x 22 days per year. From this must be subtracted 21 days annual vacation and 15 days of paid holidays per year.

3. p. 30 1st para. Last sentence. The original project budget provides for an average of $52,000 per year for Moroccan subcontracting. At the fully loaded rates for senior engineers in Morocco this equates to 150 person-days per year. When divided between three consulting firms this averages to 50 person-days per firm per year. When one subtracts the $50,000 used for training workshops and another $40,000 for individual consultants, this yields about 30 person-days per year per firm.

4. It would be appropriate for the discussion on p. 30 to bring out the fact that having up to three trainee energy management engineers in the project office on a 3/4 time basis will inevitably reduce the productivity of the three project engineers for activities such as technical assistance, subcontract supervision and outside training. These trainee engineers are only likely to become productive towards the end of their one-year relationships with the project.

5. In the 3rd para. on p. 30 it is said that the project is considering repeating the "trainee engineer" activity in 1993. While we would not exclude repeating the process we doubt that it would be possible unless (i) the project's own staff resources were increased; (ii) the project were extended to 1994-95, and (iii) increased funds for subcontracting were made available.

p. 31 2nd para.

We are puzzled by the statement in this paragraph concerning follow-up visits. All of the audited companies visited by the evaluation team have received at least one follow-up visit. The experience of the project has shown that scheduling these visits at the intervals planned in the audit contracts (6 and 12 months after the audit) can be very difficult. We are repeatedly told to call back, that the time proposed is not convenient, that the plant manager will be busy, that the plant is undergoing refitting, etc. Since the time of our own engineer's is also planned (scheduled audits and training seminars) we often then have to defer new attempts to schedule follow-up visits for a month at a time. Given the existing staff resources, we do not believe that any greater efforts can be made in this area than have been done to date.

p. 32 Hotel Europa Safir Audit

a. Insulating the hot water lines to the pool was not considered because these carry comparatively low temperature water (ca. 50° C.) and this fact, combined with the relatively short distance involved, does not yield an attractive payback time.

b. Heat recovery from the boiler stack gas was not proposed (for the Safir or most other Moroccan hotels) because the total annual operating time of hotel boilers in Morocco does not yield an attractive payback time for stack gas heat recovery. We do, however, remain alert to this opportunity wherever it might be justified.

c. Electronic energy management systems cannot be proposed to hotel managements because Morocco lacks the basic service infrastructure. The Hotel N'Fis (whom we audited in Marrakech) had such a bad experience with a small scale electronic control system (three month wait to replace a circuit board) that they had it removed and replaced with a mechanical control device. Thus, even if such systems could be justified on economic grounds, they must await the overall development of the electronics service sector.

p. 32 Construction Materials Industry

Correction: The subcontract with Holderbank was for $25,000 not Dh 25,000.

p. 33 1st Para.

It might have been useful and of interest to USAID for the evaluation to note that although the project did make use of an outside consultant (Holderbank) for the ASMAR Cement Plant audit, the project depended entirely on its own resources for the Cement Kiln Modelling Seminar; and that the CIOR cement plant audit is being done without specialized consultant assistance. We would also be interested in the basis for the observation in the last sentence: "However, there are probably few opportunities to replicate such savings at other facilities in the sector." In fact, two other cement plants have recently asked for assistance.

p. 33 Agro-Industries

Company No. 4 (please note that LCC is principally a fish processing and canning company, and that fruit and vegetable are subsidiary activities).

