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DRAFT FINAL REPORT

EVALUATION REPORT

ENERGY POLICY DEVELOPMENT AND CONSERVATION

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

PREPARED BY:

Development Economics Grou
Louis Berger International, Inc
1819 H Street, N.W.
Washington, D.C. 20006
202-331-7775

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OFFICE OF ENERGY PROGRAM EVALUATION

EXECUTIVE SUMMARY

This evaluation of A.I.D.'s Office of Energy has been prepared by the Development Economics Group of Louis Berger International, Inc., to examine the Office of Energy's entire portfolio of activities, and to determine how well the office is achieving its goals, how the various projects and activities integrate or overlap with each other, and how the program can be improved.

This executive summary, and the more detailed report which follows, begins with a description of the Office of Energy's program and findings about its activities and achievements; it follows with conclusions about the office's program, focussing on the office's strengths and weaknesses; and it finishes with a set of recommendations for improving the program of the Office.

I. OFFICE OF ENERGY PROGRAM

The mandate of the Office of Energy is to support the goals of A.I.D. to facilitate development, through a program designed to alleviate critical shortages of energy in LDCs in an efficient and environmentally sensitive manner.

A. Office of Energy Goals

The official goals of the Office of Energy currently are as follows:

1. Increased consideration of environmental criteria in energy systems
2. Increased technical efficiency and financial performance of energy systems
3. Greater private enterprise involvement in energy development and management
4. Expanded use of sustainable indigenous energy resources
5. Enhanced availability of energy for sustained rural development

In order to achieve those goals, the Office of Energy operates a portfolio of projects and related activities as described below.

B. Office of Energy Projects and Activities

The Energy Planning and Policy Development Project (EPPD) will soon be succeeded by the **Energy and Environmental Policy and Planning Project (EEPP)**. These projects are designed to improve the efficiency and environmental soundness of energy planning, policy-making, investment, and managerial decision-making. Over the past

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two years, much of the emphasis has been on India as a case study; under the new project, the office will extend more of its work to other countries.

The Energy Conservation Services Project (ECSP) will soon be succeeded by the **Energy Efficiency Project (EEP)**. These projects are intended to promote conservation planning and more efficient use of energy in utilities (including power generation, transmission and distribution) as well as with end users in industry, buildings, and transportation.

The Renewable Energy Applications and Training Project (REAT) encourages the use of renewable energy technologies such as hydro power, wind, solar, and geothermal power, especially for application in rural areas and with the participation of the private sector.

The Biomass Energy Systems and Technology Project (BEST) promotes the development of power systems fueled from the residues of common agricultural crops (e.g., sugarcane wastes and rice residues) and woodwastes of forest product industries, particularly in conjunction with agro-industry but also to generate electricity for the grid, particularly in rural areas.

Private Sector Energy Development Project (PSED) encourages the participation of the private sector in energy development in LDCs in order to increase the amount of power available for development as efficiently as possible. This project works both to improve the climate for private investment in the power sector and to facilitate the development of the human, technical, and financial resources of the private sector in LDCs. It also co-finances feasibility studies for potential U.S. investment.

Energy Technology Innovation Project (ETIP) will be starting activities in the near future, picking up where the **Conventional Energy Technical Assistance (CETA)** project left off. It is designed to introduce innovative, clean energy technologies and advanced management techniques that promote sustainable and cost-effective operation of electric generation, transmission, and distribution systems in LDCs.

The Energy Training Program (ETP) designs and implements training programs for government, parastatal, and private employers in the energy sector of LDCs. Courses include energy resource development, energy planning and engineering; and utility management, operation and maintenance (with special emphasis on efficiency and pollution control) among others.

In addition to these specific A.I.D. projects, the office works closely with other multilateral development banks and bilateral aid agencies. In particular, the office is involved with the **Multi-Agency Group on Power Sector Innovation (MAGPI)**, which seeks to promote the commercialization of (proven) innovative technology in the energy sector; and with the **Global Energy Efficiency Initiative (GEEI)**, which promotes the use of efficient technology and procedures in the energy sector world wide.

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Given its inevitable budget limitations, the Office concentrates on leveraging its resources and devotes most of its efforts toward information gathering, analysis, and dissemination. Most of its activities are in the form of energy assessments, reports, feasibility studies, technical assistance missions, training programs, newsletters, conferences, workshops and seminars. Through these activities, the office attempts to inform, mobilize, and organize resources from governments and the private sector, as well as other donors and research organizations, in order to carry out programs on the ground in the form of new energy facilities and improved technology (more efficient and environmentally sound) installed and operational, and improved policies and procedures.

C. Office of Energy Management Structure and Staffing

The office staff is made up of a Director, Deputy Director, and Program Analyst, (each of whom also serves as project manager on one or two projects), one other full time project manager, an Energy Systems Analyst, an Energy Specialist, a Program Operations Specialist, and two clerical personnel. The staff receives professional support from two additional personnel - a project coordinator and a technical writer, who are employees of contractors.

The projects are implemented by contractors under the supervision of the Office of Energy project managers. The project activities are augmented by "Mission Buy-Ins", whereby missions with an interest in energy projects, and funds to devote to it, can contract through one of the Office of Energy Projects for a specific, in-country project.

D. Office of Energy Achievements

As a result of interviews with Office of Energy staff, contractors, A.I.D. mission Energy Officers from 21 field missions, and others who have worked with the Office, as well as a review of the Office's program plans, progress reports, and other literature, the evaluation team has assessed the program of the Office of Energy as largely sound and well run.

Over the past five years, the Office has achieved useful results in facilitating the analysis, planning, and implementation of specific projects, programs and investments in several countries - particularly planning efforts in India, efficiency projects in Pakistan, private sector projects in the Philippines and Costa Rica, wind and oil shale projects in Morocco, and energy use projects in Egypt. In these countries, the Office can demonstrate significant progress towards increasing the energy supply and improving efficiency of power production and consumption.

In the areas of planning and policy reform, the Office has worked extensively in India, Pakistan, Costa Rica, the Dominican Republic and Egypt, among others. They have achieved noteworthy reforms particularly in terms of allowing private power production and working to improve the environment for private investment in the power sector. This has led to significant progress toward increased power capacity with private resources in the Philippines, the Dominican Republic, Pakistan, and Costa Rica.

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The Office is making progress in developing environmentally sensitive solutions to energy problems in LDCs, especially through the renewable energy projects (REAT and BEST) and conservation projects (ECSP). The Office has had some notable (albeit small and young) successes with biomass projects; and successes in several countries in energy conservation and efficiency, yielding measurable savings in fuel consumption and related financial costs (e.g., in Pakistan and Liberia). The new ETIP project is specifically charged with assisting in the commercialization and implementation of new, cleaner and more efficient technologies for conventional energy in the power sector.

Some of the successes of the Office of Energy can provide useful models that can be adapted and replicated in many other countries. Some of these, such as the development of the biomass fueled cogeneration plants in Costa Rica and Thailand and the load management improvements in Costa Rica, are obvious candidates for replication. However, one of the most beneficial outcomes (in terms of energy and financial savings) resulted from a project recommendation to close the inherently inefficient oil refinery in Liberia.

II. EVALUATION FINDINGS

An assessment of the major strengths and weaknesses of the Office of Energy follows below. (A more detailed discussion of achievements and shortcomings is presented in the main report, Chapter III.)

A. Summary of Office of Energy Strengths:

1) **High quality products**: By all accounts, the outputs of the Office of Energy's activities, including technical assistance missions, reports, recommendations, training programs, conferences, etc., are generally of high quality.

A.I.D. missions that had worked with the office had very few complaints about the quality of their projects or personnel; and the staff of collaborating organizations praised the office staff for their analytical capabilities and their innovative ideas, especially in the areas of private power development, alternative technologies and environmental issues. Clearly, the Office of Energy sets high standards for itself and its contractors and has a high quality of staff available to it. Several outside respondents volunteered the opinion that the Office's reputation had improved considerably in the past several years.

2) **Appropriate selection of the Office of Energy's comparative advantages in the fields of electrical power generation and related environmental concerns, and private sector strategies**: Given the inevitable resource and knowledge constraints facing it, Office of Energy has chosen to focus its efforts on **electrical power**. This choice is a sound one, and the Office's expertise in its chosen field is widely recognized.

With regard to the Office of Energy's tendency to concentrate its resources in a relatively small number of missions, some smaller A.I.D. missions complained that the

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Office was not very responsive to their requests. However, the fact remains that successful interventions in the energy sector are limited by two factors: project resources and host-country policy environment. First, successful energy projects usually require concerted effort in several different areas (e.g., training, technical assistance, and capital investments) in order to achieve success. Second, policy and pricing reform are usually necessary conditions to achieving positive on-the-ground results. The best efforts of any A.I.D. intervention in improving energy efficiency or private sector investment, for example, would likely prove fruitless without a favorable policy environment. Thus, given its current resource level and staffing, the Office of Energy has good reason to concentrate its resources in a limited number of countries.

3) **The Office of Energy has chosen a largely appropriate mix of activities and projects given the office's comparative advantages and goals:** With a few minor adjustments, the office's portfolio of projects and related activities can be streamlined to achieve its goals with a high degree of efficiency.

4) **The Office of Energy has developed good relations with other organizations,** including the World Bank and other multilateral development banks, other bilateral donors, financial organizations, and private sector firms in many countries. It has demonstrated an ability to leverage significant resources from them, for instance in helping to obtain approval and finance for new power facilities or hardware improvements in LDCs.

5) **The Office of Energy's training programs have received high marks from missions and from the trainees themselves.** The evaluation responses indicated that the training programs were well designed and implemented, and that the trainees came back with useful and relevant new skills.

B. Office of Energy Weaknesses

1) **Lack of specific management targets and measurable criteria for success,** leading to an apparent lack of attention to on-the-ground results of projects and activities. The Office of Energy's annual Program Plans, for instance, list planned "achievements" in terms of direct project outputs (such as reports, investment proposals, and conferences) rather than in terms of results (such as new facilities on line and producing power, or innovative technology installed, operating, and reducing wastage, losses and emissions).

Although on-the-ground results are usually beyond the immediate control of the Office of Energy and its projects, the goals of the office and the purposes of its projects are all established in these terms. The failure to establish specific targets and require regular documentation of progress in those terms leads to an inability to study systematically which approaches are most likely to lead to positive end results and to adjust project activities on a timely basis. It also makes it difficult to build credibility beyond a small circle of collaborators, and may contribute to a potential lack of accountability and incentive to perform.

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2) Some of the formal goals of the Office of Energy are inappropriate or too narrow.

The goal of **increasing the use of indigenous energy resources**, while appropriate for some countries, is inappropriate for others. The economics of resource endowments and world trade may indicate that some countries should continue to import energy resources as the most cost-effective way to meet their energy needs. Pushing the use of indigenous energy resources in these countries may impose an unnecessary and unwarranted economic burden. In the case of better endowed countries, the broader goal of **increasing energy efficiency** is sufficient to suggest that the Office of Energy work to develop indigenous energy resources.

The goal of **increasing energy supplies in rural areas** is needlessly narrow, and is largely outside the Office of Energy's field of comparative advantage - electrical power. While it is clear that many rural populations suffer from a lack of access to environmentally sustainable energy resources, the broader Office of Energy goals of increasing energy efficiency and environmental soundness (e.g., through policy and price reforms) address this problem without the need for a special goal. Under current policies in many LDCs, efforts to increase energy supplies to rural areas require subsidies or other economic distortions that only add to the larger problem of increasing the efficiency of energy systems.

3) The Office of Energy's goals and objectives, as described in the annual Program Plan, are not clearly linked to the objectives of the Office's portfolio of projects.

Although the Office clearly has a good sense of strategy in practice (all goals being addressed by some project elements, and considerable cooperation between different projects working toward the same goals), the Program Plan lacks a formal, written Program Logical Framework. Within its annual program plan, the Office of Energy has a list of formal goals, and within each goal, a set of more specific objectives. Once these are presented, however, the program plan turns to a discussion of each of its projects, whose specific objectives and strategy are not clearly linked back to the program objectives.

The lack of clear linkages between overall Program Goals and narrower project objectives (as described in project logframes) may account in part for the large amount of staff time spent in coordination meetings with contractors. The lack of an explicit Program logical framework may also lead to a serious loss of continuity if the office expands its staff (as is recommended below) or if the office needs to replace senior staff. Senior Office staff admitted that since their sense of strategy existed only in their collective heads, if anything should happen to them, the Office's program could "fall apart."

4) There exist several significant areas of topical overlap between projects: For instance, policy reforms are a major concern of both the Energy Planning and Policy Development project and the Private Sector Energy Development project; policy reform initiatives are also developed by most of the other projects. Conservation and efficiency

efforts are developed both by the Energy Technology Innovation Project and the Energy Conservation Services Project; the Planning Project contains an activity for "efficient lighting" in Mexico; the private power data base and the Private Power Reporter are prepared by the ECSP and not the PSED.

There are good reasons for some degree of overlap: The Office of Energy Director has a deliberate strategy of fostering competition between the contractors, which keeps them alert and actively seeking more activities. However, there is evidence that the strategy of competition has been carried too far, and has become a burden for the under-staffed office to coordinate.

5) **Lack of effective marketing of the Office of Energy projects:** Although the Office of Energy is limited by its budget, there is considerable scope for expansion of activities through "Mission buy-ins." However, the Office's efforts to solicit more buy-ins have sometimes not born fruit:

- Many missions indicated that the energy sector is not on their list of priorities (which were mostly in the realm of private sector development, rural development, or broad economic policy reform).

- Several missions complained that the Office had failed to include them in the project development process, and even bypassed the mission in working with the host government to develop projects or activities. This has soured the Office's relationship with more than one mission.

- With regard to the Office's renewable and biomass energy projects, Missions seem to be particularly skeptical, on the basis of 1970's era renewable projects which generally proved unsustainable.

In some cases, however, the best efforts of the Office of Energy to engage A.I.D. bureaus and missions in energy activities have been frustrated by the mechanics of the buy-in process itself. For instance, the Office ran up against a buy-in ceiling for its training project, and couldn't get permission to bridge the gap - even with mission funding - until the new project started. In addition, the contract regulations for buy-ins change frequently, leading to confusion, delays, and sometimes even the scuttling of otherwise good project ideas.

6) **Micro-management of contractors, and excessive administrative requirements** which divert time and resources from achieving on-the-ground project objectives: Most of the contractors expressed dissatisfaction with the requirements for weekly reporting and weekly meetings. Several contractors complained of a double bind wherein their project managers wanted to maintain close control over project resources and activities, and yet were too busy to stay on top of the resulting series of approvals of myriad minor project elements. While many of these procedures are general A.I.D. or S&T Bureau requirements (e.g., travel approval and weekly reports) - and not those of the Office of Energy - the Office of Energy could do more to minimize micro-management within its operations.

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7) **The Office of Energy is under-staffed**: Currently, the Director, Deputy Director, and Program Analyst all have project management responsibilities. They each have, in effect, two full-time job responsibilities. In addition, the Office's marketing needs are difficult to meet due to the lack of personnel and time available for travel and communication with missions and regional bureaus. Several missions complained of slow responses from the Office.

We note that although the budget for the Office of Energy has doubled in the past two years (with a corresponding increase in responsibility for project activities), they have not yet received permission to increase their staff. Many of the A.I.D. missions' complaints about the office's "lack of responsiveness" and the contractors' complaints about "slow approvals" are clearly due to the shortage of staff in the office.

8) **Language barriers hinder the ability of many potential trainees to take advantage of Office of Energy training programs**: Several A.I.D. missions in Latin America told the evaluation team that many excellent candidates for training were unable to take advantage of the Office's training opportunities due to the language mis-match.

9) **There are areas of the Office of Energy portfolio where there may be insufficient training support**, notably in the area of renewable energy technologies.

III. RECOMMENDATIONS

The following section summarizes ten areas of specific recommendations made to the Office of Energy by this evaluation team. A more detailed set of recommendations is contained in the main report, Chapter IV.

A. The Office of Energy should streamline its range of activities, allowing it to target and increasingly leverage its resources. It should, therefore, eliminate two of its specific goals: i.e. (1) increasing indigenous energy resources and (2) rural energy supplies. Also, it should strengthen the wording of the environmental goal.

As discussed in Section II.B., the indigenous energe goal is inappropriate; the rural energe goal is overly narrow; and the environmental goal is overly modest. The Office should focus on three broad goals as follows:

1) "Increased technical efficiency and financial performance of energy systems".

2) "Improved environmental soundness of energy systems".[1]

3) "Increased private sector involvement in energy development and management".

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[1]Note this is also a recommendation to change the wording of the goal. The previous wording was "increased consideration of environmental criteria".

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B. The Office of Energy should establish formal, objectively verifiable criteria for success for each of its goals, and long-term and intermediate management targets for each of its projects.

Recommended verifiable **criteria for each goal** (without specific magnitudes) which the Office of Energy may wish to consider include the following:

1. **Increased technical efficiency and financial performance of energy systems:**

Lower cost per unit of power output of utilities; lower percentage of losses in transmission/distribution; lower incidence of power outages/brown-outs; higher efficiency in the use of electrical power in industry (lower energy use per unit of output), buildings (lower energy use per building), and transportation (higher fuel efficiency/ better mileage); higher rate of return on assets for power utilities.

2. **Improved environmental soundness of energy systems:**

Lower total emissions of pollutants/other waste from utilities; lower emissions of pollutants/other waste per unit of energy output from utilities; less environmental degradation/waste associated with mining/pumping for fuels; slower rates of de-forestation; avoidance of large-scale hydro-electric projects that would dislocate communities or disturb eco-systems.

3. **Greater private enterprise involvement in energy development and management:**

Increased output of electrical power from privately owned or operated systems; higher per-capita energy consumption; increased output of power through co-generation; increased exports of U.S. energy sector goods and services.

A full range of **management targets** for each project is beyond the scope of this evaluation. However, they can be developed with some basic principles in mind: management targets should represent on-the-ground achievement, and be either measurable and quantifiable, or objectively verifiable by independent observers. Most important, there should be a sense of step by step progression from direct project outputs through intermediate and long term on-the-ground results, to the final goals.

Long term management targets for each project should be established in the logframe "End of Project Status" (EOPS). The Project Logframe of the BEST (Biomass) Project contains an appropriate (if ambitious) set of long term management targets as the End of Project Status, which can provide a good example for other projects in the Office of Energy portfolio.

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In addition, most projects will need some **intermediate management targets** that indicate how project outputs (e.g., reports, workshops, training courses, etc.) lead to the achievement of long term targets.

Some examples of appropriate management targets for each project are contained in the main report, Chapter IV, Recommendations.

C. The formal management targets for each project, as described above, should be written into project contracts. Contractors should be required to report project progress in terms of the management targets on a regular basis. Project Managers should be responsible for enforcing these requirements, and for arranging any necessary follow-through involving resources outside the project.

Meeting the targets themselves should not be thought of (nor presented!) as a contractual obligation, as such on the ground results are largely beyond the control of the Office of Energy and its contractors. The emphasis should be on reporting progress towards the targets, to keep project activities centered on concrete objectives and to study which approaches are working and which ones are not.

Once the management targets are adopted, and reporting requirements are written into project contracts, Office of Energy staff should be able to loosen administrative requirements on contractors. For instance, monthly progress reports and monthly project meetings may suffice, rather than the current requirement for weekly reports and weekly project meetings. Ad hoc meetings for specific issues will, of course, continue to be necessary.

Verification of the achievements claimed in the progress reports (including the quarterly and annual reports) can be undertaken during the regularly scheduled project evaluations, which should specifically focus on on-the-ground impact.

D. The Office of Energy should establish a formal Program Logical Framework, explicitly relating the Office's set of goals to its portfolio of projects.

In developing a program logframe, the principle should be to tie project goals and purposes (particularly the "End of Project Status" from the project logical frameworks) explicitly to the overall program goals and objectives. The full set of project goals should match the overall Office of Energy program goals (although there is no need for a one-to-one correspondence between specific goals and specific projects), and the End of Project Status for all the projects should match the Office's more specific objectives as described in its Program Plan.

A well designed Program Logical Framework could streamline the Office's portfolio of projects and activities, instruct contractors in areas where cooperation between projects is expected, and ensure continuity of the Office's broad strategy approach even as personnel and contractors change. All project contractors should be familiar in general terms with the entire program strategy, and in particular, those areas where different projects are expected to cooperate.

Our detailed and recommended Program Logframe (goal and purpose level only) is presented in Chapter IV of this report.

E. To assist in streamlining the Office's portfolio of projects, it would be advisable to reduce some of the overlap between projects.

1. Technical activities aimed at improving efficiency in energy use should be the primary responsibility of the Energy Efficiency Project.

2. Technical activities aimed at improving efficiency and cleanliness of electrical power generation, and commercialization of innovative technology in this field, should be the primary responsibility of the ETIP.

3. Policy reform activities aimed at improving the efficiency of energy policy and the investment climate for foreign and local private investors should be the primary responsibility of PSED. The private power data base and the Private Power Reporter should be shifted from ECSP.

4. The two renewable energy projects, BEST and REAT should be combined into a single project, or coordinated under a single project manager.

F. The Office of Energy should improve its marketing among A.I.D. missions by showing how the office's projects can meet their priority needs, and being more responsive to their inputs. For instance, **economic policy reform, privatization, and private sector development projects** are high priorities among most missions, and **environmental projects** are becoming high priority in many missions.

In addition, the Office of Energy should improve its communication and coordination with mission staff and the regional bureaus during the project planning process. The Office staff should think of the Missions as its clients, and treat them as the service industry in the private sector treats its clientele.

To solicit a greater number of buy-ins, the Office should stress its ability to provide services to sub-components of, say, large private sector projects. In this context, Office of Energy staff will find it necessary to tailor their programs to fit in with broader mission strategies.

G. The Office of Energy should prepare a number of models, or case studies of successful projects (i.e., projects which have achieved their goals, in measurable, concrete terms such as power facilities on-line and providing increased capacity for the grid, or measurable increases in energy output per unit input) as marketing tools, and as models which can be replicated elsewhere. The case studies should be brief and directed at A.I.D. mission and bureau decision-makers (i.e., not at energy specialists). They should highlight success in areas of interest to most missions, and show how the results were achieved (e.g., the highlights of a new, private sector energy policy which

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was enacted into law or clean technology installed). Four examples of such "models" are presented in Appendix F of the main report.

A good start on this endeavor may be for the Office of Energy to re-organize the material from its Weekly Project Progress Reports by country, adding in details about on the ground achievements, so that readers can gain a sense of the continuity and cohesion of Office activities within specific countries.

H. The Office of Energy should enlarge its staff and re-structure its positions and responsibilities. The office should have at least two full time management positions, which should include a Director plus a Deputy Director and/or Program Analyst. The Director and Deputy (or Program Analyst) should be responsible, on a full time basis, for overall program management and leadership, program budget considerations, development of new programs, and liaison with other agencies. At least two new staff should be hired, so that project managers can be assigned full time project management responsibilities. In addition, the Office should hire three to five new staff to be resident in the regional offices and available for regular travel to the missions to help design specific projects and activities for missions, arrange regional conferences, and liaise with regional agencies.

I. The Energy Training Program should develop short term courses in Spanish and French. The current priority, given the level of activity the Office of Energy maintains in Latin America, should be the development of courses in Spanish. As the activity level increases in Franco-phone Africa, the ETP will need courses in French as well. (For more detail, see the main report).

J. The Office of Energy should develop more training courses in renewable energy systems, either within the Energy Training Project or the Renewable Energy and Biomass Energy projects. The REAT and BEST projects are the only projects in the Energy portfolio that currently lack sufficient training support. Increasing the supply of skilled technicians and managers in the sub-field of renewable energy should help to improve the acceptability and sustainability of energy training projects.