p. 34 Inclusion of Other Sectors

3rd Sentence. We cannot agree that "expansion of the project into additional sectors would not require additional resources, either in financial or human resources." To date the project has touched a very small portion of the agro-industry sector. There are 30 sub-sectors and 479 firms in agro-industry, and the project has to date reached only four of these firms and four of these sectors (milk processing and fruit, vegetable and fish canning). There are 130 hotels in the four and five star categories, and with the Safir, Salam and Liwa chains the project will have access to 30 to 35 of these hotels. Two more cement companies (CINOUCA Morocco's largest producer - and ASMENT) have in the past week requested assistance from the project. The Construction Materials Sector consists of some 20 large companies (cement, ceramics, glass and bricks). While we are on course to make a lasting impact on the cement industry, we will be only beginning to make an impact on the ceramics sector in 1992 (SBS Porcher is only one of 7 producers, and by no means the largest.) Finally, we would not accept the suggestion that we defer work with the hotel sector until 1993. This sector needs assistance now more than ever, and we would lose whatever momentum we have built up. Thus, any work we take on in new sectors will inevitably mean cutting back the limited efforts underway in our initial three target sectors. The one new addition, which we believe would be effective (replicability) and manageable in 1992, would be to do one large mine audit for the ONA mines group. In this way the results could be disseminated to the other mines of the group.

Re: Audit Selection Criteria

Since the start of the project the following criteria have been applied to all audits and these criteria have guided our choice of companies:

1. Amount of potential energy savings (when compared with the complexity of plant).
2. Replicability (Is the plant unique or are there a number of other similar plants that could benefit from the energy efficiency projects proposed for the audited plant? Is the plant or hotel part of an industrial group that will disseminate audit lessons? Does the plant or hotel have a high profile within its sector?)
3. Quality of plant management. Does the plant have a management structure that is likely to implement audit recommendations?

We have the following comments on those audit selection criteria suggested by the evaluation team (p. 34) that are additional to the ones already used by the project and described above:

3. Maximum impact on energy supply. We do not understand this criteria. If the intent is "maximum reduction in imported energy" then it is the same as maximum energy savings.
4. Proven results of technology application. Again we do not understand what is meant by this term. If the intent is to say that we would only propose proven solutions, this goes without saying. No professional energy engineer would propose experimental or unproven technologies in anything except a defined pilot project.
5. Anticipated time to complete the audit. We do not necessarily see this as an audit selection criteria on its own. A plant with potential savings of 30,000 toe/year would clearly justify more time than a plant with potential savings of 1,000 toe/year.
6. Ability of firm to finance audit on its own. We do not see the relevance of this criterion for the project. "Ability to finance" in the private sector in Morocco is not a credit problem but rather a question of management perception. During our initial commercial approach we make it clear that our services are on a commercial basis, and we often give a ballpark figure as to what the audit might cost. If, after receiving our proposal, the firm decides that they are not prepared to invest the money, this is their decision. (The Salam Hotel Chain, having just reduced all staff salaries throughout the chain by 50 % owing to the impact of the Gulf War, proceeded to sign an audit contract with the project in June 1991 in which cost-sharing was set at 40%.) However, if we were dealing with public sector firms, "ability to finance" would play a central role as the firm would probably require the approval of its supervisory Ministry (tutelle).

b. Boiler Tune-Ups p. 35

Our own evaluation of the Test Phase of the Boiler Tune-Up Services (BTS) has lead us to conclude that we will need a Pilot Phase in order to better understand the market - i.e. savings achievable vs. commercial cost of carrying out Boiler Tune-ups. The Evaluation Team cites the average savings across the ten plant visits, but if one examines the savings in each of the ten plants it will be seen that this average savings figure may be misleading. In one plant the savings achieved were Dh 550/year and in two other plants the savings were Dh 2250/ year, none of which would have covered the full cost of such a service based on one-half day per boiler including travel time. Our own evaluation concludes that based on these ten plants it is not clear that a BTS firm would be able to fully recover its costs and make a profit without either (i) additional boiler selection criteria and/or (ii) a modest subsidy from the project that would be justified by the fact that we were obtaining an important marketing entree as a result of the tune-up visit. We have concluded that this sample of ten is not adequate, and that a pilot phase (as we had originally planned in 1990) will be needed before we fully understand the costs and savings obtainable. We are on the point of contracting with the Safir hotel chain to carry out tune-ups on 24 boilers during the month of December using the Subcontractor that the Evaluation Team met - Sud Clim - in Marrakech.

c. Electric Bill Analysis

(p. 15) This activity does not, in fact, measure the power factor in the plant as stated in the evaluation report. The analysis is confined to the data contained in twelve consecutive electricity bills of the plant, and this analysis is performed on the spot by an automated analytical routine written in Quattro Pro. However, we only estimate savings that would result from the implementation of measures whose cost has not been estimated for the plant concerned, but rather at a generic level. The client's report is printed and delivered during the visit, which typically takes two hours. The program was developed by a project engineer (Mr. Guemra), not by the subcontractor as stated.