CHAPTER I. INTRODUCTION

This evaluation of the Office of Energy has been prepared by the Development Economics Group of Louis Berger International, Inc., under Delivery Order No. 21 of its Evaluation and Development Information Methods, Indefinite Quantity Contract No. PDC-0085-I-00-9060-00 with the U.S. Agency for International Development (A.I.D.).

This Introduction describes the purpose and methodology of the evaluation. Chapter II presents evaluation findings with regard to the Office's portfolio of projects and related activities, including training and information dissemination; it also presents findings with regard to the Office of Energy's management and staffing. Chapter III presents the conclusions of the evaluation focussing on the Office's strengths and weaknesses, and Chapter IV presents a series of recommendations for the Office of Energy.

A. PURPOSE OF THE EVALUATION

The purpose of this evaluation study is to review and analyze the S&T/Office of Energy portfolio to determine:

(1) if there is a correct mix of energy activities to achieve A.I.D.'s goals;

(2) how the various projects/programs relate to each other; and

(3) the impact of project activities on energy supply, efficiency of consumption, private sector investment, and economic development.

The evaluation will be available as a planning tool for the Office of Energy project and program managers. The evaluation Scope of Work is presented in Appendix A of this report.

B. EVALUATION METHODOLOGY

The evaluation study was based on:

a) reviews of documents, including project papers, project evaluations, cables, weekly and quarterly project reports, portfolio reviews, program plans, and budgets;

b) group, telephone, and personal interviews with Office of Energy project managers, contractors, A.I.D. Bureau personnel, U.S. renewable energy associations and suppliers, Congress, General Accounting Office (GOA), and development banks; an Office of Energy project staff meeting was also observed; and

c) telephone surveys with 21 A.I.D. field Missions.

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Confidentiality was assured to all interviewees to elicit straight-forward responses. Persons and organizations contacted are listed in Appendix B.

The Office of Energy project managers were given a management survey questionnaire, shown in Appendix C.1. Missions were given a six page questionnaire, which appears in Appendix C.2. The Mission questionnaires were administered by two experienced interviewers on the team, to lessen biases. Contractors were interviewed with a list of nine questions, presented in Appendix C.3.

CHAPTER II. EVALUATION FINDINGS

The mandate of the Office of Energy is to support the goals of A.I.D. to facilitate development, through a program designed to alleviate critical shortages of energy in LDCs in an efficient and environmentally sensitive manner.

A. OFFICE OF ENERGY GOALS

The official goals and objectives of the Office of Energy as presented in the 1991-1992 Program Plan are as follows:

1. **Increased consideration of environmental criteria**

   Objectives: Integrate environmental criteria into energy planning and project financing; encourage efficient energy conversion; promote the use of less environmentally damaging energy sources (e.g., renewables, natural gas, and coalbed methane) and conversion processes when cost-effective; reduce greenhouse gas emissions, as well as hazardous air and water pollution associated with the energy cycle.

2. **Increased technical efficiency and financial performance of energy systems**

   Objectives: Increase the efficiency of power generation, transmission and distribution, and end uses; improve energy efficiency in the industrial, buildings, and transportation sectors through technical upgrades and improved maintenance, operations, financial procedures, and planning practices associated with all aspects of electrical services; provide technology export assistance.

3. **Greater private enterprise involvement in energy development and management**

   Objectives: Promote policy reform to improve functioning of energy markets; build local private sector capabilities; increase the efficient operation of energy systems; and increase the flow of technical and financial resources form the U.S. private sector.

4. **Expanded use of sustainable indigenous energy resources**

   Objectives: Reduce the drain of foreign exchange caused by imported fuels, increase energy security, and foster development of environmentally sustainable energy technologies.

18x

5. **Enhanced availability of energy for sustained rural development**

Objectives: Satisfy basic energy needs of rural populations (for cooking and heating, lighting, potable water, agriculture), and of rural industries (especially agroprocessing).

In order to achieve those goals, the Office of Energy operates a portfolio of projects and related activities as described below.

B. OFFICE OF ENERGY PROJECTS AND ACTIVITIES

Given its severe budget limitations, the Office concentrates on leveraging its resources and devoting most of its efforts toward information gathering, analysis, and dissemination. Most of its activities are in the form of energy assessments, reports, feasibility studies, technical assistance missions, training programs, newsletters, conferences, workshops and seminars. Through these activities, the office attempts to inform, mobilize, and organize resources from governments and the private sector, as well as other donors and research organizations, in order to carry out programs on the ground in the form of new energy facilities and improved technology (more efficient and environmentally sound) installed and operational, and improved policies and procedures.

A description of the Office of Energy's projects and related activities is presented below.

1. Description of Projects

The Energy Planning and Policy Development Project (EPPD) will soon be succeeded by the **Energy and Environmental Policy and Planning Project (EEPP)**. These projects are designed to improve the efficiency and environmental soundness of energy planning, policy-making, investment, and managerial decision-making. During the past two years, much of the emphasis has been on India as a case study; under the new project, the office will extend more of its work to other countries.

The Energy Conservation Services Project (ECSP) will soon be succeeded by the **Energy Efficiency Project (EEP)**. These projects are intended to promote conservation planning and more efficient use of energy in utilities (including power generation, transmission and distribution) as well as with end users in industry, buildings, and transportation.

The Renewable Energy Applications and Training Project (REAT) encourages the use of renewable energy technologies such as hydro power, wind, solar, and geothermal power, especially for application in rural areas and with the participation of the private sector.

The Biomass Energy Systems and Technology Project (BEST) promotes the development of power systems fueled from the residues of common agricultural crops (e.g., sugarcane wastes and rice residues) and woodwastes of forest product industries,

particularly in conjunction with agro-industry but also to generate electricity for the grid, particularly in rural areas.

Private Sector Energy Development Project (PSED) encourages the participation of the private sector in energy development in LDCs in order to increase the amount of power available for development as efficiently as possible. This project works both to improve the climate for private investment in the power sector and to facilitate the development of the human, technical, and financial resources of the private sector in LDCs. It also co-finances feasibility studies for potential U.S. investment.

Energy Technology Innovation Project (ETIP) will be starting activities in the near future, picking up where the **Conventional Energy Technical Assistance (CETA)** project left off. It is designed to introduce innovative, clean energy technologies and advanced management techniques that promote sustainable and cost-effective operation of electric generation, transmission, and distribution systems in LDCs.

The Energy Training Program (ETP) designs and implements training programs for government, parastatal, and private employers in the energy sector of LDCs. Courses include energy resource development, energy planning and engineering; and utility management, operation and maintenance (with special emphasis on efficiency and pollution control) among others.

More details about each of these projects - their current budgets, activities, project managers, contractors, and accomplishments, are presented in Appendix D.

2. Description of Collaborative Efforts

In addition to these specific A.I.D. projects, the office works closely with other multilateral development banks and bilateral aid agencies. In particular, the office formed and chairs the **Multi-Agency Group on Power Sector Innovation (MAGPI)**, which seeks to promote the commercialization of (proven) innovative technology in the energy sector. MAGPI is especially useful in coordinating the activities of A.I.D. and other donors and multilateral development banks in innovative technologies in the power sector. In addition to the Office of Energy, MAGPI is composed of members from the World Bank, the International Finance Corporation, the African Development Bank, the Asian Development Bank, the Inter-American Development Bank, and the United Nations. The Office of Energy has also signed a cooperative agreement with the World Bank for an energy efficiency and private sector project.

The **Global Energy Efficiency Initiative (GEEI)** is another major multi-agency collaborative effort which promotes the use of efficient technology and procedures in the energy sector world wide. The 1991 Program Plan notes that "AID launched the GEEI to promote the rapid implementation of energy efficiency worldwide, especially by enhancing international investments in relevant strategies."

More detailed discussion of Office of Energy relationships with other agencies is contained in Appendix E.

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C. OFFICE OF ENERGY ACHIEVEMENTS

As a result of interviews with Office of Energy staff, contractors, A.I.D. mission Energy Officers from 21 field missions, and others who have worked with the Office, as well as a review of the Office's program plans, progress reports, and other literature, the evaluation team has assessed the program of the Office of Energy as largely sound and well run.

1. Project planning and implementation

The Office has achieved useful results in facilitating the analysis, planning, and implementation of specific projects in several countries - notably in India, Pakistan, the Philippines, Costa Rica, the Morocco, and Egypt.

India in particular has benefitted from extensive Office of Energy efforts, many under the auspices of the Energy Planning and Policy Development Project: The Program for Acceleration of Commercial Energy Research (PACER) which is a US/Indian collaborative effort to facilitate innovation in the electrical power sector in India. PACER has approved 18 projects involving a total investment of $2.8 million in India. The Energy Management, Consultation, and Training Project (EMCAT) is designed to develop innovative financing and management methods to improve efficiency and lessen environmental consequences of power generation.

2. Energy Planning and Policy Reform

The Office has worked extensively to strengthen planning and policy reform in several countries, and they have achieved some noteworthy reforms in Costa Rica, the Dominican Republic, the Philippines, India, Pakistan, Thailand, and Jamaica, particularly in terms of allowing private power production and working to improve the environment for private investment in the power sector.

Their work has been very rigorous and professional. Nonetheless, achieving a thorough program of policy reform in any one country has been elusive, largely because many necessary policy reforms - e.g., management autonomy for utilities, access to foreign exchange, comprehensive price reform, permission for foreign investors to remit profits, guarantees of contract enforcement, etc. - are much broader than the energy sector. Bilateral donors and multileral development banks alike have found comprehensive policy reform to be the toughest of all development nuts to crack, and it is difficult to make a special case of the energy sector. As a result, the reform programs promoted by the Office of Energy have made considerable progress, but they all have had their limitations, such as:

- In the Philippines, an extreme sense of urgency about the deteriorating power sector (including recurrent brownouts and power failures affecting industry) concentrated the minds of senior policy makers and made them very receptive to the advice of the Office of Energy and other interested donors. A presidential

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decree was prepared with input from the PSED in 1988. Initial resistance from the entrenched parastatal bureaucracy and the labor unions melted away in the face of the severity of the energy crisis and the return of thousands of skilled Filipino energy workers from the troubled Middle East. The Philippines has probably moved the fastest on reform in the energy sector among developing nations, and it has paid off with a surge of investment in private power: a 210 MW plant from Hong Kong with U.S. equipment which is already on line, and contracts awarded for more Build-Own-Transfer and Build-Transfer-Operate plants. However, negotiations on several smaller plants (including cogeneration facilities) ranging in size from 6 MW -45 MW, have stalled.

- In the Dominican Republic, the Office of Energy managed to promote extensive reform, especially within the country's Export Processing Zones - including permission for private production of power, foreign investment, price reform, access to hard currency and imports, and repatriation of profits. This comprehensive package is not yet in place for the country as a whole, however.

- In India, which has permitted private power since independence and has probably the largest output of private power in the developing world, the government is now working on legislation to improve the climate for private investment by increasing the permitted debt equity ratio, and by increasing the rate of return allowed. However, the private sector is still hampered by restrictions on foreign participation, repatriation of capital, and insufficient guarantees on contracts. The PSED is continuing to work with private sector groups and the government to improve the policy framework.

3. Environmental Efforts

The Office is making progress in developing environmentally sensitive solutions to energy problems in LDCs, especially through the renewable energy projects (REAT and BEST) and conservation projects (ECSP). The Office has had some notable (albeit small and young) successes with biomass projects in Costa Rica and Thailand, where sugar mills are generating their own power from bagasse and selling their excess power to the grid on a seasonal basis.

In addition, the Office recently completed a feasibility study for Integrated Coal Gasification Combined Cycle (IGCC), which showed that India could exploit its own coal reserves more efficiently and with less environmental damage than previously supposed. Under the CETA project, a joint Indian/US working group is developing a demonstration project for an IGCC clean coal power plant.

The Office of Energy's activities over the last decade has strategically placed it at the forefront of a new initiative by Congress, the "Global Warming Initiative". The congressional mandate to the A.I.D Administrator is to implement a global warming initiative that focuses the Agency's energy assistance on "improving energy efficiency, increased use of renewable energy resources, and national energy plans (such as least-cost energy plans)." The general strategy of the initiative is to reduce emissions of

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greenhouse gases with "no regrets": This means that whether global warning turns out to be a serious problem or not, all countries should be taking steps to improve energy efficiency (which yields financial savings in any event) so that unnecessary emissions of potentially harmful greenhouse gases are reduced.

The new ETIP project is specifically charged with assisting in the commercialization and implementation of new, cleaner and more efficient technologies for conventional energy in the power sector, and the new EEPP will promote the explicit inclusion of environmental concerns in the energy planning process in LDCs.

4. Energy Efficiency Improvements

The Office has had successes in several countries in energy conservation and efficiency, yielding measurable savings in fuel consumption and related financial costs, primarily through the Energy Conservation Services Project. One of the most beneficial, in terms of the sheer magnitude of the savings involved, was the closing of the oil refinery in Liberia, on the advice of the Energy Conservation Services Project. The refinery was inherently inefficient in scale, and its closure in 1983 save the country $15 - 20 million dollars per year, or about 2% of GDP (for details, see Appendix F, "Successful Office of Energy Models")

In Pakistan, the ECSP project designed a large energy efficiency project aimed at energy users, which has been in operation for several years, and has led to energy savings of about $5.5 million per year. One A.I.D. interviewee familiar with the project criticized it for delivering "half the savings for twice the cost," but the evaluation team understands this comment to reflect the early years of the project, before efficiency and energy saving measures were implemented in the private sector on a wide scale. An impact evaluation could verify the full, cumulative costs and benefits (and sustainability) of this project.

In Egypt, the Office of Energy has provided expert energy auditors and technical assistance to transfer energy saving techniques to government agencies and private sector firms. At the Asfour glass company, the auditors discovered, among other things, a leak in the glass furnace recouperators. According to an Office of Energy report, "Asfour, acting on the audit's recommendations, repaired the damaged recuperator and immediately reduced fuel use from 5,880 kg/day to 4,790 kg/day", a reduction of 19%.

5. Renewable Energy Projects

The Office of Energy currently has two renewable energy projects, one that focusses primarily on biomass energy systems (BEST) and one that concentrates on wind, solar, and mini-hydro systems (REAT). The BEST project has had on-the-ground successes with biomass energy systems using sugarcane bagasse in Costa Rica and Thailand. These are highlighted in Appendix F as successful models for replication. The REAT project has assisted several wind, mini-hydro, and photovoltaic projects, including a large series of wind generators in Morocco. However, most interviewees outside the Office

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of Energy remain skeptical about the technical and financial sustainability of these projects.

Production of photovoltaic-powered lanterns under a US/Indian joint venture is being supported in India with a market seeding project financed under REAT, which will hopefully lead to a massive expansion of industrial capacity and output in the near future.

D. OVERALL DISTRIBUTION OF OFFICE OF ENERGY ACTIVITIES BY PROJECT AND GEOGRAPHICAL REGION

The largest part of Office of Energy country funding over the past three years has been in energy training (ETP and CETA). Over 36% of all funding has gone into this one area. Energy planning and policy development (which includes funding for energy conservation and efficiency improvements), has received about 25% of funding. Biomass projects (BST and BEST), have received over 23%.

Total country funding estimates, by project and fiscal year, are given below in millions of U.S. dollars.

	FY	ETP	CETA	EPDAC	REAT	PSED	BST	BEST	TOTALS
	'88	1.427	0.356	0.997	0.200	0.005	0.893	0.000	3.878
	'89	1.560	0.559	1.128	0.228	0.260	0.605	0.000	4.340
	'90	2.296	0.415	1.535	0.172	0.104	0.000	1.890	6.412
TOTAL		5.283	1.330	3.660	0.600	0.369	1.498	1.890	14.630
PERCENTAGE		36.1%	9.1%	25.0%	4.1%	2.5%	10.2%	12.9%	100.0%

NOTE: The data presented in this section was taken from a report titled: "Bureau for Science and Technology Country Activity Worksheet by Country Within Project for FY88, FY89, and FY90 Expenditures," dated April 27, 1990 (REPT: A300CT06). The data is categorized by estimated country funding from the major projects in the S&T Office of Energy portfolio.

Distribution of Office of Energy activities and expenditure by region is presented in detail in Appendix G. Much of the work over the past few years has been concentrated in a few countries, including Costa Rica, Dominican Republic, India, Egypt, Indonesia, Jordan, Pakistan, Philippines, and Thailand; with additional training activities for many participants from Ghana, Kenya, Nepal, Nigeria, Oman, Tanzania, and Yemen.

E. MISSION PERCEPTIONS OF OFFICE OF ENERGY PROJECTS

To address the issue of project impact, the evaluation team conducted a survey of 21 Missions. The survey was designed to evaluate the perceived importance of the Office of Energy projects to A.I.D.'s field operations.

Designated Mission energy officers were asked by the evaluation team to rate each project they were involved with as it relates to twelve categories of the Office's objectives. Appendix H presents the Missions' responses in greater detail.

Among the 21 Missions surveyed, the level of involvement with Office of Energy projects ranged from no participation to involvement in five projects. The responses reflect only the memory of the energy officer interviewed (in consultation with other current Mission personnel). Also, many respondents were not familiar with the Office of Energy project names. Identification under project names was obtained through inference, by reference to the contractor, the Office of Energy project manager contact, or the Mission's project name and description.

The responses ranged from "not useful" to "critical".[2] Of all the responses, a total of five "not useful" responses were indicated among 52 specific project activities within the 21 missions.

Only six of the Missions used the services of **CETA**. This is likely due to the large financial requirement involved in assisting large power-generation facilities. However, Missions that used the services of CETA found it to be "very useful" in obtaining its energy efficiency objectives. None of the Missions felt that CETA was useful in increasing environmental awareness, but this will be a major emphasis of its replacement project, ETIP.

Nine of the Missions used the service of **EPPD**. All involved Missions reported the project as "useful" or "very useful" in meeting the Office of Energy planning and policy development objectives, with the improvement of skills of LDC energy professional and the increase in energy supply/savings as the most pertinent outcome. Only one mission said that the project resulted in an increase in environmental awareness, but the successor EEPP will have more of an environmental emphasis.

ECSP was used by eleven Missions. Six Missions rated their involvement as "very useful" in increasing energy supply/savings. Four Missions found this project to be "useful" or "very useful" in developing follow-on Mission projects. Six Missions found it "useful" or "very useful" in improving the skills of LDC energy professionals.

The **REAT** project, which started in 1985, was used by three of the 21 Missions in the survey. Several Missions stated that their host governments would rather extend the distribution of power from large central facilities than develop a new system involving hundreds of individual private power units. We note that one of the three Missions felt that its involvement with REAT was "critical" in leveraging private sector investment.

The **ETP** project was the most used project in the Office's portfolio, with thirteen of the Missions surveyed using its services. This high degree of use may reflect the ease of participation, and good communication and information dissemination mechanisms.

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[2]The term "critical" implied that the Office of Energy involvement was a critical contribution to project design or implementation.

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The relatively new **BEST** project was used by four of the Missions surveyed. Its use has been mainly in the industrial private sector, where it was noted to be "critical" in the development of Mission follow-on project and "critical" in leveraging private sector investments.

The **PSED** project was used in six Missions. It is a relatively new project that has involved in-country workshops to promote participation of LDC governments and the private sector. Two Missions reported these workshops as "critical" to follow-on project development.

In conclusion, the Office of Energy is considered by the Missions as the main source of A.I.D. technical assistance in the energy sector. However, the importance and relevance of Office of Energy projects depend on the energy sector commitment of the host government, and the Missions' consideration of energy as a "priority sector". Without host government enthusiasm for change in the energy sector, Office of Energy project initiatives will most likely fail, due to non-implementation of required institutional or policy changes.

Most Missions with any significant involvement with Office of Energy projects reported positive change by the host government in their acceptance of new renewable technologies in the energy sector, especially in energy conservation/efficiency applications. Private sector energy development has also been accepted by several LDC governments. Unfortunately, however, institutional changes necessary to accommodate these new procedures and technologies have often not been forthcoming.

F. TRAINING AND INFORMATION DISSEMINATION ACTIVITIES

The Office of Energy's training program, under the auspices of the Energy Training Project, has received considerable praise both from mission respondents during the interviews for this evaluation, and from the 1990 evaluation of the ETP. Missions and past participants both agreed that the program is rigorous, practical, and relevant.

One shortcoming noted by the 1990 evaluation was the inability of many trainees from power utilities and national energy planning agencies to implement needed reforms due to lack of management support. The ETP then instituted several energy management courses, which have been available now for about one year.

There was some criticism of the program from the missions for being more expensive than most A.I.D. training programs, and for the lack of Spanish and French language programs.

The Office also undertakes a variety of information dissemination activities, including:

1. workshops and seminars under the auspices of a variety of projects, which were generally favorably received by participants and missions active in the process;

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2. databases, including databases on private power activities and opportunities;

3. newsletters, including the Private Power Reporter;

4. a variety of brochures on project activities; and

5. a great variety of technical reports under the projects which were described as "high quality" by those (admittedly few individuals) who had read them.

The evaluation team noted that in spite of the considerable output of brochures, newsletters and reports, most missions interviewed by the evaluation team said that they rely on cables for information on the Office of Energy. This suggests either that the Office's literature is not getting to the right people, or that it fails to catch the eye (or stick in the memory) of readers.

Details on training and information gathering activities are contained in Appendix I.

G. OFFICE OF ENERGY MANAGEMENT

The Office of Energy, along with the Office of Forestry, Environment, and Natural Resources, reports to the Agency Director for Energy and Natural Resources within the Bureau of Science and Technology (S&T).

1. Office of Energy Staff

The Office of Energy Staff is made up of a Director, Deputy Director, and Program Analyst (each of whom also has project management responsibilities), and one other full time project manager (see Organizational Chart and Linkages of the Office of Energy in Figure II.G.1). In addition, the Office has an Energy Systems Analyst, an Energy Specialist, a Program Operations Specialist, and two clerical personnel on staff. The staff receives professional support from two additional personnel - a Project Coordinator and a technical writer, who are employees of contractors. The positions are currently filled as follows:

Director and Project Manager, BEST and PSED	James Sullivan
Deputy Director and Project Manager, EPDAC/ECSP, CETA, and ETIP	Alberto Sabadell
Project Manager, REAT and EPDAC/EPPD	David Jhirad
Project Manager, ETP and Program Analyst	Shirley Toth

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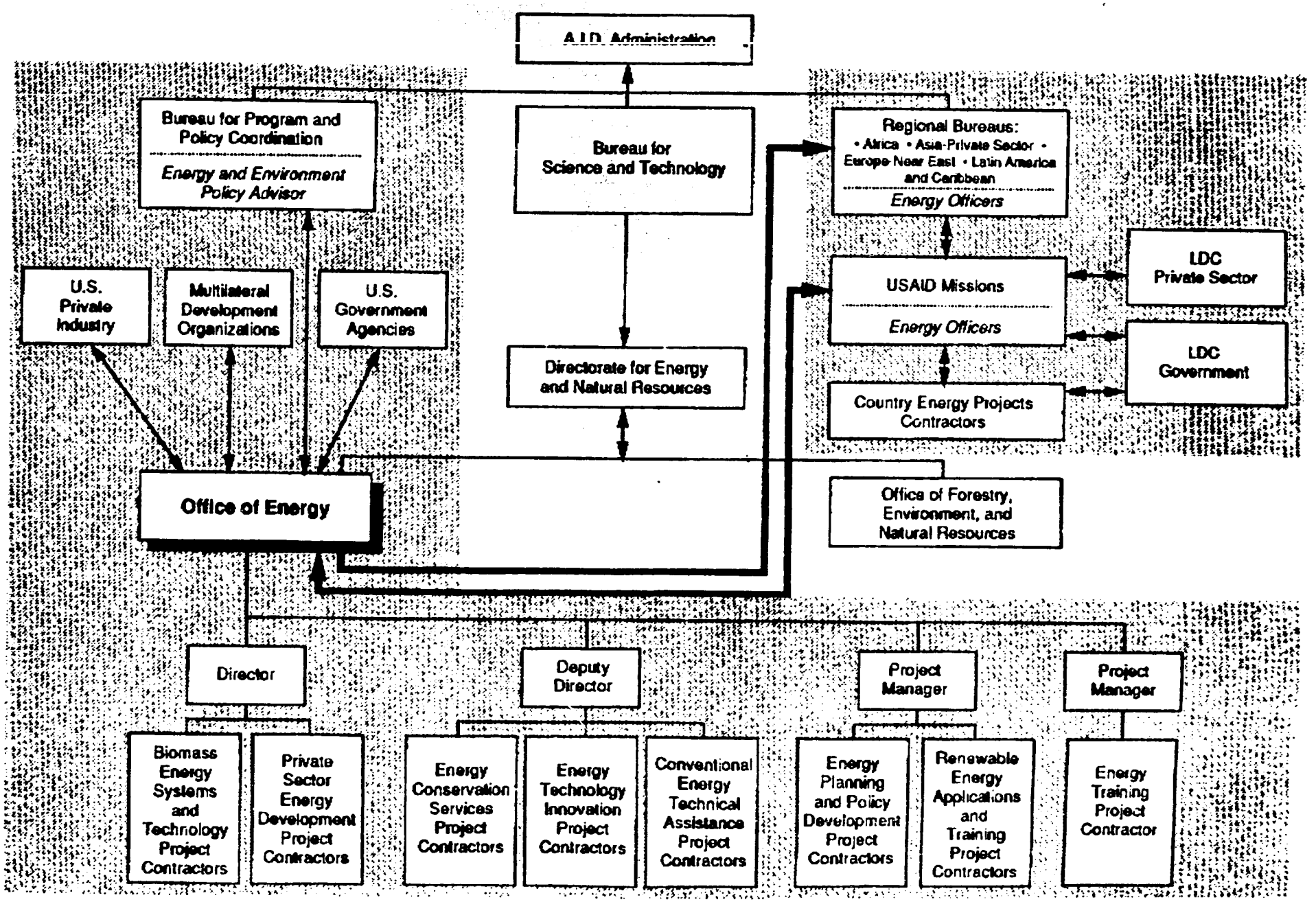
FIGURE II.G.1

Organizational Chart and Linkages of S & T/Office of Energy



Energy Systems Analyst and Coordinator EPDAC/EPPD	Ross Pumfrey
Energy Specialist	Samuel Schweitzer
Program Operations Specialist	Carolyn Kiser

and two clerical personnel. The staff members above are supported by the following personnel who are employees of contractors:

Project Coordinator	Gwen McGee
Technical Writer	Mark Murray.

2. Office of Energy Management Structure

The Office of Energy has decided that a matrix management system is necessary because they are constrained by having only seven full-time staff members working in an agency with heavy paperwork demands, a small budget with limited funds for international travel, and little support for energy within the Agency and the Missions. This includes directing project work, interfacing with 17 contractors, acting as contract watchdog, assuring quality control, assisting Missions in project preparation, coordinating policy issues with Regional Bureaus, responding to Congressional mandates and inquiries, representing A.I.D. on other donor energy committees, and interfacing with other U.S. agencies and private organizations.

Along with project and program responsibilities, full-time staff are called upon to perform tasks outside their areas of responsibility, which they carry out based on their availability and interest.

Office of Energy managers' current program responsibilities are shown in Figure II.G.2, which follows this page. The categories were drawn from the 1990/91 Program Report and identified as specific manager's priorities in consultation with each of the project managers themselves.

There appear to be overlapping responsibilities in some program areas. For example, Energy Efficiency and Global Warming, and Technology Innovation are claimed as the primary responsibilities of three managers.

No one claims primary responsibility in five program areas. Of these, the category of "International Institutional Development" concerns the various global initiatives the Office is involved in. (Institutional development within LDCs, however, is considered a top priority by all project managers). Rural energy is largely outside the realm of the rest of the Office's activities in electrical power. Increased power generation, although it is not specifically claimed as anyone's primary responsibility, is being accomplished largely through the private sector and renewable energy activities. Commercialization of innovative energy technology will be a major focus of the new ETIP project.

FIGURE II.G.2
S&T/EY
MANAGERS' RESPONSIBILITIES MATRIX

S&T/EY MANAGERS:	SULLIVAN		SABADELL			JHIRAD		TOTH	PUMPHREY
PROJECTS:	BEST	PSED	ESCP	CETA	ETIP	EPPD	REAT	ETP	N/A
PROGRAM RESPONSIBILITIES:									
Energy Planning	2			2		1		2	2
Energy Policy	2			2		1		2	2
Increase Power Generation	2			2		2		2	2
Investment Planning	2			2		1			2
Electric Utility Performance Improvement	2			2		1			
Energy Pricing Reference	2			2		1			2
Energy Efficiency & Global Warming	2			1		1		2	1
Technology Innovation	2			1		1			1
International Institutional Development	2			2		2		2	2
Technical Transfer	2			2		2		2	1
Training								1	
Energy Supply	2			1		2		2	1
Rural Power Development	2			2		2		2	2
Renewable Energy	2			2		1		2	1
Private Sector	1			2		2		2	2
Information Dissemination	2			2		2		2	1
Energy Conservation	2			1		2		2	2
Program Coordination	2			1		2		2	2
Resource Assessment Development	2			2					
Commercialization	2			2		2			
Biomass/Bioenergy	1			2					
Other Environmental	2			2		1		2	1

1 - Primary Program Responsibi
2 - Some Program Responsibilit

NOTE: S&T/EY Managers derive their functional responsibilities from the S&T/EY overall program and the projects they manage.

In the course of the evaluation, some Office of Energy staff complained of over-work and burnout due to under-staffing. Several contractors and several missions complained of slow responses from the Office of Energy to urgent requests for information or action. We find that these comments are consistent and indicate the need for revised staffing within the Office of Energy - as detailed in Recommendation 7 in Chapter IV.

3. Management of contractors

The projects are implemented by contractors under the supervision of the Office of Energy project managers (for details, refer to Appendix D-1). The project activities are augmented by "Mission Buy-Ins", whereby missions with an interest in energy projects and funds to devote to it can contract through one of the Office of Energy Projects for a specific, in-country project.

The Office of Energy has weekly staff meetings, and requires weekly project progress reports from its prime contractors. (Weekly reports are generally required by the S&T Bureau, and it is understood that the project contractors are assigned to write them.) Also, most contractors are required to meet weekly with their project officers, and are expected to attend at least one of the weekly staff meetings (and usually two or more) each month. In addition, each project requires monthly invoices, and quarterly and annual reports. Each month, one of the staff/ contractor meetings focuses on one project in the form of a semi-annual program review which covers recent accomplishments and plans ahead for the next 6 - 12 months. Another of the staff/contractor meetings takes the form of an open seminar on a topic of current interest in the energy development field.

Many of the contractors expressed a concern over micromanagement. They noted that the Office was often more concerned about attendance at staff meetings, getting reports on time, and formatting issues, rather than about the technical work. The Office of Energy, on the other hand, notes that more lenient policies in the past yielded insufficient reporting and coordination.

4. Relationships with other A.I.D. Offices, Bureaus, and Missions

The Office of Energy has linkages with the Office of the A.I.D. Administrator, through the Directorate for Energy and Natural Resources, with A.I.D. Regional Bureaus and Missions, with other U.S. government agencies, multilateral development organizations, and U.S. private industry (details are presented in Appendix E).

a. Relations with USAID bureaus and missions

In its early days, Office of Energy activities were well-fit to the operations of field Missions and their supporting Regional Bureaus. Missions were sufficiently funded and staffed to prioritize and develop energy sector projects. For example, the AFR Bureau worked closely with the Office in its development of an Africa Region energy plan in

1982. Bureaus readily sought technical advice from the Office of Energy in Mission-level project preparation.

In the mid-1980's, A.I.D. began to move away from highly technical projects, and gradually reduced its core of engineers through the rest of the 80's. In the late 1980's came an overall "paring down" of Mission funding in smaller countries, particularly in Africa; this led to a subsequent reduction in staff and in the number of priority sectors within which Missions could develop projects. The energy sector became one of the casualties. Although most Missions are required to appoint an "Energy Officer," the dearth of technically trained staff in the missions compells mission directors to designate "Energy Officers" who have little expertise (or sometimes even interest) in energy issues.

At the same time, A.I.D. left the Office of Energy with a budget to develop its own projects, to support the Agency's energy objectives, and to develop new approaches to energy problems through research and adaptation in collaboration with A.I.D. Missions worldwide.

The Office has leveraged the reduced funding by using the relationships it had developed with the R&D community in the U.S. and overseas, and, with the larger, well-funded Missions, to expand on past projects and prepare new ones. The Office also took this opportunity to support changes in energy policy for the developing world.

Coordination between the Office of Energy and the Regional Bureaus during project implementation has been more difficult in recent years. In the early 1980's the Bureaus were directly informed of, and involved in, the implementation phases of Mission-level projects by the Office. Their involvement now is more often than not indirect, and coordination is not as regular as many missions would like. One of the Regional Bureaus suggested periodic country briefings, noting that generic briefing on a particular technology is of little interest.

Larger, better financed Missions develop their energy programs with host country participants, and then solicit design or implementation assistance from the Office of Energy. Small, poorly-financed Missions often require more assistance in energy project development and implementation. Satisfying the needs of the smaller Missions has largely been considered too time-consuming by Office of Energy managers and contractors, and several evaluations have suggested that the Office would be more effective by concentrating their efforts in the larger Missions.

Missions feel that Office of Energy-assisted projects are primarily Mission projects; and must therefore be coordinated from design, through implementation and follow-on, by Mission officers. Several Missions reported that Office of Energy managers and contractors are often not sensitive to the Mission's key role as a link between in-country organizations/agencies and Office of Energy participants, during all phases of project implementation. As an example, Office representatives sometimes marketed new follow-on project ideas directly with LDC participants or other in-country donors, and subsequently requested Mission approvals of these new projects. This caused significant (albeit temporary) damage to relations between Missions and the Office.

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Cumbersome communications procedures in general within A.I.D. (e.g., between missions and the Washington based bureaus) exacerbates the problem. For example, given the absence of Mission-based energy officers, Office of Energy cables to the Missions run a greater risk of not being distributed correctly or not being acted upon, both of which may lead to problems of mis-communication and delays.

b. The buy-in mechanism

Under certain circumstances, Missions consider buy-ins as the preferred contractual arrangement with the Office of Energy for several reasons:

- Contracting procedure is relatively straightforward, with the Mission notifying the Office of its interest and negotiating a work order - in contrast to bilateral (Mission/host government) contracts that often involve greater host government administrative "red tape".

- It is a direct contracting mechanism with an already approved contractor, avoiding time-consuming competitive bidding.

- The breadth of Office of Energy projects offers more flexibility than Mission projects to respond to varying types of contractor service requirements.

- It is considered less Mission-management intensive and is an easy, rapid contracting mechanism to access assistance from a broad spectrum of expertise.

Before agreeing to a buy-in arrangement, Missions consider the following prerequisites:

- Mission must have sufficient project funds.

- Mission must have clear information on services being offered.

- Mission must have the assurance of prompt processing (ie.: the personal responsiveness of the Office of Energy contracting officer).

- Contractor should have a good reputation.

- Mission must have staff time to devote to the project.

- In some Missions, buy-in contracts must contain certain priority elements identified by the Mission (e.g.: privatization).

Disadvantages and problems noted by Missions regarding buy-ins with Office of Energy include:

- Office of Energy contractors and managers are sometimes too "high-pressure" in "selling" buy-ins to Missions.

- In smaller Missions, where project funds are not available for energy sector projects since it is not a Mission "priority sector", Office of Energy negotiators are often not sensitive to such constraints, still proceeding to discuss buy-ins "up front".

- Accounting under buy-in contracts is too slow for Mission requirements. Delays in processing contracts, project reporting, financial information, and invoice payments were reported by many of the participating Missions.

- There are "ceilings" for buy-ins, which have affected the ~~ETP~~ EPDAE and CETA projects.

- The contractual procedures for buy-ins have changed frequently, causing confusion, delays, and the scuttling of otherwise good project ideas.

Nonetheless, the buy-in mechanism is generally considered useful and efficient in procuring Office of Energy services as indicated by its extensive use, especially by the larger Missions.

A broader, multilateral buy-in mechanism, under a collaborative agreement with the World Bank, holds potential for significant use in the future. Generally, under this agreement, the Office of Energy would provide grant funds for activities such as feasibility studies, which (if positive) would lead to World Bank loan financing of actual capital investment and related development work. The collaborative agreement specifically targets work in three areas:

- energy efficiency, including demand side efforts;

- innovative approaches to electricity supply, particularly environmentally sound technologies and including networks of renewable energy generating systems; and

- private sector participation in energy development, including support for policy reform.

Regional Missions such as ROCAP and the REDSO's could also cooperate with this World Bank agreement.

c. Follow-on Activities by Missions

Follow-on activities by Missions are a good barometer of the relevance of initial projects to the Mission and its host government. They clearly represent continued interest in a developing sector. Office of Energy projects have often led to follow-on Mission projects, where Missions have the funding, and host governments are supportive of recommendations made in the initial project (often energy sector "assessment-type" projects).

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Follow-on projects usually involve buy-ins to the Office of Energy for the services of contractors in order to help implement a recommendation from the initial assessment. The ECSP and the ETP have generated the most interest in Mission follow-on buy-ins. Follow-on projects have also been developed based on contacts and ideas generated in workshops, seminars, conferences, and study tours. (The PSED project has had a number of follow-on projects as a result of these mechanisms).

The Office has generally been successful in generating interest in follow-on projects, with several exceptions:

- In two Missions, Office of Energy follow-on projects in renewable energy and biomass technologies could not be maintained or developed because the host government felt they emphasized too much R&D and not enough appropriate technology transfer to the country.

- Office of Energy follow-on projects in renewable energy often require institutional changes in the host government which, for reasons beyond A.I.D.'s control, are not forthcoming.

- Office of Energy sponsored or encouraged assessments of U.S. private sector opportunities in the energy sector of A.I.D.-assisted countries, in the hopes of follow-on projects with Missions. This approach is not appreciated by the Missions, especially when they have no funds and/or have not "prioritized" the energy sector.

- Office of Energy follow-on opportunities have been missed due to slow response, or non-response, to requests from Missions.

d. Overall Mission Awareness of Office of Energy Activities

Mission personnel responsible for energy sector projects are generally found to be aware of only those Office of Energy projects with which they had some involvement, or which were specifically marketed to them by Office of Energy management or contractors. Descriptive project brochures are reportedly not readily available in the Missions, and therefore, cable traffic has been their main source of current project information. This is exemplified by the high-degree of awareness of ETP course offerings through informative cables received by Missions' Human Resource Development Division, followed by course-descriptive brochures; and the frequent lack of awareness of other projects due to the lack of literature received on a regular basis.

CHAPTER III. CONCLUSIONS

An assessment of the major strengths and weaknesses of the Office of Energy follows below.

A. Summary of Office of Energy Strengths:

1) **High quality products:** By all accounts, the outputs of the Office of Energy's activities, including technical assistance missions, reports, recommendations, training programs, conferences, etc., are generally of high quality.

A.I.D. missions that had worked with the office had very few complaints about the quality of their projects or personnel; and the staff of collaborating organizations praised the office staff for their analytical capabilities and their innovative ideas, especially in the areas of private power development, alternative technologies and environmental issues. Clearly, the Office of Energy sets high standards for itself and its contractors and has a high quality of staff available to it. Several outside respondents volunteered the opinion that the Office's reputation had improved considerably in the past several years.

2) **Appropriate selection of the Office of Energy's comparative advantages in the fields of electrical power generation and related environmental concerns, and private sector strategies:** Given the inevitable resource and knowledge constraints facing it, the Office of Energy has chosen to focus its efforts on **electrical power**. This choice is a sound one, and the Office's expertise in its chosen field is widely recognized.

With regard to the Office of Energy's tendency to concentrate its resources in a relatively small number of missions, some smaller A.I.D. missions complained that the Office was not very responsive to their requests. However, the fact remains that successful interventions in the energy sector are limited by two factors: project resources and host-country policy environment. First, successful energy projects usually require concerted effort in several different areas (e.g., training, technical assistance, and capital investments) in order to achieve success. Second, policy and pricing reform are usually necessary conditions to achieving positive on-the-ground results. The best efforts of any A.I.D. intervention in improving energy efficiency or private sector investment, for example, would likely prove fruitless without a favorable policy environment. Thus, given its current resource level and staffing, the Office of Energy has good reason to concentrate its resources in a limited number of countries.

3) **The Office of Energy has chosen a largely appropriate mix of activities and projects given the office's comparative advantages and goals:** With a few minor adjustments, the Office's portfolio of projects and related activities can be streamlined to achieve its goals with a high degree of efficiency (see recommendations, Chapter IV, below). The Office staff put a great deal of effort into coordinating project activities; for instance, successful policy and price reform in Jamaica, which removed subsidies

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from electricity prices, is being followed up with energy conservation assistance to energy users, to help them cope with higher electricity bills.

As the Office makes progress towards achieving its program goals, it makes a significant contribution towards the achievement of A.I.D.'s broader goals of economic growth and alleviation of poverty. In fact, energy is a critical sector in industrial development, and in most nations' balance of payments.

4) **The Office of Energy has developed good relations with other organizations,** including the World Bank and other multilateral development banks, other bilateral donors, financial organizations, and private sector firms in many countries. It has demonstrated an ability to leverage significant resources from them, for instance in helping to obtain significant financial incentives (e.g., from the World Bank) for policy reform in the energy sector, or approval and finance for new power facilities or hardware improvements in LDC utilities.

5) **The Office of Energy's training programs have received high marks from missions and from the trainees themselves.** The evaluation responses indicated that the training programs were well designed and implemented, and that the trainees came back with useful new skills. After the 1990 evaluation of the Energy Training Project noted a shortcoming in the lack of training available for senior managers in LDC utilities and energy planning agencies (with the result that technical trainees had trouble getting management support to implement new procedures), the project added a series of energy management courses to its program.

B. Summary of Office of Energy Weaknesses

1) **Lack of specific management targets and measurable criteria for success,** leading to an apparent lack of attention to on-the-ground results of projects and activities. The Office of Energy's annual Program Plans, for instance, list planned "achievements" in terms of direct project outputs (such as reports, investment proposals, and conferences) rather than in terms of results (such as new facilities on line and producing power, or innovative technology installed, operating, and reducing wastage, losses and emissions). Even when the Office was invited by the evaluation team to write up summaries of on the ground successes, some of the claims were no more than "methodologies developed [which participants expect] will lead to some 50 megawatts of private generation capacity" and a "joint Indian/U.S. working group [which] is developing a demonstration project" that has not yet even secured funding. There is little evidence of systematic tracking of project progress in terms of concrete results in each country.

Although the Office's weekly project reports do include some discussion of project results, these reports are only presented chronologically, lumping all the projects together week by week. In its present form, it is not conducive to fostering the systematic tracking that is required to ensure that the means accomplish the ends. Similarly, the quarterly reports for each project have a much heavier emphasis on project activities than on outcomes and results.

Although on-the-ground results are usually beyond the immediate control of the Office of Energy and its projects, the goals of the office and the purposes of its projects are all established in these terms. The failure to establish specific targets and require regular documentation of progress in those terms leads to an inability to study systematically which approaches are most likely to lead to positive end results and to adjust project activities on a timely basis. It also makes it difficult to build credibility beyond a small circle of collaborators, and may contribute to a potential lack of accountability and incentive to perform.

2) **Some of the formal goals of the Office of Energy are inappropriate or too narrow.** This is true for two goals in particular, i.e. (a) increasing indigenous energy resources, and (b) increasing energy supply in rural areas.

The goal of **increasing the use of indigenous energy resources**, while appropriate for some countries, is inappropriate for others. The economics of resource endowments and world trade may indicate that some countries should continue to import energy resources as the most cost-effective way to meet their energy needs. Pushing the use of indigenous energy resources in these countries may impose an unnecessary and unwarranted economic burden. In the case of better endowed countries, the broader goal of **increasing energy efficiency** is sufficient to suggest that the Office of Energy work to develop indigenous energy resources.

The goal of **increasing energy supplies in rural areas** is needlessly narrow, and is largely outside the Office of Energy's field of comparative advantage - electrical power. While it is clear that many rural populations suffer from a lack of access to environmentally sustainable energy resources, the broader Office of Energy goals of **increasing energy efficiency and environmental soundness** (e.g., through policy and price reforms) address this problem without the need for a special goal. Under current policies in many LDCs, efforts to increase energy supplies in rural areas require subsidies or other economic distortions that only add to the larger problem of increasing the efficiency of energy systems as a whole.

In terms of wording, the current goal of **Increased consideration of environmental criteria** is overly modest and vague; it does not lend itself to measurement and it does not demand concrete change.

Finally, the evaluation team notes that the **private sector** goal is at once a goal and a strategy. The ultimate goal may be to increase energy supply to keep pace with economic growth; however, as the Office of Energy experts have made abundantly clear in numerous reports and planning documents, public sector investment potential is already stretched to its limit (and in any event has proven itself generally inefficient). The best hope, therefore, both for creating new power capacity and increasing energy efficiency, lies with the private sector. Given the need to stress the private sector alternative with (often reluctant) LDC governments, the evaluation team concurs with the current wording of the private sector goal.

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3) The Office of Energy's goals and objectives, as described in the annual Program Plan, are not clearly linked to the objectives of the Office's portfolio of projects.

Although the Office clearly has a good sense of strategy in practice (all goals being addressed by some project elements, and considerable cooperation between different projects working toward the same goals), the Program Plan lacks a formal, written Program Logical Framework. Within its annual program plan, the Office of Energy has a list of formal goals, and within each goal, a set of more specific objectives. Once these are presented, however, the program plan turns to a discussion of each of its projects, whose specific objectives and strategy are not clearly linked back to the program objectives.

The lack of clear linkages between overall Program Goals and narrower project objectives (as described in project logframes, for instance) may account in part for the large amount of staff time spent in coordination meetings. The lack of an explicit Program logical framework may also lead to a serious loss of continuity if the office expands its staff (as is recommended below) or if the office needs to replace senior staff. Senior Office staff admitted that since their sense of strategy existed only in their collective heads, if anything should happen to them, the Office's program could "fall apart."

4) There exist several areas of topical overlap between projects:

- Policy reforms are a major concern of both the Energy Planning and Policy Development project and the Private Sector Energy Development project and policy reform initiatives are also developed by most of the other projects.

- Conservation and efficiency efforts are developed both by the Energy Technology Innovation Project and the Energy Conservation Services Project;

- EPPD contains an activity for "efficient lighting" in Mexico although this type of activity is usually conducted under ECSP;

- the ECSP project provided assistance to the Dominican Republic in writing privatization legislation;

- both the CETA/ETIP project and the ECSP project have been working on combined cycle power plants;

- the "Private Power Data Base" and the "Private Power Reporter" is prepared by ECSP, instead of PSED.