(see p. 35). We would be interested in the Evaluation Team's views on the following questions with respect to Operation Facturation Electrique:

a. Does the analysis go far enough?
b. Should we include power factor measurement and analysis?
c. Should we attempt to estimate the cost of power factor correction and demand control measures for each plant instead of simply indicating the level of savings achievable if these measures were undertaken?
d. Given the relatively high electricity costs in Morocco of $ 0.08 to $0.10 /kWh (when compared to the U.S.) should this activity be "deepened" to analyze the advisability of installing electric time-clocks, variable speed drives, lighting control equipment?

d. Demonstration Projects

See comments above.

IV.D. Training

(p. 37 para. 3) cites a target of 62 months of training set out in the project paper. However, the funds available for training were reduced by 36% in Contract Modification No. 1, hence the target must also be revised. It should also be noted that we have drawn on Subcontracting funds to pay for logistic support to carry out training workshops, and that we will probably have used $50,000 of subcontracting funds for training workshops (logistics and consultants to carry out instruction) by February 1992. As the Evaluation Report points about we have lost considerable ground in 1991 as a result of the Gulf War. Having had to drop one full series, we may have lost up to 500 person-days in 1991.

p. 39 Training Outside Morocco

Correction: para. 3. The project has established contact with the Ecole Mohammedia. Professors from the Ecole Mohammedia (EM) have worked for the project as consultants (adapting the Electric Systems Training Manual), and in August 1991 a meeting took place between Messrs. Lahbabi and Mark Oven, and the designated contact from EM. Cooperation possibilities were reviewed, and it was agreed that EM would provide the Project with a written statement of its needs by the end of September.

In briefing the Evaluation Team on our study tour to Tunisia, I forgot to mention one aspect which is particularly important in connection with our co-operation with MEM. This study tour was planned in conjunction with MEM, and it was intended to be a joint activity in which MEM staff would take part in the trip. They would become better acquainted with Project Staff and we would jointly study the Tunisian approach to energy conservation. Our travel dates were then timed to coincide with the presence in Tunisia of Mr. Adyel, the head of MEM's planning and documentation division, such that he would join our two day program. However, when we arrived in Tunis we found that Mr. Adyel had just left for Rabat.

p. 40 We welcome the Evaluation Team's suggestion that foreign training for project staff not be limited to the U.S.

Training: All Aspects

All of the points made in the Evaluation Report are well taken. However, we must come back to the basic problem of human resources. In order to do more training of Moroccan engineers, the existing project staff will have to cut back on technical assistance efforts, and carry out audits at a slower rate than during 1990-91. The Moroccan end of the preparation of U.S. training activities cannot easily be subcontracted to local firms and it is very time consuming. We estimate that preparation and implementation of the U.S.

study tour for the Moroccan sugar industry will require at least 2 person-months of staff time in the Rabat office, including participation in the two-week tour.

IV.F. Management Support

p. 41. There appears to be something missing from the last sentence in the first paragraph. The situation is that support staff are very stretched, and the project urgently requires additional support staff (one secretary). We have been able to meet deadlines only by placing exceptional pressure on existing staff and requiring overtime. During certain periods, report production has been backlogged. It is likely that in-house desktop publishing was not anticipated in the original project design. However, for all of training manuals we have produced complete camera-ready copy for our printers in order to reduce printing costs and proof-reading time. (NB: there might be a typo in that the word "required" should read "requires".)