There are good reasons for some degree of overlap: The Office of Energy Director has a deliberate strategy of fostering competition between the contractors, which keeps them alert and actively seeking new opportunities. In addition, the context or history of project activities in a particular country, and different project tools or strategies sometimes lead to different contractors in different countries performing similar

activities. However, there is evidence that the strategy of competition under overlapping scopes of work has been carried too far, and has become a burden for the under-staffed office to coordinate.

5) **Lack of effective marketing of the Office of Energy projects:** Although the Office of Energy is limited by its budget, there is considerable scope for expansion of activities through "Mission buy-ins." However, the Office's efforts to solicit more buy-ins have sometimes not born fruit:

- Many missions indicated that the energy sector is not on their list of priorities (which were mostly in the realm of private sector development, rural development, or broad economic policy reform).

- Several missions complained that the Office had failed to include them in the project development process, and even bypassed the mission in working with the host government to develop projects or activities. This has soured the Office's relationship with more than one mission.

- With regard to the Office's renewable and biomass energy projects, Missions seem to be particularly skeptical, on the basis of 1970's era renewable projects which generally proved unsustainable.

In some cases, however, the best efforts of the Office of Energy to interest A.I.D. bureaus and missions in energy activities have been frustrated by the mechanics of the buy-in process itself. For instance, the Office ran up against a buy-in ceiling for its training project, and couldn't get permission to bridge the gap - even with mission funding - until the new project started. In addition, the contract regulations for buy-ins change frequently, leading to confusion, delays, and sometimes even the scuttling of otherwise good project ideas.

In another frustrating effort, the Office has been trying to engage A.I.D.'s Eastern Europe Bureau in energy projects relevant both to their privatization and environmental activities. Congress has even specifically ear-marked environmental improvements in Eastern European power utilities as a priority, and host government personnel have appeared receptive. The lack of response on the part of A.I.D.'s Eastern European bureau is puzzling.

6) **Micro-management of contractors, and excessive administrative requirements** which divert time and resources from achieving on-the-ground project objectives: Most of the contractors expressed dissatisfaction with the requirements for weekly reporting and weekly meetings. Several contractors complained of a double bind wherein their project managers wanted to maintain close control over project resources and activities, and yet were too busy to stay on top of the resulting series of approvals of myriad minor project elements. While many of these procedures are general A.I.D. or S&T Bureau requirements (e.g., travel approval and weekly reports) - and not those of the Office of Energy - the Office of Energy could do more to minimize micro-management within its operations.

7) **The Office of Energy is under-staffed**: Currently, the Director, Deputy Director, and Program Analyst all have project management responsibilities. They each have, in effect, two full-time job responsibilities. In addition, the Office's marketing needs are difficult to meet due to the lack of personnel and time available for travel and communication with missions and regional bureaus. Several missions complained of slow responses from the Office.

We note that although the budget for the Office of Energy has doubled in the past two years, and quadrupled in the past five years (with a corresponding increase in responsibility for project activities), they have not yet received permission to increase their staff. Many of the A.I.D. missions' complaints about the office's "lack of responsiveness" and the contractors' complaints about "slow approvals" are clearly due to the shortage of staff in the office.

8) **Language barriers hinder the ability of many potential trainees to take advantage of Office of Energy training programs**: Several A.I.D. missions in Latin America told the evaluation team that many excellent candidates for training were unable to take advantage of the Office's training opportunities due to the language mis-match.

9) **There are areas of the Office of Energy portfolio where there may be insufficient training support**, notably in the area of renewable energy technologies. Although the ETP contractors could develop courses, no one (neither from ETP, the REAT/BEST projects, nor the Office staff) appears to have put significant effort into marketing among the missions for such courses; generally 20 participants are needed to justify the cost of preparing and offering any single course.

CHAPTER IV. RECOMMENDATIONS

The following section presents ten areas of specific recommendations made to the Office of Energy by this evaluation team.

A. STREAMLINE THE SET OF GOALS

The Office of Energy should eliminate its goals for increasing indigenous energy resources and rural energy supplies, and strengthen the wording of the environmental goal.

As discussed in Section III.B., above, these goals are (respectively) inappropriate, overly narrow, and overly modest. The Office should focus on three broad goals as follows:

1) "Increased technical efficiency and financial performance of energy systems, (including consideration of all potential energy sources, conversion processes, and uses)."

2) "Improved environmental soundness of energy systems, (including cleaner technologies and inclusion of environmental criteria in energy policy and planning)."[3]

3) "Increased private sector involvement in energy development and management, (particularly private investment to expand energy supply capacity).

B. ESTABLISH MANAGEMENT TARGETS

The Office of Energy should establish formal, objectively verifiable criteria for success for each of its goals, and long-term and intermediate management targets for each of its projects.

Recommended verifiable **criteria for each goal** (without specific magnitudes) which the Office of Energy may wish to consider include the following:

1. Increased technical efficiency and financial performance of energy systems:

Lower cost per unit of power output of utilities; lower percentage of losses in transmission/distribution; lower incidence of power outages/brown-outs; higher efficiency in the use of electrical power in industry (lower energy use per unit of output), buildings (lower energy use per building), and transportation (better mileage); higher rate of return on assets for power utilities.

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[3]Note this is also a recommendation to change the wording of the goal. The previous wording was "increased consideration of environmental criteria".

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2. **Improved environmental soundness of energy systems:**

Lower total emissions of pollutants/other waste from utilities; lower emissions of pollutants/other waste per unit of energy output from utilities; less environmental degradation/waste associated with mining/pumping for fuels; slower rates of deforestation; avoidance of large-scale hydro-electric projects that would dislocate communities or disturb eco-systems.

3. **Greater private enterprise involvement in energy development and management:**

Increased output of electric power from privately owned or operated systems; higher per-capita energy consumption; increased output of power through co-generation; increased exports of U.S. energy sector goods and services.

A full range of **management targets** for each project is beyond the scope of this evaluation. However, they can be developed with some basic principles in mind: management targets should represent on-the-ground achievement, and be either measurable and quantifiable, or objectively verifiable by independent observers. Most important, there should be a sense of step by step progression from direct project outputs through intermediate and long term on-the-ground results, to the final goals.

Long term management targets for each project should be established in the logframe "End of Project Status" (EOPS). The Project Logframe of the BEST (Biomass) Project contains an appropriate (if ambitious) set of long term management targets as the End of Project Status, which can provide a good example for other projects in the Office of Energy portfolio.

In addition, most projects will need some **intermediate management targets** that indicate how project outputs (e.g., reports, workshops, training courses, etc.) lead to the achievement of long term targets.

Some examples of appropriate management targets for each of the projects are as follows:

Energy and Environmental Policy and Planning Project (EEPP):

Least-Cost Investment Planning:
Intermediate target - planning procedures implemented in a country and producing investment/expansion plans that take into account comprehensive, long-term comparisons of all relevant alternatives including appropriate assessment of risks and environmental criteria (i.e., such that an independent, objective evaluator could compare pre-project planning decisions with post-project planning decisions and assess the improvement).
Long term target - planning decisions implemented which have led to more cost-effective and environmentally sound outcomes than had occurred in the past (measured ultimately in terms of the goal-level targets listed above).

Energy Efficiency Project (EEP):

Improved load management strategies:
Intermediate target - strategies implemented, leading to x% reduction in peak(s) in the load curve.
Long term target/goal - lower requirements for additions to electrical grid capacity, leading to lower average cost per unit of energy output.

Energy Technology Innovation Project (ETIP)

Installation of innovative technologies for cleaner, more efficient power generation:
Intermediate target - positive feasibility studies lead to proposals for investment in innovative technologies for which government approval and finance has been secured.
Long term target/goal - new technologies installed in LDC utilities, with training and technical assistance provided in operation and maintenance, leading to increased production of power at lower unit cost and with lower emissions.

Biomass Energy Systems and Technology (BEST)

Installation of biomass energy systems:
Intermediate target - positive feasibility studies prepared in collaboration with potential investors lead to specific proposals for investment in biomass systems for which government approval and finance has been secured; continued research improves the economic efficiency of entire agro-industrial/energy system.
Long term target/goal - biomass systems installed and personnel trained in operation/maintenance, leading to an operating power system providing power for the grid on a regular, reliable basis.

Renewable Energy Applications and Training Project (REAT)

Installation of renewable energy systems in medical clinics:
Intermediate target - feasibility studies demonstrate cost-effectiveness of solar-powered refrigerators in remote rural clinics; approval, financing and other resources secured.
Long term target/goal - solar-powered refrigerators installed in remote rural clinics, operating regularly, reliably, and at lower long run cost than alternative power sources.

Private Sector Energy Development Project (PSED)

Private energy projects:
Intermediate target - Policy reform yields favorable investment climate for private energy projects, including:
a) price reform establishing energy prices on the basis of long run marginal costs;

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b) permission for private production of power
c) access to necessary foreign exchange and imports
d) permission for foreign investment and repatriation of capital
e) guarantees of contract enforcement
f) elimination of onerous tax and regulatory barriers; and
g) positive feasibility studies prepared in collaboration with potential investors lead to specific proposals for investment in private energy systems for which government approval and finance has been secured.
Long term target/goal - private energy systems operating profitably and providing power on a regular, reliable basis.

Energy Training Project (ETP)

Training of personnel for power utilities:
Intermediate target - personnel trained in efficient and clean operation, maintenance, and management of power utilities.
Long term target - trained personnel working in positions for which they have been trained for at least one year and are in a position to implement needed changes in policy and procedures.

In finalizing the targets for each project, the project development team needs to think through the project both forwards and backwards: starting with goals, they need to ask "what all needs to happen before these goals can be realized?" and develop a plan. The plan then needs to be adjusted for the availability of resources - primarily budget and personnel. The specific targets (or their magnitudes) may then have to be revised to fit the availability of resources.

C. WRITE MANAGEMENT TARGETS INTO PROJECT CONTRACTS

The formal management targets for each project, as described above, should be written into project contracts. Contractors should be required to report project progress in terms of the management targets on a regular basis. Project Managers should be responsible for enforcing these requirements, and for arranging any necessary follow-through required involving resources outside the project.

Meeting the targets themselves should not be thought of (nor presented!) as a contractual obligation, as such on the ground results are largely beyond the control of the Office of Energy and its contractors. The emphasis should be on reporting progress towards the targets (including reasons for success or failure), to keep project activities centered on concrete objectives and to study which approaches are working and which ones are not.

Once the management targets are adopted, and reporting requirements are written into project contracts, Office of Energy staff should be able to loosen administrative requirements on contractors. For instance, monthly progress reports and monthly project meetings should suffice, rather than the current requirement for weekly reports and weekly project meetings. Ad hoc meetings for specific issues will, of course, continue to be necessary.

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Verification of the achievements claimed in the progress reports (including the quarterly and annual reports) can be undertaken during the regularly scheduled project evaluations, which should specifically focus on on-the-ground impact.

Finally, as current projects finish work and new projects replace old, the Office of Energy should ensure that the new projects continue with the successful activities of the old, and that new contractors are required to carry out follow up activities on the basis of the achievements of past contractors.

D. ESTABLISH A PROGRAM LOGICAL FRAMEWORK

The Office of Energy should establish a formal Program Logical Framework, explicitly relating the Office's set of goals to its portfolio of projects. In developing a program logframe, the principle should be to tie project goals and purposes (particularly the "End of Project Status" from the project logical frame-works) explicitlHP DeskJet PlusHPDESPLU.PRSone correspondence between specific goals and specific projects), and the End of Project Status for all the projects should match the Office's more specific objectives as described in its Program Plan.

A well designed Program Logical Framework could streamline the Office's portfolio of projects and activities, instruct contractors in areas where cooperation between projects is expected, and ensure continuity of the Office's broad strategy approach even as personnel and contractors change.

All project contractors should be familiar in general terms with the entire program strategy, and in particular, those areas where different projects are expected to cooperate.

A recommended Program Logframe is presented in figure IV.D.1, below.

E. STREAMLINE PROJECT ACTIVITIES

To assist in streamlining the Office's portfolio of projects, it would be advisable to shift some activities among the projects:

1. Technical activities aimed at improving efficiency in energy use should be the primary responsibility of the Energy Efficiency Project.

2. Technical activities aimed at improving efficiency and cleanliness of electrical power generation, and commercialization of innovative technology in this field, should be the primary responsibility of the ETIP.

3. Policy reform activities aimed at improving the investment climate for foreign and local private investors should be the primary responsibility of PSED. The private power data base and the Private Power Reporter should be shifted from ECSP.

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PROPOSED PROGRAM LOGFRAME FOR S&T/OFFICE OF ENERGY

NARRATIVE SUMMARY

Goals

1) Increased technical efficiency and financial performance of energy systems
2) Improved environmental performance in energy systems, and
3) Greater private enterprise involvement in energy development and management...

...all leading to improved economic growth, human health and welfare in LDCs.

Purposes

1) To lower capital requirements per unit of delivered energy.
2) To increase efficiency of power generation and transmission.
3) To increase efficiency of power use in industry, buildings and transportation.
4) To enact new national energy policies which explicitly promote efficiency and environmental soundness in energy systems.
5) To improve investment decision-making, enterprise management and technology adaptation and innovation within the public sector.
6) To install new technologies and introduce new procedures for power generation which have lower pollution emmissions and higher efficiency than older technologies and procedures.
7) To create a favorable environment for private ownership, financing and operation of energy facilities in LDCs.
8) To increase financial, technical and managerial capabilities of indigenous private sector investors in the energy sector in LDCs.
9) To increase the flow of technical and financial resources from the US private sector.
10) To train LDC decision-makers and engineers in managing, maintaining, and operating energy systems in the cleanest and most efficient manner.
11) To increase the use of biomass and other renewable energy sources in LDCs.

OBJECTIVELY VERIFIABLE INDICATORS

Measures of Goal Achievement

1) increase in megawatts of power produced and delivered; lower cost per unit of power output of utilities; lower percentage of losses in transmission/ distribution; lower incidence of power outages/brown-outs; higher efficiency in use of electrical power in industry (lower energy use per unit of output), buildings (lower energy use per building), and transportation (higher fuel efficiency/better mileage); higher rate of return on assets for utilities.

2) lower total emissions of pollutants/ other waste from utilities; lower emissions of pollutants/other waste per unit of energy output from utilities; less environmental degradation/waste associated with mining/pumping for fuels; slower rates of de-forestation; avoidance of large-scale hydro-electric projects.

3) Increase in power capacity and output available from private sources; increase in private sector involvement in operations in the energy sector; increase in per capita power availability; increased exports of U.S. energy sector goods and services; increased power output through co-generation.

End of Program Status

1) Increased efficiency of energy systems has reduced requirements for capital expansion of power systems (EEPP, EEP, ETIP).
2) Implementation of improved load management procedures has reduced the peaks in the power curve in electricity grids (EEP).
3) Implementation of improved energy conservation procedures among end users has led to a) greater industrial output per unit of energy input; b) lower energy use for lighting and cooling/heating in buildings; and c) better mileage in transport (EEP).
4) Policy reforms in the energy sector enacted, including price reform (such that all energy prices are based on long run

MEANS OF VERIFICATIONS

Goals

Evaluations; reports and statistics from relevant host country ministries and/or other multi-lateral agencies; mission and contractor reports.

Purposes

Evaluations; reports and statistics from relevant host country ministries and/or other multi-lateral agencies; mission and contractor reports.

IMPORTANT ASSUMPTIONS

Assumptions for Achieving Goal Targets

1) Program purposes achieved as an integrated package (i.e., - most elements must be in place in a country, whether by S&T or other agencies).
2) Economic growth is currently hampered by lack of energy/ inefficiency of energy systems
3) Human health is currently suffering due to unnecessary environmental degradation/pollution associated with energy development
4) Current environmental damage is caused in significant part by the energy sector.

Assumptions for achieving Purposes:

1) LDC populations and their govt. representatives are interested in a cleaner environment.
2) Host governments willing to implement significant policy reforms (will often require incentives from outside S&T).
3) Investment financing is available (including both commercial financing for conventional/proven systems and soft financing/guarantees/grants for development of alternative systems which are considered risky by the market)
4) Incentives are made available (from OECD nations/institutions) to LDCs to improve their environmental standards (especially for sectors with global impacts).
5) Availability of potential trainees with appropriate background and interest in improving energy system performance.
6) Cooperation of other donor agencies to impliment a coherent package of interventions in a given country.
7) Availability of interested entrepreneurs in LDCs, and foreign investors.

OBJECTIVELY VERIFIABLE INDICATORS

End of Program Status (con't)

marginal costs), full consideration of environmental costs, autonomy for power utilities, requirements for parastatals to yield a positive rate of return on assets, and permission for private production of power for the grid (EEPP, PSED).
5) Investment decision-making in LDCs is made on the basis of comprehensive least-cost planning methodologies; productivity of labor and capital improves in utilities (EEPP, EEP, ETIP).
6) Improved technology installed and procedures implemented in power utilities leads to higher productivity and lower pollution emmissions (ETIP, EEP).
7) Policy reforms enacted in the energy sector permitting private investment in the power sector, access to capital, foreign exchange, and imports at efficiency prices; procedures for selling power to the grid at prices based on long run marginal costs; permission for foreign investment and repatriation of capital; procedures for contract enforcement and fair settlement of disputes; and elimination of prohibitive taxes (PSED, EEPP, BEST, REAT).
8) private investors in LDCs have obtained approval for investments in the energy sector and financing for investments, and have ready access to energy technology, skilled technical and managerial personnel, and other inputs needed for investments in the energy sector (PSED).
9) Increase in US exports of energy-sector goods and services; increase in US investment in energy sector in LDCs (PSED, EEP, ETIP, REAT, BEST).
10) Trainee participants have successfully completed energy training programs, stay employed at least one year in positions for which they have been trained, and are able to implement what they have learned (ETP).
11) investments in biomass and other renewable energy systems (including photovoltaic, wind, mini-hydro, and geothermal) yielding power in LDCs (REAT, BEST).

4. The two renewable energy projects, BEST and REAT should be combined into a single project; or coordinated under a single project manager.

F. IMPROVE MARKETING EFFORTS AMONG MISSIONS

The Office of Energy should improve its marketing among A.I.D. missions by showing how the office's projects can meet their priority needs, and being more responsive to their inputs. For instance, **economic policy reform, privatization, and private sector development projects** are high priorities among most missions, and **environmental projects** are becoming high priority in many missions. The Office of Energy should market to these missions by showing, respectively:

a) The significant fiscal and balance of payments impact that the energy sector can have within an economic policy reform program;

b) The high-profile of successful privatization within the energy sector (e.g., privatization of electrical utilities);

c) The high success rate among private sector energy projects; and

d) The high impact and cost-effectiveness of improving environmental conditions by concentrating on the energy subsector.

In addition, the Office of Energy should improve its coordination with mission staff and the regional bureaus during the project planning process. The Office staff should think of the Missions as its clients, and treat them as the service industry in the private sector treats its clientele.

To solicit a greater number of buy-ins, the Office should stress its ability to provide services to sub-components of, say, large private sector projects. In this context, Office of Energy staff will find it necessary to tailor their programs to fit in with broader mission strategies.

G. PREPARE CASE STUDIES OF SUCCESSFUL MODELS FOR REPLICATION

The Office of Energy should prepare a number of models, or case studies of successful projects (i.e., projects which have achieved their goals, in measurable, concrete terms such as power facilities on-line and providing increased capacity for the grid, or measurable increases in energy output per unit input) as marketing tools and as models which can be replicated elsewhere. The case studies should be brief and directed at A.I.D. mission and bureau decision-makers (i.e., not at energy specialists). They should highlight success in areas of interest to most missions, and show how the results were achieved (e.g., the highlights of a new, private sector energy policy which was enacted into law or clean technology installed). Four examples of such "models" are presented in Appendix F of this report.

As a start, the Office of Energy may find it a useful exercise to reorganize the material from its weekly project progress reports by country, and to add in details about on-the-ground progress and achievements.

The Office should be particularly careful in marketing its renewable and Biomass energy projects. Probably the most successful strategy would be to publicize its recent successes, such as the biomass co-generation facilities in Costa-Rica and Thailand. Given the healthy skepticism of missions about the sustainability of such projects, the Office should continue to track the success of the model projects over time.

H. HIRE NEW STAFF AND RE-STRUCTURE POSITIONS AND RESPONSIBILITIES

The Office of Energy should enlarge its staff and re-structure its positions and responsibilities. The office should have at least two full time management positions, which should include a Director plus a Deputy Director and/or Program Analyst. The Director and Deputy (or Program Analyst) should be responsible, on a full time basis, for overall program management and leadership, program budget considerations, development of new programs, and liaison with other agencies. At least two new staff should be hired, so that Project managers can be assigned full time project management responsibilities. In addition, the Office should hire three to five new staff to be resident in the regional offices and available for regular travel to the missions to help design specific projects and activities for missions, arrange regional conferences, and liaise with regional agencies.

I. DEVELOP TRAINING COURSES IN SPANISH AND FRENCH

The Energy Training Program should develop short term courses in Spanish and French.

The current priority, given the level of activity the Office of Energy maintains in Latin America, should be the development of courses in Spanish. As the activity level increases in Franco-phone Africa, the ETP will need courses in French as well.

Depending on the resources available, the ETP should either recruit trainers who can teach in Spanish/French, or prepare video or inter-active computer courses in Spanish/French. If the ETP cannot recruit bi-lingual trainers, another option might be to put some of their own Spanish-speaking alumni through Train-the-Trainer courses, and then hire them to deliver training. Certain courses could be presented in one location in South or Central America for all Spanish-speaking participants and in one location in, say, West Africa for all of Franco-phone Africa. Recruiting Spanish speaking trainers would probably be the most cost-effective solution for Latin America, where there are (according to evaluation interviewees from missions and from ROCAP) a large number of prospective participants.

In Franco-phone Africa, where there are fewer likely candidates for training, it may be more cost effective hire French-speaking trainers on a short term basis to prepare video-

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taped courses. The draw back to this method, of course, is that it is not interactive, and participants tend not to learn the material as thoroughly as do those in courses with a face-to-face instructor. Another possibility is an inter-active computer course, but these are still quite expensive to develop, and have the drawback that participants who are not as self-directed may not do as well as with a face to face instructor.

For the few long term degree courses available through ETP, it may be more useful for the Office to identify concentrated English language programs that participants could take, say, during the summer preceding the start of their degree program.

J. DEVELOP MORE TRAINING COURSES FOR RENEWABLE ENERGY SYSTEMS

The Office of Energy should develop more training courses in renewable energy systems and rural energy systems, either within the Energy Training Project or the Renewable Energy and Biomass Energy projects. Increasing the supply of skilled technicians and managers in the sub-field of renewable energy should help to improve the acceptability and sustainability of energy training projects.

The BEST and REAT projects should work with the ETP to develop relevant courses and devote a serious effort to marketing among the missions (especially those where REAT/BEST has been or is currently active) for participants to these courses.

APPENDIX A

SCOPE OF WORK

ARTICLE I - TITLE

Energy Policy Development and Conservation.

ARTICLE II - Scope of Wor

I. Background - The goal of the Agency for International Development is a world in which economic growth and development are self-sustaining and the extremes of poverty have been eliminated. Energy is a critical input to attaining these goals. The Office of Energy (S&T/EY) shares with other Bureaus and Missions in the Agency the responsibility for helping A.I.D.-assisted countries obtain appropriate energy services. Since 1978 the Office of Energy has designed and implemented a variety of programs to achieve these goals. Some of the earlier programs have been superceded or expanded to incorporate new activities, the current Office of Energy portfolio includes the following projects:

- 936-5724 - Conventional Energy Technical Assistance
- 936-5728 - Energy Policy Development and Conservation
- 936-5730 - Renewable Energy Application and Training
- 936-5734 - Energy Training Program
- 936-5737 - Biomass Energy Systems and Technology
- 936-5738 - Private Sector Energy Development
- 936-5741 - Energy Technology Innovation

The last three projects listed are new since 1989.

At various times during the last twelve years the Office of Energy has either carried out in-house evaluations or has had independent contractors evaluate specific programs, but there has never been an evaluation of the entire Office of Energy portfolio to determine whether or not this is the correct mix of energy activities to achieve the Agency's goal, or how the various programs integrate or overlap with each other. This proposed evaluation will attempt to address these questions, as well as others.

II. Statement of Work

The evaluation of the Office of Energy portfolio will begin in late FY 1990 or early FY 1991 to analyze achievements and shortcomings relative to the Office and/or Agency expectations and current international energy and economic situations; and will look at the individual projects and activities within the Office and how they relate to each other. The evaluation will include interviews with participants, counterparts, and users of the Office of Energy projects; examination of financial and administrative records, when appropriate; examination of reports and publications; and consultation with appropriate A.I.D. officials in Washington and in the field. (Field contacts will be made by cable, fax, or phone.) The contractor will address but not be limited to the following key questions:

a. Have the Office's activities achieved useful results in terms of:

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(1) Facilitating the analysis, planning and implementation of specific projects, programs and investments to increase energy supply and/or maximize efficiency of consumption?

(2) Improving the LDC energy database?

(3) Strengthening LDC energy planning, policy-making and/or related institutions?

(4) Increasing the skills of LDC energy professionals in counterpart institutions?

(5) Helping to bring about policy innovations that contribute to the Office's overall goal and purpose?

(6) Providing leverage for investments in the country's energy sector, specially investments by private enterprise?

(7) Developing environmentally sensitive solutions to energy problems?

(8) Inplementing cooperative programs with other donors, agencies and NGOs.

b. Do the A.I.D. Missions have current or firmly committed future follow-on projects/activities? How will they build on S&T/EY-funded activities? How important is it in the Missions' overall program?

c. Did the Office's activities raise important issues, provide important lessons or produce significant new information that can be applied in A.I.D.-assisted countries? If so, what are they? Were they, or can they be, transferred to other settings?

d. Were conferences and other activities undertaken to ensure inter-country coordination, shared experiences and learning to provide meaningful opportunities for ideas generated in one country to be tested and applied elsewhere? Were the efforts successful, in the view of the Office and participants? What concrete evidence is available to support this conclusion?

e. Looking towards the future, the contractor should look at the mix of Office of Energy programs, and where approriate, make recommendations for changes in the mix of the programs to address new initiatives as identified by the contractor, A.I.D. and Congress.

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The contractor should view this evaluation as a management assistance tool, similar to the process of arriving at a business plan in the private sector. The final report will be used to make management decisions on continuation of projects and starts of new projects to address the increasing energy and environmental demands.

The contractor should recognize the importance of directly surveying the relevant A.I.D. offices, missions and other appropriate in-country sources to determine their perceptions of the offices goals, to assess the quality of specific activities, to measure financial and economic benefits, and to identify lessons learned. As budgetary constraints limit funds available for this activity, it will be accomplished by telephone, telex, fax, or cable.

The output of the evaluation will be documented in a final report based on the activities of the team and an analysis of the information received. The final report will be management oriented, succinct, and in accordance with the guidelines specified later in this scope of work.

III. Methods and Procedures

It is anticipated that the contractor will work on a five day per week schedule beginning on/about 17 September 1990. The majority of the time will be spent in Washington reviewing Office of Energy files, talking with Office staff, Regional Bureau representatives, contractors, and any other individuals identified by the Office of Energy, or the contractor, who they feel will be helping in conducting this evaluation.

After an initial review of the Office of Energy's program the contractor will design a questionnaire to be sent to key missions where the majority of the Office's activities have taken place, such as Pakistan, Philippines, Thailand, Costa Rica, Jamaica, etc. Due to the wide variety of Office of Energy projects, the questionnaire might have to be broken up into sections in order to get a clear picture of the results of the work that has been accomplished, or underway, in the LDCs.

The contractor will break the evaluation of the Office of Energy portfolio into specific components that can be evaluated individually, with the results integrated for the final report. The following is a suggested outline for the breakdown.

a. Project Administration

(1) Project planning
(2) Project staffing
(3) Communications with other projects within the Office, and the respective contractors

b. Office Components

(1) Execution of activities
(2) Linkage with other Agency programs

c. Overall Quality of Implementation

d. Overall Agency and Mission Perceptions

e. Training

(1) Does the Energy Training Program complement other activities in the Office?
(2) If not, where is the program lacking?

f. Information Dessimination

(1) Quality of specific activities

(a) Workshops and conferences
(b) Publications

(2) Overall Quality of Information Dissemination

The contractor should evaluate the overall program, and following is a suggested breakdown of areas:

A. Quality of Effort

(1) Technical adequacy
(2) Managerial adequacy
(3) Human resources development
(4) Development of innovative ideas and projects

B. Perceptions of Cooperating Organizations

(1) Perceptions of A.I.D. bureaus and other Washington offices
(2) A.I.D. Missions
(3) LDC governments/private sector
(4) U.S. private sector

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C. Likely or Actual Impacts of Office of Energy programs

(1) Actual energy savings
(2) In-country capacity to carry on activities
(3) Supporting private sector development

D. Problems and obstacles encountered

(1) Technical
(2) Institutional
(3) Procedural
(4) Policy

APPENDIX B

PERSONS INTERVIEWED

PERSONS INTERVIEWED

Office of Energy, Bureau for Science and Technology, A.I.D.

Dr. James Sullivan, Director
Dr. Alberto Sabadell, Deputy Director
Dr. David Jhirad, Senior Physical Scientist
Ms. Shirley Toth, Program Operations Specialist
Mr. Ross Pumfrey, Energy Systems Analyst
Dr. Samuel Schweitzer, Energy Specialist
Ms. Carolyn Kiser, Program Operations Specialist
Mr. Jorge Perez Ponce, Energy Training Consultant
Mr. Ken Feldman, Energy Consultant
Mr. Nathaniel Brackett, Energy Consultant

A.I.D. Regional Bureaus

Mr. Robert Archer, ENE/TR
Mr. James Hester, LAC/DR
Mr. Thomas Nicastro, APRE
Mr. Tony Prior, AFR/TR

A.I.D. Missions

Mr. Robert Adams, Office of Engineering Director, Honduras
Mr. Edilberto Alarcon, Private Sector Chief, Peru
Mr. Ramon Alvarez, Forestry Advisor, Honduras
Mr. Stafford Baker, PDO, Kenya
Mr. Bob Beckman, Special Projects Chief, India
Mr. Wynn Cullen, Engineer & Environ. Div. Chief, REDSO/Abidjan, WCA
Mr. Roberto Figueroa, PDO/EO, Guatemala
Mr. Paul Fitz, A.I.D. Representative, Chile
Mr. Mario Funes, Regional Energy Advisor, ROCAP
Mr. Raoul Gonzales, Energy Officer, El Salvador
Mr. Bob Hanchett, Regional Environ. Officer, REDSO/Abidjan, WCA
Mr. Farrukh Mahmood, EPPRD Div. Chief, Pakistan
Mr. Falsto Maldonato, Natural Resources Specialist, Equador
Ms. Sher Plunkett, Deputy Div. Chief, (Ag. & Rural Dev.), Nepal
Mr. Richard Rhoda, Office of S&T Director, Egypt
Mr. Robert Rose, Chief Engineer, REDSO/Nairobi, ESA
Mr. F. Salah, Project Officer, Jordan
Mr. Jose Sanchez, Chief Engineer, Panama
Mr. Charles Scheibal, OEEE Director, Jamaica
Ms. Conchita C. Silva, OCP Program Specialist, Philippines
Mr. Alex Sundermann, OCP Chief, Philippines
Mr. Min Tara, Chief Engineer, Thailand
Mr. George Thompson, GDO Chief, Mali
Mr. Mohammed Oubnichou Project Officer, Morocco

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Office of Energy Contractors

Dr. Steve Ebbin, Director ETP, and Vice President, Dept. of Science and Tech., IIE.
Mr. Carl Hocevar, Vice President, EPPD, REAT, International Development & Energy Associates
Mr. Mangesh Hoskote, Deputy Director, PSED, Center for International Electric Power Development
Mr. Frederick V. Karlson, Technical Manager, CETA, Bechtel National, Inc.
Mr. Ernie Lam, CETA, Bechtel National, Inc.
Mr. Will Polen, PSED, Center for International Electric Power Development
Dr. Mansfield Smith, Academic & Alumni Officer, ETP and Manager, Program Development, Dept. of Science and Tech., IIE.
Mr. Alain Streicher, Senior Vice President, ECSP, RCG/Hagler, Bailly, Inc.
Mr. Frank Tugwell, Program Director, BEST, Winrock International
Mr. Tom Wilbanks, EPPD, REAT, Oak Ridge National Laboratory
Mr. Daniel Waddle, REAT, Oak Ridge National Laboratory

Multinational Development Banks

Mr. Donald Giampaoli, ex-Chief, Energy Division, Inter-American Development Bank
Mr. Alastair J. McKechnie, Chief, Efficiency and Strategy Unit, Industry and Energy Department, The World Bank
Dr. Gunter Schramm, Chief, Energy Development Division, Industry and Energy Department, The World Bank
Mr. Graham Smith, The World Bank

Private Sector Organizations

Ms. Diane Eppler, Director of Operations, American Wind Energy Association (AWEA).
Mr. James Hoelscher/Dr. Anil Cabraal, Meridian Corporation, support contractor for the DOE Conservation and Renewable Energy Office and the Committee for Renewabel Energy Commerce and Trade (CORECT).
Mr. Scott Sklar, Executive Director, U.S. Export Council for Renewable Energy (US/ECRE), and the Solar Energy Industries Association (SEIA).

Other U.S. Government Organizations

Mr. Kerry Bologhese, U.S. Congress, House Committee on Foreign Affairs, Sub-Committee on Human Rights and International Organizations
Mr. Ronald Kushner, GAO
Mr. Michael McAtee, GAO
Ms. Delores Toth, GAO
Dr. Jack Van Derryn, S&T/EN

APPENDIX C.1

S&T/EY MANAGEMENT QUESTIONNAIRE

SUGGESTED MANAGEMENT QUESTIONS FOR OFFICE OF ENERGY

1) What percentage of Office of Energy staff time is devoted to the administration of the seven projects and the 24 major contracts? What percentage to policy development, project planning, direction and coordination?

2) Who is (are) specifically responsible for the Office's Outreach and Information Dissemination Program? How is this done?

3) Who is (are) specifically responsible for liaisoning with USAID field missions/ other cooperating organizations? How is this done?

4) What are the pros and cons of overlapping project components/activities?

5) List in descending order major constraints to achieving S&T/EY Program goals.

6) a) Are project logical frameworks changed to reflect results from periodic review of project goals and objectives?

   b) How does this relate to Contractor performance?

7) a) Is each S&T/EY Project Manager responsible for monitoring and evaluating project goals and objectives?

   b) How are target achievements communicated to other S&T/EY Project Managers?

   c) What kind of monitoring system do you have?

   d) How often do you follow-up with Missions about project changes, target achievements, and program needs?

   e) How often do you follow-up with Contractors?

8) What are your marketing responsibilities?

9) We understand that there is an Energy Data Base that is a part of several of the S&T/EY Projects and that PPC also has an Energy Data Base which is tied in with Congressional tracking of various AID programs.

   a) Do you think it advisable that S&T/EN/EY develop a Worldwide Energy Data Base? For AID projects? Other Donors/Private Programs?

   b) How would you develop an Energy Data Base?

   c) How would an Energy Data Base be managed?

   d) How could an Energy Data Base be tied in with an Energy Users Network?

   e) Do you think a Worldwide Energy Users Network/Data Base would raise the visibility of AID/EN/EY as having something important to contribute to the energy sector worldwide?

APPENDIX C.2

USAID MISSION QUESTIONNAIRE

A. Introduction

Thank you for participating in our study. We are interviewing AID and Other Donor Energy Program Managers throughout the world to determine the impact of the S&T Energy Program on LDC energy policy, planning, usage and conservation. To carryout this mission we will consider your needs for assistance and whether current services are meeting those needs. **All results will be kept strictly confidential.**

B. Project/Program Experience:

Under what S&T Bureau projects have you carried out energy work:

1.____ Conventional Energy Technical Assistance Project (Project #936-5724)

2.____ Energy Policy Development & Conservation Project (Project #936-5728)

Includes: 2a.____ Energy Planning and Policy Development (EPPD) Project

2b.____ Energy Conservation Services Project (ECEP)

3.____ Renewable Energy Application & Training Project (Project #936-5730)

4.____ Energy Training Program Project (Project #936-5734)

5.____ Biomass Energy Systems and Technology Project (Project #936-5737)

5a.____ Previously the Bioenergy Systems and Technology (BST) Project

6.____ Private Sector Energy Development Project (Project #936-5738)

7.____ Energy Technology Innovation (Project #936-5471)
(this a new project for FY91)

Questionnaire no. _____
(leave blank)

This portion for contact information only and will be torn from questionnaire.

Mission: _____

Telephone: _____ Fax No.: _____

Name of Person Interviewed: _____

Title: _____

Office: _____

Time Working in Mission on Energy: _____

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C. Project/Program Achievements

For applicable projects on the list of seven (7) S&T Energy (S&T/EY) projects noted in B please check the appropriate boxes for energy activity assistance/achievements that Mission received from the S&T offices:

	Project Source(1)					Importance*				Buy-In		$
	Rec'd?	Year First Asst'd	1st	2nd	3rd	Not Useful	Useful	Very Useful	Critical	Did?	Want To?	Magnitud of Buy-I
C.1 Follow-on Efforts	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
C.2 Energy Planning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
C.3 Energy Policy Making	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
C.4 Energy Innovations	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
C.5 Improving Skills of LDC energy professionals	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
C.6 Leverage Private Sector Investment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
C.7 Increase Environmental Awareness	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
C.8 Increase of Energy Supply/Savings	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
C.9 Improvement of LDC Energy Data Base	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
C.10 Cooperative Programs with:												
C.10.1 Other Donors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
C.10.2 Other Government Agencies	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
C.10.3 NGOs	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	

Scale: 1 = Not useful means irrelevant
2 = Useful, but not vital
3 = Very useful; absence of assistance would have had impact on program activity and/or energy production
4 = Critical; would not have gone forward without this assistance

Comments: _____

D. Institutional Impact

D.1 Based on the list of factors below and other factors you suggest, which factors would you say underlie the success of your energy program:

Comments: _____

_____

1 Internal management of your program
2 Design of your program
3 S&T management of their programs
4 Design of S&T Program
5 Other

D.2 What projects have you carried out as a follow-on to work initiated by one of the S&T projects above?

Discussion: _____

_____

(1) Use Project Numbers 1-7 from B.1, on page 1, ranked by degree of involvement.

D.3 Can you attribute that follow-on work to (a) a specific project or (b) to the program in general?

Discussion: _____

D.4 Were all of your Mission's objectives of the project met? If not, please discuss

Discussion: _____

_____

D.5 Have any project recommendations made by your Mission been implemented? By whom? If not, please discuss.

Discussion: _____

_____

E. Marketing

E.1 How did you find out about the S&T energy portfolio?*

Comments: _____

_____

*For Example:
1 S&T/EY Contractor
2 S&T/EY Project Manager
3 S&T/EY Director or Deputy Director
4 S&T/EY Literature
5 Mission Personnel (Who?)
6 Other, please explain

E.2 Do you believe that you have adequate knowledge of the S&T/EY Project portfolio? If not, what would be helpful?

Discussion: _____

_____

E.3 What encourages you to buy-into a project?

Discussion: _____

_____

E.4 Which is your mission most responsive to?

____ Literature (such as brochures)
____ U.S. Private Sector In-Country Marketing or
____ S&T Initiatives

Discussion: _____

_____

E.5 What do you perceive is the current mechanism for buying-into the S&T/EY projects? Does this cause you problems? Suggestions for improvement?

Discussion: _____

_____

F. Implementation

F.1 In the implementation of the applicable S&T/EY Projects noted in B, were there any obstacles that inhibited performance.

	Yes	No
Organizational	___	___
Procedural	___	___
Technical	___	___
Policy	___	___

Discussion: _____

_____

F.2 Are there some activities that were planned by your Mission that will not be pursued because of S&T activities?

Discussion: _____

_____

For example:
1. S&T/EY Project results indicated new project not worthwhile.
2. S&T/EY Project was not of interest to host government because of Contractor's attitude.
3. S&T/EY Project was not of interest to host government because of project management.
4. Technical problems. Please explain.
5. Other

G. Future Activities

G.1 To date, the S&T/EY portfolio has focussed on providing technical support services for prefeasibility and feasibility studies, project design, institutional and resource assessments, and in-country and U.S. training. Please rate the following potential areas of future S&T/EY activities in terms of their relevance to Mission priorities:

			Importance*			
			Not Useful	Useful	Very Useful	Critical
o Project/Program Design			☐	☐	☐	☐
o Energy Resource Assessments			☐	☐	☐	☐
o Renewable Energy Systems			☐	☐	☐	☐
o Energy Conservation (as opposed to generation)			☐	☐	☐	☐
o Institutional Development			☐	☐	☐	☐
o Policy/Pricing Reform			☐	☐	☐	☐
o Private Power Development			☐	☐	☐	☐
o Environmental Protection			☐	☐	☐	☐
o Training (indicate in-country or U.S. preference):			☐	☐	☐	☐
	In-Country	U.S.				
• Technical/Engineering	☐	☐	☐	☐	☐	☐
• Management/Administration	☐	☐	☐	☐	☐	☐
• Planning/Programming	☐	☐	☐	☐	☐	☐

G.2 Is there anything S&T/EY can do to improve or enhance the range of services available to your Mission?

Discussion: _____

_____

G.3 If your recommendations are followed, would you expect to participate more in S&T/EY activities specifically for your host country through requests for assistance and/or by providing buy-in funding?

Discussion: _____

_____

_____

G.4 To what extent are there more requests for S&T/EY project funding than there are available funds?

Discussion: _____

_____

_____

G.4.a Referring to G.4 above, is this a problem for holding interest in these projects?

Discussion: _____

G.4.b Referring to G.4, are these requests increasing or decreasing?

Discussion: _____

G.5 Have any of the criteria from S&T/EY for project selection ever led to non-funding of worthy projects?

Discussion: _____

_____

_____

G.5.a How would you change the criteria noted in G.5, above?

Discussion: _____

G.5.b Have U.S.-based follow-up activities ever hindered the implementation of a well-conceived project? (Eg: S&T/EY project provides an energy audit through ECSP but the best available technology at the least cost was available only from other than U.S.-based companies.)

Discussion: _____

G.6 Are there any types of energy-sector related projects that were rejected by S&T/EY for funding that you thought were worthy?

Discussion: _____

H. Training

H.1 Has the level of financing for short-term/technical courses participation been adequate to meet the needs for deserving country nationals?

Discussion: _____

H.1.a What changes in the financing noted in H.1 do you recommend?

Discussion: _____

H.2 How effective have short-term technical courses to the participants and their companies/agencies?

Discussion: _____

H.2.a Referring to H.2, are they appropriately advertized by S&T/EY? By the Mission?

Discussion: _____

H.2.b Referring to H.2, have they led to significant changes in institutional development or technology transfer acceptance?

Discussion: _____

H.2.c Referring to H.2, are they effective in establishing relations with U.S. firms and institutions for the purchase of goods and services?

Discussion: _____

H.2.d How would you improve the results or short-term technical courses?

Discussion: _____

H.2.e Do you monitor the results of short-term technical courses with respect to expected follow-up benefits?

Discussion: _____

H.3 Have training efforts led to institutional changes to accommodate renewable energy projects?

Discussion: _____

H.4 Have you been satisfied with the selection process of trainees for training? If not, what changes should be made to facilitate the inclusion of the most appropriate trainees?

Discussion: _____

I. Other Suggestions

Discussion: _____

APPENDIX C.3

CONTRACTORS QUESTIONNAIRE

SUGGESTED QUESTIONS FOR CONTRACTORS

1) Are Scopes of Work clear?

2) What has been the receptivity of USAID Missions to your activities? Of LDC governments/private sector? Of U.S. private sector?

3) Do you coordinate your activities with those of other Office of Energy Contractors?

4) What have been the major achievements of your project - technical innovations that increased energy supply or affected energy savings, private sector development, rural electrofication, rationalization of energy sector (i.e. price reform, privitization), etc.?

5) What have been the major obstacles encountered - technical, logistical, administrative, etc.?

6) What have been your experiences with your S&T/EY Project Manager and policies with respect to your contract? (Is he/she supportive of your initiatives? Available when needed?)

APPENDIX D.1

PROJECT LOGFRAMES

LOGICAL FRAMEWORK

Project Title & Number: Technical Assistance in Conventional Energy Resource Identification

Funding: FY 1980 [illegible] FY 1981 [illegible]
LOP Funding: $2.5 million
Date Prepared: June 25, 1980

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program Goal: The broader objective to which this project contributes To help LDCs mobilize the capital, technology and expertise necessary to increase their domestic supplies of conventional energy.	Measures of Achievement: Increase in level of exploratory drilling, discovery rate, and private investment in energy exploration/development in recipient countries.	a) LDC Government Reports b) U.S. Government Reports c) Energy Industry Publications	Assumptions for achieving goal targets: Technical assistance can help overcome constraints on private investment in LDC energy exploration/development.
Project Purpose a) To expand LDCs' stock of information about the geological potential for indigenous energy resources. b) To improve LDCs' ability to plan and manage a program to explore and develop conventional energy resources.	Conditions that will indicate purpose has been achieved: End of project status: a) Solid resource data base in recipient countries. b) Functioning government organizations with trained personnel in LDCs to manage energy exploration/development.	Contractor and AID records Host government records	Assumptions for achieving purpose: AID/Contractor capabilities and financial resources can achieve measureable progress in building data base/institutional capabilities.
Outputs a) Reports, maps, magnetic tapes describing energy resource potential of numerous AID-recipient countries. b) Country-level exploration plans. c) Country-level legal analyses/regulations. d) On-the-job training in analytic techniques.	Magnitude of Outputs: Up to 60 countries eligible; probable participation up to 20 countries.	Contractor and AID records Host government records	Assumptions for achieving outputs: Sufficient availability of required expert consultants, equipment, geophysical contractors.
Inputs a) Advisory/consulting services b) Geophysical data acquisition c) Geophysical data processing and interpretation	Implementation Targets (Type and Quantity) First year: a) 72 man months of advisory/consulting services b) 6,100 line miles of raw data c) 1,000 line miles of interpreted data	Contractor vouchers and reports	Assumptions for providing inputs: Same as assumption for achieving output, plus: a) Sufficient LDC interest b) Congressional budget authority

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number

INSTRUCTIONS: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAD REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.