IV.G Private Sector Development and Management Support.

p.41-43. This discussion provides a good summary of the situation, but it is incomplete is one vital aspect. In para. 4 on p. 42 it is said "The primary constraint to increasing the number of institutions [e.g. consulting companies] involved in providing technical expertise is financial. The project is constrained by the amount of resources available for subcontracting." Both these statements are true, but providing additional amounts only for subcontracting will not remove the constraints. The project does not have sufficient staff to manage a significant increase in subcontracting resources, and if there were to be no increase in staffing levels the additional subcontracting funds could not be properly spent. The kind of subcontracting that trains engineers requires close, continuing supervision and participation by project engineers. Thus, increasing the subcontracting budget must be accompanied by increased staff resources. And this leads to the third important element which, in our view, cannot be separated from increasing human and financial resources, and that is the duration of the project.

Assuming that new staff and subcontracting resources were provided, it would not be until mid-1992 that a major increase in the subcontracting pipeline could be in place under increased (and operational) staff resources. At this point the project would have one year to run. Even assuming that new Moroccan staff could be recruited for a one year period (extremely unlikely), the higher level of activity generated by the quantum jump in subcontracting resources would be reaching the necessary level for the first time in the project just as the project was starting to wind down.

This entire project has been an experiment. USAID was entering new territory. In our view, the experiment has been a success thus far, but it is incomplete in a number of areas because of lack of resources. These aspects were very difficult to foresee at the design stage because there were so many unknowns.

In summary, we believe that four elements must be addressed together:

- Project staffing requirements to accomplish objectives
- Project subcontracting resources, which were drastically underestimated. (90 person-days per year available for audit work.)
- Project duration necessary to achieve a set of objectives determined to be realistic as a result of the first two years of experience.
- Additional equipment needs.

The fact that the project has made minimal progress in developing skills in local consulting firms as a result of the shortage in subcontracting funds cannot, in our view, be remedied by a large cash injection over one year. Such an increment in funding should be given time to come to fruition.

V. Conclusions and Recommendations

(p. 44 para. 2.) On p. 4 of the report it is pointed out that the major reason for splitting the project into a 36 month and a 16 month Option Period was an error in requesting funds for the project, and the need to stay within the funds approved by the first PIO/T. Hence, it was never part of the project design to halt the project after 36 months, although obviously this option is open to USAID at any point in a project. Thus, it hardly seems appropriate for the Evaluation Report to attach such importance to the "general recommendation that the project be extended to 52 months" when the division into two periods was simply an artifact of the budgeting/financing process. The contractor has never assumed that there would be any question of halting the project after 36 months unless its performance was judged to be unacceptable and irremediable, or unless the U.S. economic assistance program to Morocco underwent a drastic curtailment.

As we stated above, we believe that additional funding for subcontracting is very necessary (indeed all the remaining funds for subcontracting will have been obligated by the end of 1991), but that such a step must be part of an overall concept that includes additional staff resources and an extension of the project for 18 to 24 months.

Recommendation No. 1

We regret that the Evaluation Team apparently did not have more time to develop an understanding of the Moroccan market for energy audits, and we must reject the assertion that our audits are of too high a quality and that they are too thorough. (This opinion could be the subject of unfortunate misinterpretation by MEM.) Overcoming the basic scepticism towards the kind of consulting services such as energy management offers requires being able to offer the highest quality energy audit. The emphasis by the Contractor on quality is very deliberate, and in our view essential to the success and the sustainability of the project. The pre-project feasibility study showed that Moroccan

businessmen are (i) not in the habit of paying for "soft" consulting services, such as energy management as distinct from civil engineering, and (ii) suspicious of "vendors" in general. An indispensable component of establishing the brand image and hence a market for "soft" energy management services has been to establish the credibility of a previously unknown team of engineers performing services that Moroccan companies have hitherto never received. The project has fully succeeded in establishing its technical credibility and this has only been possible by delivering audit reports that could withstand the scrutiny of Moroccan engineers who have been educated to the high standards of the French "Grandes Ecoles" and their U.S. equivalents. If we face a choice between maintaining the excellent technical credibility that the project has succeeded in establishing and producing superficial work in order to meet a numerical target, then we believe that the long term interests of energy management, of MEM and of USAID will be better served by revising the numerical target.