Life of Project:
From FY 87 to FY 91
Total U.S. Funding $19.9 million
Date Prepared: Feb 11, 1987

PAGE 1

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal. The broader objective to which this project contributes: To increase LDC technical competence to identify, explore, and use, a wide range of energy resources for productive use and economic development.	Measures of Goal Achievement: Number of participants that complete training programs successfully and assume employment positions in which skills/technique acquired by training can make a contribution to host country and AID related programs and activities.	Contractor records of follow-up activities. AID records. LDC records. Projects Evaluation at end of FY 1989 and FY 1991.	Assumptions for achieving goal targets: (A). LDC ministries and institutions will hire and retain personnel trained in energy resource development and utilization. (B). Trained personnel will be in positions in which they can effect policy decisions.
Project Purpose: To provide targeted training to LDC personnel in energy resource [illegible] identification, exploration, production, [illegible] and use.	Conditions that will indicate purpose has been achieved: End of project status. Number of participants that successfully complete training programs and stay employed at least one year in positions for which they have been trained.	AID and Contractor's reports based on follow-up activities. Contractor's reports and Project Manager's Annual report. Appropriate LDC records. Internship host records.	Assumptions for achieving purpose: A. Project, through the implementing contractor, will take adequate steps to ensure that most trainees have related employment commitments prior to engagement in training. B. Trained participants will return to host institutions and be able to utilize skills gained through courses.
(A). Trained personnel (primarily non-academic) in energy technical areas related to: project design, implementation, management, and supervision; energy plant operation and maintenance; pricing, policy, planning, modeling, analysis and evaluation. (B). Energy assessments performed. (C). Better trained personnel in private-sector energy activities: finance, investments, and supporting enterpreneurial initiatives. (D). Trained personnel as requested and funded by Missions and LDC institutions.	Up to 1990 LDC professionals trained. [illegible] funded by [illegible] and an additional [illegible] through buy-ins. Up to 21 assessments completed (12 funded by [illegible], and 13 funded by buy-ins)	Contractor's periodic reports. AID/Contractor/LDC records. Project Manager's Annual report.	(A) Sufficient funds are available. (B) Sufficient number of training candidates enter with adequate prerequisites of skills, language, and secured relevant employment.

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 87 to FY 91
Total U.S. Funding $30.0 million
Date Prepared: Feb. 11, 1987

PAGE 4

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS (Implementation Targets (Type and Quantity))	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS (Assumptions for providing inputs)
inputs.			
(A) From Society: professional training in support of AID's ongoing and planned activities and programs.	(A) Funding of up to $15.0M over the LOP.	Contractor's Vouchers and AID's records.	AID Congressional budget authority
(B) From Ministries & Bureaus: training including overhead in support of specifically requested training activities.	(B) Funding of approximately $10.0M as training over the LOP.	LDC's Governmental and Institutional records.	LDCs Foreign exchange for international travel, per-diem, salary, and local currency for locally procured activities and services.
(C) From LDCs: full or partial funding (including overhead) in support of specifically requested training activities.	(C) To be determined on a need/request basis		

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April 21, 1989

BIOMASS ENERGY SYSTEMS AND TECHNOLOGY PROJECT (PROJECT #536-5737)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
GOAL			
To increase energy production and improve resource management in developing countries through the use of biomass wastes for power and liquid fuel production.	Increased utilization of biomass energy systems in developing countries and increased involvement of private interests in such systems.	• A.I.D. reports • World Bank reports on trends in use of biomass energy systems • Professional journals • Host Country reports • Private Sector studies/reports	1. Developing countries continue to increase demand for energy. 2. Biomass wastes are available in sufficient quantities for fuel use.
PURPOSE	**END OF PROJECT STATUS**		
To reduce the technical, financial, economic, and institutional risks associated with biomass energy systems to encourage public and private sector interests (both U.S. and indigenous) to invest in commercially-proven energy conversion systems in target A.I.D. - assisted countries.	• Private sponsors invest $30m in biomass energy systems ventures. • Financial institutions provide $300m for biomass energy systems. • $25m in leveraged research funding • Institutional structures in place to foster expanded investment in biomass energy systems. • Additional rural income and jobs created. • Energy systems using biomass residue as fuel add 150 MW to planned energy production.	• Office of Energy reports • USAID Mission reports • BEST reports and newsletter • Dollar investment levels in biomass energy systems by public and private sector. • Host Country investments • Private Sector investments • Multilateral Development Bank investments	1. Developing countries' energy policies accommodate bioenergy systems and facilitate private sector participation. 2. Private sector investment in biomass energy systems results in biomass systems that are technically and economically feasible.
OUTPUTS			
APPLIED RESEARCH • Field Studies • Biomass Energy System Design **PRE-PROJECT ANALYSIS** • Macro-screening • Micro-screening • Definitional Missions • Country Assessments • Pre-feasibility and feasibility studies • Technical evaluations **PROJECT IMPLEMENTATION** • Assistance in obtaining project financing • Technical Assistance • Procurement of equipment **INFORMATION DISSEMINATION AND INSTITUTIONAL SUPPORT ACTIVITIES** • Technical Reports • Newsletters • Conference, workshops, symposiums, and training • Networking	• 10 research activities • 10 country assessments • 12 prefeasibility studies • 10 feasibility studies • 13 project implementation activities • 13 workshops • 10 quarterly newsletters • 2 evaluations	• Project reports • Field visits/trip reports • BEST office reports and memos • Evaluation reports	1. Developing countries and donor agencies actively support research and development of biomass energy systems and technology. 2. USAID Missions participation in BEST activities.
INPUTS			
1. A.I.D. funding 2. Mission buy-ins 3. Core professional staff 4. Outside technical assistance 5. Equipment	$13,000,000 (FY89 to FY94) in core BEST Bureau funds and $10,000,000 of possible Mission buy-ins for a total project of $23,000,000	• Vouchers • Programming budget • Evaluation reports	1. USAID Mission buy-ins.

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ENERGY POLICY DEVELOPMENT & CONSERVATION PROJECT (PROJECT #936-5728)

January 21, 1985

AID [illegible]
SUPPLEMENT 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

(INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.)

Life of Project:
From FY 82 to FY 86
Total U.S. Funding $8 million
Date Prepared: 5/28/82

Project Title & Number: Energy Policy Development and Conservation (936-5728)

PAGE 1

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes:	Measures of Goal Achievement:		Assumptions for achieving goal targets:
To promote the economic growth and social progress of developing countries by ensuring the availability of energy at the lowest possible total economic, financial and social cost consistent with national development goals.	Standard economic and social indicators such as GNP growth rates, per capita GNP, structure of GNP, balance of payments, external debt ratio, oil imports as percentage of export earnings, POLI index, energy supply/demand balances, sectoral performance and energy consumption/intensity statistics.	Reports and statistics of the World Bank, OECD, UN, IEA, Overseas Development Council, and other international organizations, as well as information and statistics generated within the project itself.	That more efficient energy use and expanded availability of indigenous supply can make a measurable contribution to economic development.

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ANNEX C - LOGICAL FRAMEWORK

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AID 1020-28 (7-71)
SUPPLEMENTARY 3

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 82 to FY 86
Total U.S. Funding $8 million
Date Prepared: 5/28/82

Project Title & Number: Energy Policy Development and Conservation (936-5720)

PAGE 2

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Purpose: To provide technical assistance to developing countries so that they may effectively address their national energy problems through analysis, institution building and policy development; to assist LDCs to develop institutions, personnel and processes capable of effective energy policy-making; to provide assistance in the design of policies, action programs and investments needed to relieve critical current energy problems and minimize exposure to future energy crises; and to help LDCs achieve measurable improvements in the efficiency of energy use and the level of national energy self-sufficiency.	Conditions that will indicate purpose achieved: End of project status. Existence of effective, well-staffed country energy policy-making entities; country policies, laws, incentives, fundable proposals, etc. aimed at achievement of project goals; commitments from private and public capital sources to fund appropriate projects to increase energy efficiency and indigenous supplies; existence of a body of literature, plans, analyses and methodological works that will advance the state of the art in energy policy development, planning and conservation.	Evaluations at end of FY 84 and FY 86. LDC National energy and economic development plans; government organization charts, budgets and program documents; published World Bank loan information; financial commitments from other international lenders and private capital sources.	Assumptions for achieving purpose: That governments have been motivated by increased oil prices, firewood depletion and other energy problems to give appropriate attention to energy issues in development planning, government organization and budgets, and efforts to attract external financing.

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AID 1020-20 (7-71)
SUPPLEMENT I

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 82 to FY 86
Total U.S. Funding $8 million
Date Prepared: 5/28/82

Project Title & Number: Energy Policy Development and Conservation (936-5728)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs:	Magnitude of Outputs:		Assumptions for achieving outputs:
1. Country-level energy programs, plans, and studies; 2. Consulting services, manuals, information materials and instruction on energy conservation, especially for industry, transportation and buildings; 3. Studies and research reports on major energy policy issues affecting LDCs; 4. Conferences for country energy policy-makers and technical assistance experts.	An estimated 10 country programs, 12 major studies, 15 conservation assistance packages, and 5 workshop/conferences for energy policy-makers.	Project implementation documents, including PIO/Ts, contractor reports, project manager's annual reports, etc.	That sufficient host government personnel and funds will be made available to work with U.S. teams toward accomplishment of project purposes.

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AID 1330-25 (3-79)
SUPPLEMENT I

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 82 to FY 86
Total U.S. Funding $8 million
Date Prepared: 5/28/82

Project Title & Number: Energy Policy Development and Conservation (936-5728)

PAGE

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs:	Implementation Target (Type and Quantity)		Assumptions for providing inputs
1. Data on energy resources, uses, needs and prices, to be gathered from both primary and secondary sources; 2. Analytical tools and methods, such as forecasting techniques, cost/benefit and life-cycle cost analyses, risk assessments, and analyses of social and environmental impacts; 3. Technical expertise and training, provided by U.S. specialists in fields such as economics, planning, policy analysis, physical sciences, engineering, social sciences, and in sectoral operations in industry, transportation, agriculture and housing.	FY 82: Two country programs continued from predecessor project; conference prepared for energy planners; evaluations of prior country programs; two policy studies undertaken. FY 83: Conservation services begun, two new country programs begun; conference held; additional evaluations and research projects. FY 84-86: Additional country programs, conservation services, research projects, conservation services, evaluations, and conferences.	Contractor reports; monitoring by A.I.D. project office; evaluation.	That project budgets will be sufficient in each year of funding to procure the necessary expert services; that direct-hire staff will be sufficient to provide effective management; that a sufficient supply of the required expertise can be found and procured from private-sector, university, non-profit or national laboratory sources.

ENERGY POLICY DEVELOPMENT AND CONSERVATION PROJECT

(PROJECT #936-5728)

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 87 to FY 92
Total U.S. Funding [illegible]
Date Prepared [illegible]

PAC

Project Title & Number: Energy Policy Development and Conservation (936-5728)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: To promote the economic growth and increased productivity of developing countries by providing energy and power at the lowest possible economic, financial and social cost.	Measures of Goal Achievement: 1) Increased investments in innovative systems and approaches, 2) say private and public institutions, possibly to promote private sector role in technology commercialization, and capital mobilization; 3) increased reliability and availability of energy and electricity, 4) greater productivity of industrial and agricultural enterprises, 5) lowered capital requirements per unit of delivered energy; 6) improved financial performance of LDC utilities, 7) enhancer indigenous capability for investment decision-making, policy formulation, enterprise management and technology adaptation and innovation.	Information and case examples disseminated by the project and published in books, peer-reviewed journals, reports, magazines and news letters.	Assumptions for achieving goal targets: That economic growth and productivity can be accelerated by improving the availability of delivered energy and power.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Energy Policy Development and Conservation (936-5728)

Life of Project: From FY 82 to FY 87
Total U.S. Funding: $22 million
Date Prepared: [illegible]

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Purpose: To provide technical assistance to develop and introduce policies, R&D approaches and investment strategies that relieve current energy and power problems, while minimizing vulnerability to future energy crises, and to achieve measurable improvements in the technical, financial and managerial performance of energy systems and institutions.	Conditions that will indicate purpose has been achieved (end of project status): Investment commitments from public and private entities; on-the-ground improvements in technical, financial and managerial performance, existence of country policies, laws and incentives.	Evaluations will be conducted periodically. LDC energy and economic reports, budgets and program documents; financial commitments from other international donors and private capital sources.	Assumptions for achieving purpose: That governments and donor agencies have been motivated by difficulties in mobilizing capital, size of energy investment budgets in relation to gross annual domestic budgets, the indispensable role of energy in ensuring economic growth, uncertainties regarding the future of oil prices and fuelwood depletion, high priority to energy issues in development planning.

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 8[illegible] to FY 9[illegible]
Total U.S. Funding [illegible] million
Date Prepared [illegible]

Project Title & Number: Energy Policy Development Conservation (936-5728)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs:	Magnitude of Outputs:		Assumptions for achieving outputs:
Country-specific energy investment plans, pre-investment feasibility studies, market and policy analyses. Conferences, workshops, seminars, and studies on R&D strategy and technology commercialization involving U.S. and LDC manufactures, utilities, R&D organization and financial institutions. Dissemination of refereed journal articles book; reports and newsletters.	An estimated 15 country-specific pre-investment packages, 15 reports on technology commercialization, R&D strategy, private sector opportunities, and pricing models, and 5 major international workshops, seminars or conferences.	Project implementation documents, including PID's, contractor reports, project manager's annual reports, etc.	That sufficient host government personnel and funds will be made available to work with U.S. teams towards accomplishment of project purpose.

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Energy Policy Development and Conservation (936-5728)

Life of Project: From FY 87 to FY 92
Total U.S. Funding: $[illegible] million
Date Prepared: [illegible]

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs Data on energy markets, resources, conversion systems, prices and capital requirements. Analytic tools for investment decision-making, [illegible] and environmental impact assessment, and least-cost energy and power planning. Expertise drawn from U.S. and LDC R&D organizations and private sector entities.	Implementation Targets (Type and Quantity) Major activities will continue in energy analysis, assessment and institution building; power system investment planning, energy pricing and household fuels. Major conservation activities will be conducted in such areas such as electric power, household fuels and efficient use of energy for rural enterprises.	Contractor reports; monitoring by A.I.D. project office, evaluation.	Assumptions for providing inputs: That project budgets will be sufficient in each year of funding to procure the necessa[illegible] expert services; that direct-hire staff will be sufficient to provide effectiv[illegible] management; that a sufficient supply of the required expert[illegible] can be found and procured from private-sector, university, non-profit or national laboratory sources.

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Appendix 8.4

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

AID 1330-28 (9-79)

Project Title & Number: RENEWABLE ENERGY APPLICATIONS AND TRAINING PROJECT

Life of Project: From FY 85 to FY 89
Total U.S. Funding: $8.2 Million
Date Prepared: 8/27/85

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: To promote the economic growth and social progress of developing nations by providing energy for economic development through the expanded deployment of economically viable renewable energy and power options.	Measures of Goal Achievement: Economic indicators such as the ratio of oil imports to export earnings, direct and indirect employment benefits, increased production and new enterprises brought about by expanded energy availability. Social indicators such as improved health, education, transportation and communication.	Information and statistics generated within the project, project evaluations and reports by the World Bank, the UN and other international organizations.	Assumptions for achieving goal targets: That economic growth will be significantly enhanced when the energy inputs necessary for development are provided in a reliable and economically viable fashion.
Project Purpose: To develop renewable energy and power systems and related policy guidance which contribute significantly to: Removing energy constraints to production, strengthening developing country institutions, involving the U.S. and indigenous private sector, developing an investment portfolio of "bankable" projects, improving agro-industry, health, communications, education and rural development.	Conditions that will indicate purpose has been achieved: End of project status. Financial Commitments from public and private financial institutions; existence of institutions to manage operate, and maintain renewable systems; existence of country policies to encourage economically viable systems; a published body of authoritative reports, case examples, monographs, software.	Evaluations at end of FY 87 and 89. National energy and economic development plans; evaluations of institutional capability, financial commitments from international lenders and private capital sources.	Assumptions for achieving purpose: That governments have been motivated by: increased oil and fuelwood prices, the foreign exchange required to develop indigenous energy supplies, and the impossibility of development without economically viable, adequate, reliable supplies of energy; and are committed to improving the efficiency of their institutions and attracting external capital for development.
Outputs: 1. Country-level energy investment portfolios, plans and policies, leading to financial commitments. 2. Studies and "state-of-the-art" reports on renewable energy and power systems 3. Training manuals, case studies, data-bases and computer software on systems and projects. 4. Conferences and workshops for country energy policy-makers and technical experts.	Magnitude of Outputs: An estimated 8 country investment portfolios, 8 major technology evaluation reports, 3 case studies, training monographs, a data-base, and 3 workshops/conferences.	Project implementation documents, including PIO/Ts, contractor reports, and project manager's annual reports.	Assumptions for achieving outputs: That adequate host country government commitment, personnel and funds will be available.
Inputs: 1. Information on country energy demands markets, needs, and prices. 2. Data on capital investment, manpower and resource requirements to implement renewable energy and power systems. Data on competing options. 3. Analytical methods, such as energy demand forecasting based on development targets, economic and financial analysis, risk assessment, decision theory, social and environmental impact, optimal engineering design procedures.	Implementation Target (Type and Quantity): FY 85: Two country portfolios, three state-of-the-art reports, one workshop. FY 86-89: Additional investment portfolios, technology evaluations, case studies, data-bases and conferences.	Evaluation and monitoring by A.I.D. project office, contractor reports.	Assumptions for providing inputs: That project budgets are sufficient to procure the necessary technical services; that direct-hire staff will provide effective management, and that the required expertise can be obtained from private sector, national laboratory, university or non-profit sources.

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PROJECT DESIGN SUMMARY – LOGICAL FRAMEWORK

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Goal: To alleviate by environmentally acceptable means the supply/demand gap in energy sectors of developing countries.	**Measures of Goal Achievement:** 1. Increase in megawatts of power produced and delivered. 2. Increase in efficiency of power generation, transmission, and distribution. 3. Increase in environmental quality. 4. Increase in quality of life, i.e. income, employment, investment, and production.	**Verification Through:** 1. 3, 6, and 9 year project evaluations. 2. Reports and statistics from relevant host country Ministries. 3. Annual reports on economic indicators. 4. Annual reports on environmental quality. 5. Contractor reports.	**Assumptions for Achieving Goal Targets:** 1. Developing countries acknowledge power shortages as a problem and recognize that past methods to increase capacity has led to environmental damage. 2. Developing countries acknowledge that power sector institutions need rehabilitation and modernization give policy changes priority, and commit necessary resources to this end.
Project Purpose: To introduce innovative energy engineering technologies and management techniques which promote sustainable and cost effective operation of electric generation, transmission, and distribution systems in developing countries.	**End of Project Status:** 1. Use of new, innovative, and advanced energy technologies will increase cost-effective power generation and reduce energy waste thereby cutting by 25% the current gap between energy supply and demand in affected LDCs by FY2000. 2. Clean energy policies and regulations will be introduced and/or supported in at least 5 LDCs where fossil-fueled power generation is most intense. 3. At least 5 Joint Ventures involving U.S. companies will be supported in private sector power generation by FY2000. 4. At least 100 LDC decisionmakers and 200 power sector engineers will be trained in workshops by FY2000.	**Verification Through:** 1. 3, 6, and 9 year project evaluations. 2. Reports and statistics from relevant host country Ministries. 3. Contractor reports.	**Assumptions for Achieving Purpose:** 1. Sufficient number of A.I.D.-assisted countries and Missions interested in project. 2. Cooperation of host country governmental agencies, research institutions and private sector companies, both industrial and financial.

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PROJECT DESIGN SUMMARY – LOGICAL FRAMEWORK

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs: 1. Project Officer and support staff. 2. Technical Assistance Contractor and Project Identification Fund Contractor. 3. Subcontractors and consultants for technical assistance. 4. Cost sharing arrangements for Project Identification Fund initiatives. 5. Mission buy-ins.	Implementation Targets: Clean Energy technologies: $10M S&T/EY and $13M Buy-Ins Innovation in Energy Processes: $4M S&T/EY and $5M Buy-Ins Technology Transfer/Training: $2M S&T/EY and $0 Buy-Ins Institutional Improvements: $4M S&T/EY and $2M Buy-Ins	Verification Through: 1. 3, 6, and 9 year project evaluations. 2. Reports and statistics from relevant host country Ministries. 3. Contractor reports	Assumptions for Inputs: 1. A.I.D. commitment of resources, both centrally funded and buy-ins. 2. Availability of appropriate management personnel and contractors. 3. Approval and funding for necessary travel of A.I.D. personnel for project management purposes.
Outputs: Examples of worldwide initiatives for selected LDCs include: . Municipal waste-to-energy, geothermal, and wind and solar electric energy resource and application assessments. 2. Definitional Missions to assess the application of clean energy technologies, such as fluidized bed combustors. . Project verification studies for clean coal technologies; i. e. integrated gasification combined cycle, fluidized bed combustion, etc. . Application assessments, design, and demonstration for computer-based energy technology screening tools and energy management information systems. . Support for trade missions and U.S. industry [illegible] host country and/or private	Magnitude of Outputs: 1. 20 indigenous resource assessments. 2. 15 energy system applications and/or market assessments. 3. 25 prefeasibility studies. 4. 25 missions for development and implementation of innovative approaches to technology transfer/training. 5. 20 missions for management/operational assistance workshops for institution development. 6. 25 technical assistance missions to provide new, innovative engineering services. 7. 30 special studies.	Verification Through: 1. 3, 6, and 9 year project evaluations. 2. Reports and statistics from relevant host country Ministries. 3. Contractor reports.	Assumptions for Outputs: 1. Cooperation of host country governments, utilities, and private sector industry. 2. Ability to hire qualified staff, consultants, and long-term contractors. 3. Mission interest, cooperation, and buy-ins. 4. Willingness of financial agencies to participate and support U.S./host country local industry joint ventures. 5. Approval and funding for necessary travel of A.I.D. personnel for project management purposes.

PRIVATE SECTOR ENERGY DEVELOPMENT PROJECT

(Project # 936-5738) May 1989

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Private Sector Energy Development 936-5738

Total U.S. Funding: $400
Date Prepared: [illegible]

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes To accelerate the sustainable economic & social development of AID assisted countries by increasing the supply of reliable, affordable energy, particularly electric power, for productive purposes	Measures of Goal Achievement 1. Increases in GNP, i.e. income, employment, investment & production 2. Increases in MWs of power produced & delivered	1. Project mid term & end of project evaluations 2. Reports & statistics from Ministries of Finance, Energy & Industry 3. Annual reports on economic indicators 4. CDSSs 5. Contractor reports	Assumptions for achieving goal targets Developing countries acknowledge power sector problem, continue to extend policy priority & resources to the sector
Project Purpose: To assist in creating a favorable environment to encourage private ownership, financing and operation of energy facilities in selected developing countries, concentrating on the electric power sector	Conditions that will indicate purpose has been achieved: End of project status 1. Favorable legal & institutional environments established in developing countries conducive to private participation in the energy sector 2. Private sector resources mobilized 3. Private sector energy projects approved 4. $500M committed for investment in private sector energy projects 5. 3 private energy projects implemented 6. 300 MWs of additional installed capacity & delivered	1. Project mid term & end of project evaluations 2. Reports & statistics from Ministries of Finance, Energy & Industry 3. Contractor reports	Assumptions for achieving purpose: 1. Sufficient number of AID assisted countries & AID missions interested 2. Favorable policy & institutional environments in host countries 3. Private sector in U.S. & host countries is interested & will commit resources

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Outputs:	Magnitude of Outputs:		Assumptions for achieving outputs:
1. Assessments of potential for private power in selected countries. 2. Private energy Feasibility Study Fund to cost share studies for potential private energy projects with project developers. 3. Special studies of potential macro-economic impact of private power on developing countries, of the requirements for local capital market development, & of the forms of private sector participation. 4. Conferences & Workshops on private power with government officials, utility personnel & private sector representatives. 5. Private energy Technical Assistance Teams to assist developing countries & project developers. 6. Formal training courses on private participation in energy sector. 7. Internship training with U.S. utilities & utility regulatory commissions on institutional arrangements for, & regulation of, private power provided to officials from developing countries. 8. Energy consultants to selected A.I.D. regions. 9. Study Tours to bring officials of developing countries to the U.S. to visit private power facilities & meet with project developers, utilities & regulators. 10. Project Technical Advisory Group to ensure coordination within U.S. govt. & with private sector. 11. Cooperation arranged between A.I.D., IFC, multilateral development & other bilateral donors to promote private power. 12. Supervision of private energy data base.	1. 8 Country Assessments 2. Establish Feasibility Study Fund & fund 28 preprojectability/feasibility studies 3. 5 Special Studies of policies & guidelines, macroeconomic impact, capital markets, financing programs, etc. 4. 3 Conferences & 5 Workshops 5. 10 Tech. Assist. Team missions. 6. 3 Training Courses with 60 persons trained. 7. 20 Internships 8. 1 Reg. Energy Consultant in field 9. 6 Study Tours 10. Establish 1 Technical Advisory Group 11. 15 meetings with multilateral development organs & other bilateral donors. 12. Maintain 1 private energy data base 13. $300M from private sector invested 14. 6 countries with improved laws & regulations	1. Project mid term & end of project evaluations 2. Reports & statistics from Ministries of Finance, Energy & Industry 3. Contractor reports.	1. Cooperation of host governments & utilities 2. Ability to hire appropriate personnel. 3. Sufficient resources are made available 3. Minimum interdiction & bureaucracy 4. Willingness of private sector to commit resources
Inputs:	**Implementation Target (Type and Quantity)**		**Assumptions for providing inputs:**
1. Contracting arrangements for preprojectability & feasibility studies & other studies. 2. Technical assistance 3. Training in regulating & implementing private power. 4. Personnel: Project officer & support staff.	1. Feasibility Study Fund - $3M (S&T/EY) + $3.4M other 2. Technical assistance - $8.3M (S&T/EY) + $1.9M other. 3. Training - $.3M (S&T/EY) + $.3M other. 4. Evaluations - $.2M (S&T/EY) 5. Private energy projects - $300M other.	1. Project mid term & end of project evaluations 2. Reports & statistics from Ministries of Finance, Energy & Industry 3. Contractor reports	1. A.I.D. commitment of resources 2. Availability of appropriate management personnel & contractors.

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APPENDIX D.2

CURRENT PROJECTS

APPENDIX D.2

ROJECT DESCRIPTIONS

A. CURRENT PROJECTS

The Office of Energy's present portfolio of projects is summarized below.

1. Energy Policy Development and Conservation Project (EPDAC)

FY 90 Budget : $4.9 million

Proposed FY 91 Budget : $1.7 million

Years of Project Life : FY 82 - FY 92

The Energy Planning and Policy Development Project (EPPD) and the Energy Conservation Services Project (ECSP) described below are sub-projects of the EPDAC. Two new projects, now in the planning stage, will replace EPPD and ECSP.

a. Energy Planning and Policy Development Project (EPPD)

Project Manager: David Jhirad

Contractors: Oak Ridge National Laboratory (Prime)
International Development & Energy Associates, Inc. (Prime)
World Bank
Princeton University
Environmental Protection Agency

The EPPD project funds several areas of planning and policy work, including two large cooperative programs, PACER and MAGPI, environmental management and global warming re-mediation, rural power delivery, energy price reform, investment planning, and private sector and energy efficiency planning. It also contributes some funding toward work in household fuels.

b. Energy Conservation Services Project (ECSP)

Project Manager: Alberto Sabadell

Contractors: RCG/Hagler, Bailly & Company, Inc. (Prime)
Lawrence Berkeley Laboratory

The ECSP project funds the Office's efforts in efficiency and conservation as a response to global warming, in electric power systems, in industry, in buildings, and in the transportation sector.

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2. Renewable Energy Applications and Training Project (REAT)

Project Manager: David Jhirad

Contractors: Oak Ridge National Laboratory (Prime)
International Development & Energy Associates, Inc. (Prime)
American Wind Energy Association
Export Council on Renewable Energy
Geothermal Resources Council
Lawrence Berkeley Laboratory
World Bank
National Rural Electrification Cooperative Association

FY 90 Budget: $1.5 million

Proposed FY 91 Budget: $1.0 million

Years of Project Life: FY 85 - FY 92

The REAT project funds feasibility studies for commercial applications of renewable energy technologies (other than biomass), with an emphasis on private sector participation; various rural and agricultural activities, including household fuels; and a variety of publications to facilitate the successful diffusion of appropriate technologies. In addition, this project supports education and training through "reverse trade missions", project planning and professional outreach in renewable technologies, technical assistance to Missions, and policy and institutional planning in support of renewable energy technology acceptability and implementation.

3. Biomass Energy Systems and Technology Project (BEST)

Project Manager: James Sullivan

Contractor: Winrock International, Inc.

FY 90 Budget: $2.0 million

Proposed FY 91 Budget: $2.0 million

Years of Project Life: FY 89 - FY 96

The BEST project funds efforts to use biomass, especially the residues of common agricultural crops and wood wastes, for electricity generation. Project activities include applied R&D, commercial feasibility analysis, and solicitation of LDC private investment. The Office categorizes its biomass efforts into: project development and implementation, working labs, a Venture Investment Program, and overall program support through computer networking.

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4. Private Sector Energy Development Project (PSED)

Project Manager: James Sullivan

Contractors: T. Head, Inc.
K&M Engineering
National Geothermal Resources Association

FY 90 Budget: $2.8 million

Proposed FY 91 Budget: $2.0 million

Years of Project Life: FY 89 - FY 94

The PSED project facilitates private sector investments and expertise in the energy sectors of LDCs, with initial emphasis on the electricity sub-sector. This project is directed ultimately at overcoming current and imminent power shortages. Activities include policy reform and institutional development, a funding of feasibility studies for project development, and technical assistance and information dissemination.

5. Conventional Energy Technical Assistance Project (CETA)

Project Manager: Alberto Sabadell

Contractor: Bechtel National, Inc.

FY 90 Budget: $0.7 million

Years of Project Life: FY 80 - FY 90 (extended to 3/91)

The CETA Project, in its final year of operation, funds programs that apply U.S. advances in energy technology to LDCs, and assists countries to develop their indigenous conventional energy resources to reduce dependence on imported oil, while improving efficiency and environmentally clean performance. This is accomplished through resource assessment and development projects, and through the dissemination of information on innovative technologies. Some of the activities identified under CETA will continue under the ETIP project described below.

6. Energy Technology Innovation Project (ETIP)

Project Manager: Alberto Sabadell

Contractor: to be determined

FY 90 Budget: $0.5 million

Proposed FY 91 Budget: $1.7 million

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Years of Project Life: FY 90 - FY 2000

The ETIP project is new, and is designed to implement innovative energy technologies and methodologies to help meet expected energy/power sector demand in LDCs in an environmentally benign and cost-effective manner. Components of this project involve clean energy technologies; innovations in energy efficiency and in power generation, transmission, and distribution; technology transfer to rehabilitate current power systems; and improvement of power sector institutional structures.

7. Energy Training Project (ETP)

Project Manager: Shirley Toth

Contractors: International Institute for Education (Prime)
T. Head, Inc.
United States Energy Association

FY 90 Budget: $3.1 million

Proposed FY 91 Budget: $1.8 million

Years of Project Life: FY 87 - FY 92

The ETP project funds training activities, complementing the major components of all the other Office of Energy programs. Nearly all of the training is "short-term", U.S.-based training. Cooperators include electric utilities, academic institutions, government agencies, national laboratories, proprietary training organizations, oil refineries, and exploration companies. Courses are offered to meet the implementation needs of LDC managers, policy-makers, and technicians. They cover topics from environmental management, pollution-control systems, and data management; to energy policy and analysis, indigenous fossil fuel development, power-industry development, energy conservation and efficiency, and renewable energy systems.

B. Recently Completed Projects

8. Bioenergy Systems and Technology Project (BST)

Project Manager: James Sullivan

Contractor: Tennessee Valley Authority

Years Of Project Life: FY 79 - FY 89

Total Expenditure Over Project Life: approx. $12 million

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The BST project goal was to increase the role of fuels of biological origin in LDC energy planning, and to give LDC planners information and technical assistance. This would enable them to evaluate the potential contribution of their country's bioresources to national energy needs, as well as to help host countries plan specific bioenergy systems. This goal was met through the identification, evaluation, development, and demonstration of promising cost effective bioenergy systems for application in A.I.D.-assisted countries; with an emphasis on implementation through private investment and private participation in electric power development. This project was succeeded by the Biomass Energy Systems and Technology Project (BEST).

9. Conventional Energy Training Project (CETP)

Project Manager: Shirley Toth

Contractor: Institute for International Education

Years of Project Life: FY 80 - FY 87

Total Expenditure Over Project Life: approx. $14 million

The goal of CETP was to increase the technical competence in A.I.D.-assisted countries to explore for, and utilize, conventional energy resources. This was done by providing LDC participants with M.S. degrees and in-service and industry fellowships in science and engineering fields related to conventional energy. The CETP sponsored over 700 participants placed in academic and technical training programs at universities, private energy companies, non-profit institutions, and national laboratories. Training ranged from two months to two years in duration. IIE, the training contractor, designed 152 activities under CETP. The CETP was succeeded by the Energy Training Program (ETP), with some shifts in emphasis away from academic degree programs and toward a more "hands-on" approach.

APPENDIX D.3

PROJECT ACHIEVEMENTS BY PROGRAM GOAL

Bank and A.I.D. rural electrification projects, and will develop a new rural power lending strategy in collaboration with the World Bank.

ETP's Photovoltaic (PV) Course has rural power development objectives; there was one trainee from Botswana who was interested in using PV to power railroad signals. The ETP contractor developed a Diesel Maintenance Course, but there was no support for it.

b. Energy for Household Cooking and Heating

REAT assisted in the successful development and commercialization of improved charcoal stoves in Kenya, consulted on the design of a household fuels program in Sudan, and assisted in implementing a market-oriented improved cookstoves project in Guatemala. It investigated the potential for producing and using smokeless coal briquettes in Pakistan and Haiti, and is pursuing opportunities for replication of a successful private sector venture that sells small PV systems to rural households in the Dominican Republic.

c. Energy for Agriculture

REAT contributed to a handbook for the comparative evaluation of water pumping systems and water lifting technologies, and assisted USAID/Rabat in completing a wind-powered water pumping project.

d. Energy for Rural Industries

The activities of REAT and BEST, which often serve the energy needs of rural industries, are discussed in Sections 5.b and c. of this appendix.

3. PRIVATE SECTOR ENERGY DEVELOPMENT AND MANAGEMENT

The principal objectives of this goal are to promote policy reform to improve functioning of energy markets, develop local private sector capabilities, and increase the flow of technical and financial resources from the U.S. private sector.

a. Policy Reform and Institutional Development to Improve Energy Markets

Projects addressing private sector energy policy reform and institutional development include EPPD, ECSP, REAT, PSED, CETA, and ETP.

EPPD prepared a report on price reform in Korea, and conducted a workshop on energy pricing reform in developing countries.

ECSP organized a Central America and Caribbean private power workshop, which is likely to result in a regional energy efficiency initiative; and studied the potential for, and impediments to, private power in developing countries.

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REAT conducted a study to establish the institutional and financial framework for private investments in renewable energy power generation in Costa Rica.

PSED provided technical assistance for the development of private energy rules and regulations in Indonesia, for a cogeneration pricing study in Guatemala, for assessments of private power generation opportunities in Bolivia and Jamaica, and for the transfer of a production costing model (ELFIN) in the Philippines, and plans to provide technical assistance for private power policy development and institution building in Eastern Europe.

PSED organized and conducted workshops and seminars on private power in Jamaica, Bangladesh, Panama, Costa Rica, India, and the Philippines; plans similar workshops in Eastern Europe, Colombia, Kenya, and other countries; conducted study tours for officials from the Philippines, Indonesia, Egypt, Morocco, Jamaica, Poland, and Hungary; and plans similar tours for officials from Panama, El Salvador, and other countries.

PSED is also establishing a technical advisory group from the power industry and government (including Exim Bank, OPIC, TDP, DOE, A.I.D.) to advise S&T/EY on matters pertaining to private power; and is developing a video-based training course for A.I.D. Missions on private power, rules and regulations, pricing, power purchase contracts, and institution building issues.

CETA conducted a seminar on private power generation through build-own-transfer (BOT) in the Philippines, and private power conferences in Jordan and Egypt.

b. Development of Local Private Sector Capabilities

REAT and **BEST** promote the development of renewable energy projects through the U.S. and local private sectors. The activities of these projects are discussed in Sections 5.b and c. of this appendix. Other projects with activities addressing the stated objective of developing energy capabilities in the private sector of developing countries include ECSP, PSED, CETA, and ETP.

ECSP developed and applied a power project financial analysis model to analyze private power projects in developing countries.

PSED organized and conducted workshops and seminars on private power in Jamaica, Bangladesh, Panama, Costa Rica, India, and the Philippines; and plans similar workshops in Eastern Europe, Colombia, Kenya, and other countries, with participation of local private firms.

PSED provided technical assistance for a cogeneration pricing study in Guatemala, for assessments of private power generation opportunities in Bolivia and Jamaica, and has developed a model private power purchase agreement. It has funded feasibility studies for a 300 MW hydroelectric project in Turkey (nearing completion), a 290 MW

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refurbishment project in Poland (in progress), and a combined cycle project in the Dominican Republic (to start in early 1991).

PSED is reviewing applications to fund feasibility studies in Pakistan, Chile, Costa Rica, Grenada, the Dominican Republic, Hungary, India, the Philippines, and other countries.

PSED prepared and maintains private power database reports on the Dominican Republic, India, Pakistan, and the Philippines; and plans reports on other countries. It also publishes the "Private Power Reporter".

CETA performed fuel assessments and assisted in initiating private sector oil-shale project development efforts in Jordan, and assessed oil-shale development possibilities in Morocco and Egypt. In the Philippines, it assessed opportunities for indigenous fuel (including geothermal sources) and innovative technology energy projects.

In the Philippines, it provided assistance for two U.S. trade missions, conducted a seminar on private power generation through build-own-transfer (BOT), and provided technical assistance in identifying and supporting private power initiatives. It also performed a private power study in Pakistan.

c. Increase of U.S. Private Sector Participation in Energy Development

As noted in Subsection b. above, **ECSP** has been gathering information on private power projects and activities in developing countries for the private power database, and is conducting studies in Eastern Europe of the potential market for U.S. energy products and services.

PSED also organized and conducted workshops and seminars on private power in Jamaica, Bangladesh, Panama, Costa Rica, India, and the Philippines. They have plans for similar workshops in Eastern Europe, Colombia, Kenya, and other countries, with participation of U.S. private sector firms.

CETA coordinated S&T/EY, TDP, trade association, and contractor initiatives for geothermal power development in the Philippines, and worked with TDP on a project in India.

Activities planned under ETIP include establishing the Clean Energy Technology Feasibility Study Fund and financing various studies, conducting a mission to assess the application of fluidized-bed combustion in selected countries, co-sponsoring trade missions to selected countries for U.S. participants to explore financing of business ventures and collaboration, and co-sponsoring reverse trade missions for key government decision makers and industrialists from developing countries to visit relevant U.S. manufacturing and power generation facilities and financial institutions.

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4. INCREASED CONSIDERATION OF ENVIRONMENTAL CRITERIA

The main objectives of this goal are to integrate environmental criteria into the energy planning process, and encourage efficient environmentally safer energy conversion.

a. Integration of Environmental Criteria into Energy Planning

Projects promoting the consideration of environmental criteria when planning energy projects include EPPD and ETP.

EPPD completed a report assessing A.I.D. programs related to global climate change, completed an environmental manual on power development, and developed a strategy to minimize environmental impacts from energy sector activities in developing countries. It plans to conduct a conference for LDC decision makers on environmental criteria in power sector investment decision-making, and is developing a handbook for incorporating environmental management objectives into power plant investment.

ETP has developed six environmental courses in response to the "Global Warming Initiative" (only three of which will be offered because of budgetary constraints). The courses scheduled include: Ambient Air Pollution Monitoring (May - July 1991), Stationary Source Pollution Monitoring (July - November 1991), and Environmental Policy Development and Implementation (August -November, 1991).

b. Promotion of Efficient Energy Conversion Systems

Projects promoting the use of efficient energy conversion systems include EPPD, ECSP, PSED, CETA, ETIP, and ETP.

EPPD plans to conduct case studies of least-cost strategies to reduce greenhouse gas emissions in two countries, has undertaken various research activities in India (PACER), plans a joint program with the EPA on initiatives to reduce greenhouse gas emissions, and completed an Integrated Coal Gasification Combined Cycle (IGCC) feasibility study for India.

ECSP plans to establish a clearinghouse on energy use, including its contribution to global warming, and is studying cogeneration opportunities in Indonesia and Mexico.

PSED has funded feasibility studies for a cogeneration and environmental upgrade project in Poland and an efficient combined cycle project in the Dominican Republic, and plans to identify environmentally sound cogeneration opportunities.

CETA studied the prospects for U.S. clean coal technologies in the Philippines, Thailand, and Indonesia.

ETIP plans to establish the Clean Energy Technology Fund and finance various feasibility studies; to conduct a mission to assess the application of fluidized-bed combustion in developing countries; to perform an integrated gasification combined cycle

power plant feasibility study for India; and to perform clean coal technologies project verification studies for Indonesia, the Philippines, and Thailand.

5. REDUCTION OF ECONOMIC INSTABILITY CAUSED BY OIL SHORTAGES

This goal, stated in the S&T/EY Program Plan for FY 1988 and 1989, has as its main objective the development of indigenous fossil and renewable energy sources, including biomass.

a. Development of Indigenous Fossil Fuel Energy Systems

Projects assisting in the development of energy systems using indigenous fossil fuels include EPPD, ECSP, CETA, ETIP, and ETP.

EPPD completed an IGCC feasibility study for India, and provided assistance to India, Pakistan, Jordan, and other countries in assessing potentials for the use of innovative fossil fuel technologies to exploit indigenous coal and oil shale reserves.

ECSP reviewed the performance of efficient power generation technologies, such as combined cycle using natural gas, in Pakistan and Egypt.

CETA performed oil shale to power studies and fuel assessments in Jordan, Egypt, and Morocco. It performed gas utilization planning studies in Egypt and Thailand, performed a coal power study in Costa Rica, conducted training for Ecuador's petroleum sector, provided energy consultations in Yemen, provided energy planning assistance in Indonesia, performed the Jamshore Power Plant Study in Pakistan, and conducted an integrated coal gasification/combined cycle study in India. It also defined the program scope for a petroleum sector management information system in Egypt, assisted with a trade mission to identify potential applications of energy development using waste gas in Indonesia, and is considering a proposal for application of clean coal technologies in Thailand.

ETIP plans to establish the Clean Energy Technology Feasibility Study Fund and finance various studies; to assess the application of fluidized-bed combustion in selected countries; to perform an integrated gasification combined cycle power plant feasibility study for India; and to perform clean coal technology studies for Indonesia, the Philippines, and Thailand.

b. Development of Renewable Energy Systems

Projects addressing the development of energy systems based on renewable sources; such as wind, hydro, geothermal, and solar; include REAT, PSED, ETIP, and ETP. Biomass-based energy activities are reviewed in Section V.C.

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REAT identified five site-specific renewable energy applications for pre-investment analysis. It is evaluating investment opportunities for wind, PV, and other power systems in India and Indonesia. It has prepared feasibility studies for small hydro projects in Costa Rica, plans to conduct similar studies in Indonesia, and is supporting a feasibility study for geothermal power development in Kenya.

REAT developed renewable energy projects in India, Egypt, Kenya, Madagascar, the Philippines, and Central America. It developed rural energy projects in India and Bolivia, assisted USAID/Rabat in completing a wind-powered water pumping project and in assessing renewable energy applications in rural health delivery, is assisting USAID/Cairo with development of a micro-computer based renewable energy information facility for the New and Renewable Energy Authority of Egypt and with the design of a new renewable energy project, and is pursuing opportunities for replication of a commercially successful private sector venture that sells small PV systems to rural households in the Dominican Republic.

REAT published an assessment of A.I.D.'s renewable energy activities since the mid-1970's, with guidelines for future activities; is funding a renewable energy information, training and reverse trade mission program; is supporting the participation of nationals from A.I.D.-assisted countries in reverse trade missions; and co-sponsored a symposium on U.S. wind energy experience.

It is sponsoring the presentation of professional seminars and the preparation of training materials on the technical, economic, financial and institutional aspects of renewable energy applications for A.I.D. staff; has published a directory of U.S. renewable energy technology vendors; and provided support for the interagency Committee on Renewable Energy Commerce and Trade (CORECT).

REAT is analyzing the role of renewable energy power generation options in one or more countries, is developing mechanisms for dissemination of small-scale renewable energy technologies (Dominican Republic, Guatemala), conducted a study to establish the institutional and financial framework for public and private investments in renewable energy in Costa Rica, and prepared a paper on the commercialization of wind electric technology in the U.S.A.

PSED is providing technical assistance in the assessment of private power from geothermal resources in Kenya, to be followed by a workshop.

ETIP plans to perform a municipal waste-to-energy project assessment in India or the Philippines.

c. Development of Biomass Energy Systems

Projects involving the development of energy systems based on biomass as a fuel source include BST (completed in 1989) and BEST.

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BST, under its cane energy systems program, performed a feasibility study on the production and sale of electricity from sugarcane residue, provided technical assistance to the El Viejo sugar factory in Costa Rica (which invested in equipment that will enable it to sell approximately 5 MW of power to the national utility), assessed prospects for gas turbine power generation, conducted country surveys in Honduras, the Philippines, Jamaica, and Thailand; and designed model cogeneration projects in Jamaica and Thailand. It conducted a year program in Thailand to assess the benefits of selling electricity produced by sugarcane residues.

BST utilized specialized field equipment for the collection of cane field residues to produce electricity in Jamaica. It sponsored a cane energy utilization symposium, and performed a field study of the potential for expansion of ethanol production in Malawi and Swaziland.

BST prepared feasibility studies for rice residue energy systems in the Philippines and Indonesia; implemented a wood gasification project in Costa Rica, which faced several problems; and assessed the potential of wood waste power systems for the Indonesian wood products industry.

BST also provided support to the Producer Gas Roundtable and to the Biomass Users Network, supported systems research on the use of energy markets to sustain tropical forests, conducted a regional survey of biomass energy opportunities in Southern and Eastern Africa, and prepared a report on the prospects in developing countries for energy from urban solid wastes.

BEST assessed biomass-fueled private power projects and provided policy support to government institutions in Costa Rica, has conducted a cogeneration pricing study and plans to work with the sugar industry to develop projects in Guatemala, plans to undertake feasibility studies of wood cogeneration in Honduras, and is preparing a multi-sector biomass fuel assessment in India. It has prepared a bioenergy survey of the sugarcane, palm oil, and forest products industries in Indonesia; is exploring the feasibility of three private sector rice and sugar cogeneration systems in Pakistan; has monitored a program to bale, store, and burn sugarcane field residues at private sugar factories in Thailand (the results of which were positive, proving that sugarcane residues can be a cost-effective source of fuel); is co-financing a feasibility study in Jamaica; and is preparing studies in Malawi and the Gambia.