Neither the contractor's nor the project team's interests are served by overshooting a market and providing levels of analysis that surpass either what the client can absorb or what is necessary to convince the client that the investment is justifiable. Our audit reports are tailored to the client, and vary from the simple, targeted audit (Conserves de Meknes, Hotel Tikida) without complete energy balances or models, to reports for Maroc Lait, ASMAR, Porcher and Les Conserves Cherifiennes (LCC), where the credibility of our proposed energy efficiency projects rests on full and complete supporting analysis. (During the presentation of our LCC audit report on October 14th the client's engineers insisted on going through every supporting calculation in every model on the spot.)

As pointed out above on p. 4 (Technical Support) the project has developed other simple, short services such as Boiler Tune-ups and Electric Service Analysis, and these should be taken into account in assessing the adequacy of technical support delivered to date. A simple calculation will show that unless project resources are increased it will not be possible to realize 40 audits (as they currently defined) by mid-1993. With audits that are currently underway or about to start, and with the commitments to the training workshops running through February 1992, and with other Work Plan commitments, it is unlikely that any new audits can started until February 1992. That leaves 17 months until the end of the project. Deducting vacations, holidays, a theoretical total of 300 days per engineer remain, or 900 for the project. If all other project activities were abandoned it would be possible to carry out another 20 audits taking 45 days each. We think that a more realistic revised project total would be 30, including the 14 now contracted.

Recommendation No. 2

We are well aware of the need to streamline audit techniques, and this has always been an objective of the project. In the case of the Hotel Tikida and Hotel Royal Mansour audits we have used a shorter, abbreviated approach that does not include complete thermal and electrical balances. (Site measurements for the recent Tikida audit took two days.) In the case of processes, the observation of the Evaluation Report is incorrect, and, as the LCC audit has shown, a process plant can insist on an in-depth presentation of supporting calculations.

Recommendation No. 3

As indicated to the Evaluation Team during their visit, all our audits are now lead by staff engineers with Mr. Gravel providing backup and oversight.

Recommendation No. 4

We fully agree, and above we have pointed out that this will increase the amount of person-days needed for audits because of the training component.

Recommendation No. 5

The project already has audit selection criteria (see above p. 6)

Recommendation No. 6

This recommendation appears to have be made without an assessment of the impact on overall project objectives. We are not opposed to this suggestion in principle, but it must be clear that the result will be a dilution of the project's activities in the three existing target sectors, and as pointed out above on p. 5, the project still has a considerable amount of work to do in these sectors. Does it make sense, for example, for the project to audit one textile plant between now and the end of the project? This topic should be taken up by the Steering Committee.

Recommendation No.7

We agree.

Recommendation No.8

We agree, although we believe that it will be important to address the questions set out above on p. 7.

Recommendation No.9

We do not agree with the formulation of this recommendation. As pointed out earlier, and it is usually the case that if a technology is being used in Morocco it is not out of ignorance, it is for of valid reasons - e.g. it is uneconomic (sometimes owing to import duties and taxes) or because there are no vendors in Morocco to provide after sales maintenance. We have already promoted five demonstration projects, and we are constantly on the lookout for new opportunities. We are certain that neither USAID nor MEM nor the Evaluation Team would suggest that we artificially promote demonstration projects that do not meet fundamental criteria including (i) proven technologies backed by vendors' performance guarantees; (ii) attractive payback periods; and (iii) local vendors able to provide reliable maintenance support.

Recommendation No. 10

We agree, and we believe that the project has demonstrated ample potential to warrant a second highly qualified expatriate EDM engineer.

Recommendation No. 11

As explained to the Evaluation Team, we have already developed a "Joint Marketing Agreement" formula for local subcontractors, under which they would be able to market audits using the Projet GEM name, offering clients a "quality guarantee" provided by the Project. We would provide a fixed number of person-days to the subcontractor in order to review its proposals and its draft audit reports. In our view, one subcontractor is ready for such activity. We estimate that two more might be ready by the end of 1992.

Recommendation No.12

Our promotional activities for our training workshops are reaching large numbers of firms. In October we sent letters and supporting information to 1500 firms. Promotional activities at a higher level than that achieved to date are constrained only by staff and financial resources.

Recommendation No.13

We agree, and we have intended to offer free, quick diagnostic visits ever since 1990. We have simply not had the time. It should be noted that five of the audits carried out to date have been for small and medium enterprises (PME) - the two canning companies and the three hotels. Our objective with diagnostic visits was to reach firms in the agro-industry sector such as flour mills, cold storage depots, etc.

Recommendation No.14, 15, 16, 17

We agree.

Recommendation No. 18

Is this recommendation different from No. 17? RCG/Hagler, Bailly carried out a study of the market in Morocco for U.S. EDM technologies as part of the project feasibility studies. The situation has not changed significantly since that study was done. As for other issues for private sector implementation (lack of awareness, lack of Moroccan EDM skills, etc.) the project itself is addressing these.

Recommendations No.19 through 24.

We agree.

Additional Recommendations Sought

1. If USAID decides to add resources to the project, does the Evaluation Team believe that the Equipment Budget will need to be increased? For example, should the project acquire an Energy Diagnostic Bus that could be shared with all of the subcontractors involved with the project? Should the project equip each of its "audit certified" subcontractors with the basic range of audit equipment (ca. $30,000 per set).

2. The Evaluation Report does not comment on the overall management of the project, i.e. on the effectiveness of the Chief of Party.

APPENDIX H
Response to Comments

All of the submitted comments to the draft report have been reviewed and considered. Many of the comments provide additional insight into the project, and help to clarify specific points mentioned in the draft report. Where appropriate, the report has been modified to reflect these comments. Some comments were considered and rejected, and the original wording and/or thought was left intact. The Evaluation Team appreciates the comments that were received, and thanks the contributors for their participation and effort in improving the mid-term evaluation.

In conducting the mid-term evaluation, the evaluation team was given many documents to review. However, the Project Paper was identified as the basic AID document that outlined the Project's expected outputs. Therefore, this document was used extensively by the Evaluation Team in performing the evaluation. As indicated in the draft report, the Project Paper indicates that the following technical achievements should be accomplished:

1. 40 energy audits;
2. 45 feasibility studies; and
3. 15 demonstration projects.

As indicated in the draft report, ten energy audits have been completed, and one demonstration project has been started. This information was provided to the Evaluation Team directly by the Contractor. There was some apparent confusion on the part of the Contractor as to the wording in the Project Paper relating to energy audits and feasibility studies.

Typically, energy audits identify potential targets (such as specific equipment or systems within a facility) for improvements, and then calculations are performed to determine the estimated energy savings and the expected simple payback for each target. The Project Paper deals with these targets separately, and refers to the calculation process as "feasibility studies".

While the Project Paper does not elaborate, it is the Evaluation Team's interpretation that the forty audits were not intended to be long, detailed studies and reports. The Project Paper identifies forty five feasibility studies, or just more than one for each audit. To the Evaluation Team, this also indicates that the Project Paper is describing a shorter energy audit and analysis. The ten completed audits include an analysis of 111 target areas, or "feasibility studies", which is over eleven per audit.

During the evaluation, only one demonstration project was identified by the contractor (the Bio-Climatic hotel study). The Contractor's memo of October 23, 1991 identifies five demonstration projects. These projects do not appear to comply with the definition of demonstration projects as used in the Project Paper. The contractor makes the argument that the fifteen projects required in the Project Paper should not be considered a firm target, and that they (the Contractor) should determine how many demonstration projects "make economic sense". The Evaluation Team believes that the Steering Committee should discuss this point, and AID should reduce the project output if appropriate.

The Contractor makes a valid point regarding audits, in that the business community of Morocco expects detailed, extensive audits of a high quality. However, the Evaluation Team found many reasons to believe that audits could be done faster, and could focus on specific equipment or systems rather than study entire facilities. The Contractor has had at least one company request this type of effort (audit of Conserves de Meknes). In addition, since the portion of the audit to be borne by the facility will be increasing, keeping the cost of the audit down would appear to be a reasonable objective.

In summary, the EDM project has accomplished many things, and the Contractor should be pleased at the progress. These points of ambiguity should be discussed and clear outputs established for the remainder of the Project.