BEST is refining assessments of BIG/STIG (Biomass-Injected Gas Turbine/Steam-Injected Gas Turbine) technology for the forest products and sugar industries, and is assessing the agronomic impacts of cane residue removal. It is also conducting further baling trials and developing options to prepare bales for feeding to bagasse boilers in Thailand, Brazil, Costa Rica, and the Philippines; and is preparing a baseline energy analysis and other studies for the pulp and paper industry.

BEST, under its competitive grants program will provide about $40,000 of research funds, and under its general research program it will analyze desirable site characteristics

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for establishing biomass plantations and will review the biomass power experience in California.

BEST prepared a business plan for a non-profit venture fund to invest in renewable energy projects and companies, and
has been preparing and disseminating reports on bioenergy.

CETA prepared a cane energy study in Jamaica and a sugar industry power study in the Philippines.

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APPENDIX D.3

PROJECT ACHIEVEMENTS BY PROGRAM GOAL

1. ENERGY EFFICIENCY IMPROVEMENTS

The objectives of the energy efficiency improvement goal are to increase the efficiency of power generation, transmission, and distribution; and to improve the energy efficiency in the industrial, transportation, and buildings sectors.

a. Increase of Power Generation, Transmission and Distribution Efficiency

Projects addressing the stated objective of increasing the efficiency of power generation, transmission, and distribution systems include the EPPD, ECSP, CETA, ETIP, and ETP.

EPPD is appraising India's power sector plans for the next decade, implementing a $15 million power efficiency program in India, completing least-cost investment plans for power sector efficiency in India and Costa Rica, and implementing a multi-donor agency electric utility performance improvement initiative. It identified energy efficiency investment opportunities in Eastern Europe, prepared a report on energy price reform in Korea, and organized a workshop on energy price reform strategies.

ECSP designed and initiated a load management demonstration project in Costa Rica; and is considering implementation of similar programs in Pakistan, Indonesia, Morocco, and Tunisia. It participated in the design and implementation of the Global Energy Efficiency Initiative (GEEI), assisted USAID/Cairo in the design of the Egypt Energy Conservation and Efficiency Project, and has been providing assistance for the implementation of the Central America Power Efficiency Initiative.

ECSP evaluated the potential for non-utility power generation and cogeneration in Pakistan, Thailand, India, and the Dominican Republic. It also is developing a system to monitor energy efficiency activities in developing countries; is preparing an action plan for feasibility studies to rehabilitate power plants in 8-10 countries; and is carrying out energy-efficient electricity pricing studies in Indonesia, Thailand, India, and Poland.

CETA provided technical assistance to upgrade two powerplants in the Philippines, provided technical assistance to the Somalia Power Company, and is considering proposals for power plant rehabilitation or conversion in Pakistan, Egypt, Panama, Hungary, and Poland.

ETIP activities planned include developing a computer-based energy technology screening tool for Asia and the Near East; co-sponsoring reverse trade missions for government decision makers and industrialists from developing countries to visit U.S. manufacturing and power generation facilities, and financial institutions; and designing a management information system for a Pakistani petroleum company.

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b. Improvement of Energy Efficiency in the Industrial Sector

Projects addressing the stated objective of improving the energy efficiency in the industrial sector include ECSP and ETP.

ECSP provided technical assistance to USAID/Amman for implementing an energy conservation program in small and medium-sized industries in Jordan; provided technical assistance to USAID/Cairo for implementing the Energy Conservation and Efficiency Project; analyzed the energy conservation potential in industry in Haiti and in agriculture in Sri Lanka; is considering carrying out combined energy, environment and productivity audits in industries in selected countries; assisted in the evaluation or development of energy conservation programs in the Philippines, Pakistan, Thailand, Egypt, Morocco, Djibouti, Ecuador, Peru, the Dominican Republic, Panama, and Central America; is developing a worldwide energy conservation outreach and information dissemination plan; and is designing energy efficiency programs in Indonesia and Brazil.

ETP, on behalf of the S&T/EY, the RDP, and the DOE, developed a proposal on human resource development for the specific purpose of improving power-system efficiency in Poland, while taking appropriate steps to minimize adverse environmental impacts of energy operations. Both the RPD and DOE approved the proposal. No further action has been taken, pending issuance of necessary travel clearances.

c. Improvement of Energy Efficiency in the Transportation Sector

ECSP evaluated the energy conservation potential in transportation in Costa Rica and the Dominican Republic; provided training for transportation energy conservation in Costa Rica; and is preparing an action plan for conservation activities in the transportation sector in Pakistan, Thailand, and Indonesia.

d. Improvement of Energy Efficiency in the Buildings Sector

ECSP is considering projects to analyze energy consumption in the urban buildings sector and to identify priority programs to reduce electricity demand in Jamaica and Indonesia, and is discussing with a U.S. university the design of an energy-efficient building as a case study in a selected country.

2. ENERGY SUPPLY AND RURAL DEVELOPMENT

The objectives of this goal are to satisfy the basic energy needs of rural populations for cooking and heating, agriculture, and small industries.

a. Rural Power Development

The rural power development activities of **REAT** and **BEST** are discussed in Sections 5.b and c. of this appendix. **EPPD** completed a report on lessons learned from World

APPENDIX E

RELATIONS WITH COOPERATING ORGANIZATIONS

APPENDIX E

RELATIONS WITH COOPERATING ORGANIZATIONS

1. Coordination/Communication with A.I.D. Regional Bureaus

The ENE Bureau has two technical people who take the lead on energy with the ENE Missions. The APRE Bureau is newly formed, and is working with S&T/EY to hire an energy officer who will be part of APRE and will interface with S&T/EY and Missions. The LAC Bureau is interested in finding someone, to be located in the Latin America-Caribbean region, who can interface with Missions and the S&T/EY. The AFR Bureau has one staff member in its Technical Resources office (Natural Resources Policy and Energy Advisor) who is responsible for Bureau coordination with the Office of Energy. AFR/TR would welcome additional S&T/EY-funded energy officers placed in regional field offices, as well as increased liaison with the Office of Energy in Washington, D.C.

During preparation of S&T/EY projects there seemed to be relatively limited input from A.I.D. Bureaus. Communication and coordination with S&T/EY seems limited to periodic meetings, program reviews, and cable traffic.

In its early days, S&T/EY activities were well-fit to the operations of field Missions and their supporting Regional Bureaus. Missions were sufficiently funded and staffed to prioritize and develop energy sector projects. For example, the AFR Bureau worked closely with S&T/EY in its development of an Africa Region energy plan in 1982. Bureaus readily sought technical advice from S&T/EY in Mission-level project preparation.

In the mid-1980's, A.I.D. began to move away from highly technical projects, and gradually reduced its core of engineers through the rest of the 80's. In the late 1980's came an overall "paring down" of Mission funding in smaller countries, particularly in Africa. This led to a subsequent reduction in staff and in the number of priority sectors they could identify, and fewer Missions that could develop projects. The energy sector became one of the casualties.

At the same time, A.I.D. left S&T/EY with a budget to develop their own projects in support of the Agency's energy objectives, and to develop new approaches to energy problems through research and adaptation in collaboration with A.I.D. Missions worldwide.

S&T/EY's has leveraged the reduced funding by using the relationships it had developed with the R&D community in the U.S. and overseas, and, with the larger well-funded Missions, to expand on past projects and prepare new ones. S&T/EY also took this opportunity to support changes in energy policy for the developing world.

Coordination between S&T/EY and the Regional Bureaus during project implementation has become less close in recent years. In the early 1980's the Bureaus were directly

informed of, and involved in, the implementation phases of Mission-level projects by S&T/EY. Their involvement now is, more often than not, indirect. One of the Regional Bureaus suggested periodic country briefings, noting that generic briefings on a particular technology is of little interest.

Some Bureaus perceive that S&T/EY has evolved away from its cooperative and supportive role with Missions and Bureaus. They feel it has developed its own agenda of expanding "state of the science" R&D-type projects in collaboration with private sector and national labs in the U.S., with the large multi-lateral development banks, and with like-minded agencies overseas. Two Bureaus perceive that S&T/EY is often more interested in supporting U.S. private sector suppliers of goods and services than in serving the Missions' (and Bureaus') needs.

S&T/EY is perceived to have circumvented smaller Missions in favor of working directly with larger and better financed Missions that offer project "buy-in" opportunities. (The evaluation team noted that previous evaluations recommended that S&T/EY move away from supporting Missions that will not have a chance of follow-on, because of limited Mission funding.)

Some Bureaus mentioned that S&T/EY is proactive rather than reactive, sometimes approaching Missions directly with their own agenda of participatory ideas instead of listening to Missions' needs (with their Bureaus' guidance). This is perceived as inappropriate by some Bureaus.

Most Regional Bureaus think that energy support in countries should be through policy support, and suggested that the S&T/EY Program support policy initiatives.

2. Coordination/communication with A.I.D. Missions

It appears that S&T/EY solicits input from Missions relatively late during project preparation.

Upon completion of an S&T/EY PIO/T, S&T/EY relies on a variety of means to develop Mission interest and participation in energy sector projects, including project-related information dissemination to Missions and personal communication between S&T/EY management/contractors and Mission personnel.

Although S&T/EY management staff have their individual project responsibilities, due to regional familiarity and personal relationships developed over the years, initial Mission contact is usually divided geographically among project managers. S&T/EY project managers or contractors visiting a field Mission represent the entire S&T/EY portfolio, to the maximum extent possible, largely to compensate for small travel budgets.

Once Mission expresses interest in an S&T/EY project, communication is mainly between the S&T/EY project manager and the designated energy officer in the Mission.

A Mission may buy-into an S&T/EY project using its own funds; or S&T/EY may pay for the project activity, especially if it involves a general assessment of opportunities in the energy sector which may lead to future Mission-funded projects.

Larger, better financed Missions develop their energy programs with host country participants, and then solicit design or implementation assistance from S&T/EY. Small, poorly-financed Missions often require more assistance from S&T/EY in energy project development and implementation. (Overcoming this constraint has largely been considered too time-consuming by S&T/EY managers and contractors, and several evaluations have suggested that S&T/EY would be more effective by concentrating their efforts in the larger Missions).

REDSO/ESA and West, and ROCAP in Central America suggested that S&T/EY consider placing a resident advisor in their office (except REDSO/Nairobi-ESA where the Kenya government has restrictions on the number of regional personnel), to coordinate S&T/EY project development and monitoring for the countries in their region.

Communication during project implementation is largely between the A.I.D. Mission and the S&T/EY contractor in the field, as per the arrangements stipulated in the contract between the Mission and S&T/EY. Mission project officers periodically consult with the S&T/EY manager by telephone, cable, or personal visits.

Although these communications generally run smoothly, several Missions reported problems. A commonly expressed concern was slow communication of financial and progress information on Mission buy-in contracts. (This is discussed in more detail below.) Several Missions reported that response time between cables is often too slow. This is especially unfortunate when follow-on opportunities discovered by Mission officers, which often require rapid response, are missed.

Coordination is a very sensitive issue with Missions. Most Missions interviewed by the evaluation team identified their design and management of their programs as the most important factor of success.

Missions feel that S&T/EY-assisted projects are primarily Mission projects; and must therefore be coordinated from design, through implementation and follow-on, by Mission officers. Several Missions reported that S&T/EY managers and contractors are often not sensitive to the Mission's key role as a link between in-country organizations/agencies and S&T/EY participants, during all phases of project implementation. As an example, S&T/EY representatives sometimes aggressively market new follow-on project ideas directly with LDC participants or other in-country donors, and subsequently request Mission approvals of these new projects. This caused significant (albeit temporary) damage to relations between Missions and S&T/EY.

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3. Coordination with other U.S. Government organizations

The Office of Energy has undertaken several activities in collaboration with other U.S. government organizations, including the Department of Energy (DOE), the Trade and Development Program (TDP) and the Overseas Private Investment Corporation (OPIC) of the Department of State, the Export Import Bank (Exim Bank), and the Environmental Protection Agency (EPA). The scope of this collaboration has covered both technical and financing aspects of S&T/EY projects. Current or recent activities undertaken in collaboration with other U.S. organizations are reviewed below.

S&T/EY has Participating Agency Service Agreements (PASA) with the EPA, and with the Oak Ridge National Laboratory and the Lawrence Berkeley Laboratory of the DOE. S&T/EY also periodically convenes small ad-hoc groups of experts from the above organizations to provide input for its planning activities, and to assist in program implementation and outreach.

Under **EPPD**, the S&T/EY is developing a joint program with EPA on initiatives to reduce greenhouse gas emissions. Under the same project, it collaborated with the TDP and the World Bank in the development of a 15 MW mini-hydropower capacity in Madagascar, involving an investment of $20 million.

Under **ECSP**, S&T/EY is participating in the Global Energy Efficiency Initiative (GEEI); a broad-based, world-wide program whose purpose is to assist, accelerate, and expand energy efficiency efforts in developing countries and Eastern Europe. This program is being developed by representatives from USAID; DOE and its national laboratories; EPA; and a number of private U.S. environmental groups and non-government organizations, including the American Council for an Energy Efficient Economy, Princeton University, Environmental Defense Fund, International Institute for Energy Conservation, Natural Resources Defense Council, the U.S. Export Council for Renewable Energy (US/ECRE), and the U.S. Office of Technology Assessment.

Under **REAT**, the Office of Energy coordinates many renewable energy activities with the work of the inter-agency Committee on Renewable Energy Commerce and Trade (CORECT); which includes DOE, the Department of Commerce, Exim Bank, OPIC, TDP, and other federal agencies. In the past, S&T/EY has supported CORECT by providing information on renewable energy experience, assisting in the preparation of brochures, and working with industry associations to bring senior LDC officials to U.S. educational and promotional events.

S&T/EY works with US/ECRE to develop training materials; to conduct reverse trade missions; and to undertake seminars and workshops for developing country government, private decision makers, and for A.I.D. staff. REAT is also joining a new multi-agency initiative, the Financing of Energy Services for Small-Scale Energy Users (FINESSE) Project; in collaboration with CORECT, the World Bank, and the Netherlands. FINESSE will be providing both technical and financial support for developing and implementing small-scale renewable energy project financing mechanisms, and for project identification and pre-investment analysis and assessment.

PSED seeks to improve coordination between A.I.D., OPIC, the Departments of Energy and Commerce, TDP, other U.S. government agencies, other bi-lateral donors, multilateral development banks, and the private sector; through consultations with technical advisors from such organizations, and the dissemination of information.

CETA assisted TDP to evaluate energy projects in the Philippines and India.

4. Coordination with LDC Governments

LDC governments are familiar with S&T/EY largely to the extent that country Missions invite S&T/EY and their contractors to assist Missions in their project activities. This may start with LDC government participation in workshops, seminars, conferences, or study tours sponsored by S&T/EY to familiarize these officials with project offerings they may want to participate in through their country A.I.D. Missions. On occasion, S&T/EY contractors working in a country on a non-S&T/EY project will familiarize LDC government officials with S&T/EY offerings. Other donor agencies may also refer LDC officials to S&T/EY projects. Last but not least, successful in-country S&T/EY projects enhances familiarity with other project offerings.

Coordination between S&T/EY activities and LDC governments is accomplished through the A.I.D. Missions. Day to day project activities are often conducted directly between the government and the S&T/EY contractors.

S&T/EY activities are generally welcome by LDC governments, since energy sector development is understood to be vital to all sectors of development. S&T/EY contractors report that most Missions cannot satisfy the needs expressed by LDC government officials in the sector due to obvious budget limitations. Another indicator of LDC governments' receptiveness is their willingness to open up energy sector activities to private firms, and to make institutional changes to accommodate new technologies.

5. Coordination with LDC Private Sector

LDC private companies involved in the energy and manufacturing sectors have gained familiarity with S&T/EY activities at an accelerated pace. In-country S&T/EY-sponsored seminars and workshops are most often the first avenue of introduction to private sector energy opportunities. In addition, past ETP participants, now in the private sector, became familiar with other S&T/EY projects through follow-up networking. With LDC governments just beginning to open up the energy sector to private firms, much interest has been generated, and participation in S&T/EY projects is growing.

Project opportunities for LDC private firms range from participation in energy efficiency improvements in manufacturing plants and power generation stations under ECSP, to renewable energy technology design and manufacturing under REAT. PSED is designed to promote LDC private sector involvement in the energy sector; its identification by

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Missions as playing a critical role in sector development is further proof of the increased involvement and acceptance of private sector activities in LDC energy development.

Coordination between the LDC private sector and S&T/EY activities is defined by the host government and the A.I.D. Mission in the project agreement. During project implementation, LDC private firms usually work directly with S&T/EY contractors and U.S. private sector counterparts.

The receptiveness of the LDC private sector to S&T/EY activities has been reported by the S&T/EY contractors to be very good. S&T/EY project involvement offers these companies the opportunity to learn, alongside American counterparts, the latest innovations in energy planning, and technology design and application.

6. Coordination/Cooperation with U.S. Private Sector

There is a substantial participation of U.S. firms in S&T/EY's activities, as contractors and sub-contractors; attendees or participants in conferences, workshops, and trade or reverse trade missions; recipients of funds to conduct feasibility studies; recipients of information on business opportunities; and beneficiaries of S&T/EY's promotion of U.S. technology and expertise.

While participation by the private sector is generally good, there is a perception that "incumbents" receive too favorable a consideration in follow-on efforts to Office projects. It is understood that S&T/EY must not give the slightest indication of "lobbying" in its interaction with industry and Congress. However, the Agency is expected to encourage the sale of U.S. goods and services in A.I.D.-assisted countries. The belief exists in the private sector that S&T/EY could take a more forceful role in policy determination and implementation with regard to the introduction of U.S. energy technology overseas, especially in the area of renewable energy and rural energy development.

U.S. private sector firms have extensive participation in S&T/EY project activities as contractors or subcontractors. Additional opportunities for U.S. private sector involvement exist through many S&T/EY projects.

Most S&T/EY prime contractors are U.S. private firms: Bechtel National, Inc. (CETA); RCG/Hagler, Bailly & Company, Inc. (ECSP); International Development & Energy Associates, Inc. (IDEA) (EPPD and REAT); T. Head, Inc. (PSED and ETP); Winrock International, Inc. (BEST); and others. Numerous subcontractors involved in site or activity specific work are also U.S. private sector firms.

The Global Energy Initiative under ECSP includes participants from several U.S. non-governmental organizations (NGOs) and private voluntary organizations (PVOs).

REAT and **BEST** work with the U.S. Export Council for Renewable Energy (US/ECRE) to develop training materials, conduct reverse trade missions, and to conduct seminars and workshops for developing country government and industrial decision

makers and A.I.D. staff. They also publish brochures, such as "Renewable Energy for Agriculture and Health" and "Improving the Quality of Life with Renewable Energy", which highlight U.S. private sector applications in USAID-assisted developing countries. S&T/EY has also published "A Directory of U.S. Renewable Energy Technology Vendors".

Renewable industry associations with which S&T/EY collaborates include the American Wind Energy Association, Cogeneration and Independent Power Coalition of America, National Geothermal Association, Geothermal Resources Council, National Hydropower Association, National Wood Energy Association, Wood Heating Association, Renewable Fuels Association, Solar Energy Industries Association, American Solar Energy Society, Passive Solar Industries Council, and the Biomass Energy Research Association.

PSED is specifically geared to promoting U.S. and LDC private sector participation in energy development; through workshops, study tours, technical assistance, training, special studies, the maintenance of private power databases, and the dissemination of information on private power investment opportunities.

CETA has also been working closely with the U.S. trade associations and private firms. ETIP plans to continue and increase this collaboration, including co-sponsoring trade and reverse trade missions.

Assistance to U.S. (and often LDC) private firms is available from S&T/EY, in the form of funds to finance or co-finance feasibility studies and project development efforts. Such funds include: the Venture Fund, under BEST, to finance renewable energy projects; the Feasibility Fund for Project Development, under PSED; and the Clean Energy Technology Feasibility Study Fund, planned under ETIP.

7. Coordination with Other Development Organizations

Organizations with which S&T/EY has been coordinating activities include the World Bank, regional development banks, the United Nations, and bilateral agencies. Interviews of the evaluation team with staff of the World Bank and IDB have indicated that their collaboration with the S&T/EY has been beneficial and fruitful; particularly in the areas of private sector energy development, energy efficiency and conservation, and environmental considerations in energy planning. Some of these joint efforts are discussed below.

In planning its activities, S&T/EY solicits input from the World Bank, the Inter-American Development Bank, and other organizations. At the same time, S&T/EY positions a number of its initiatives, such as pre-investment studies for power development, so that they can serve as input to investment decisions by financing agencies.

Under the Office's information outreach program, other donors receive S&T/EY publications; participate in joint workshops, seminars, and study tours; and get involved in program planning and implementation.

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S&T/EY has cooperative agreements with the World Bank, under the EPDAC and REAT projects.

The Office of Energy has initiated the Multi-Agency Group on Power Sector Innovation (MAGPI), in collaboration with the World Bank, the Inter-American Development Bank (IDB), the Asian Development Bank (ADB), the African Development Bank (BAD), the International Finance Corporation, and the United Nations. MAGPI is made up of about 15 senior decision-makers with operational responsibilities.

Several activities have been undertaken under MAGPI. These include the Electric Power Utility Efficiency Study (supported by A.I.D.), the World Bank, the United Nations, and the governments of Germany and Finland. There are also several African-related initiatives and studies with participation of BAD, the World Bank, United Nations, and A.I.D.; and the governments of Germany, United Kingdom, France, Canada, Sweden, and Italy.

The MAGPI framework provides a mechanism for S&T/EY to work with the multilateral development banks and other institutions in identifying and conducting feasibility studies for specific energy projects that are innovative in technology, application or scale. Such projects, under EPPD, include the development of a 15 MW mini-hydropower capacity in Madagascar, in collaboration with the World Bank; and the development of small hydro and bagasse-fired private power generation in Costa Rica, in collaboration with the Inter-American Development Bank.

Other current or planned multi-donor activities include a major appraisal of India's power sector plans, in collaboration with the World Bank and the Overseas Development Administration (ODA) of Britain; the implementation of a $15 million power efficiency program, with USAID/New Delhi, the World Bank and the Asian Development Bank; and a multi-donor agency electric utility performance initiative. A report on lessons learned from World Bank and A.I.D. rural electrification projects has been completed; the development of a new rural power lending strategy; and other initiatives, studies, and workshops undertaken in collaboration with the World Bank and other international organizations.

Under CETA, the energy related activities of Japan's Overseas Economic Cooperation Fund (OECF) and the Japanese Export-Import Bank in A.I.D.-assisted countries will be analyzed to identify areas of cooperation.

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APPENDIX F

SUCCESSFUL OFFICE OF ENERGY MODELS

APPENDIX F

SUCCESSFUL OFFICE OF ENERGY MODELS

Examples of Office of Energy Models

1. Biomass Energy Projects are Private Sector/Environmental Successes
2. Massive Savings Result from Closing Inefficient Energy Parastatals
3. Load Management Collaboration with Private Industry Yields Significant Energy and Financial Savings
4. Private Sector Energy Reform Leads to Influx of FOreign Investment and Substantial Increase in Electricity Capacity

BIOMASS ENERGY PROJECTS ARE PRIVATE SECTOR/ ENVIRONMENTAL SUCCESSES

The Biomass Energy Systems and Technology Project (BEST) has had two recent on-the-ground successes - the El Viejo sugar mill in Costa Rica and the Nong Yai sugar factory in Thailand - which are now starting to be replicated elsewhere. Both involve co-generation from private agro-industry (in this case, sugar cane bagasse), utilizing agricultural crop residues on an environmentally sustainable basis to generate power for agro-processing, with excess power being sold to the national grid.

The BEST project began in both instances with a study of co-generation potential in each country. The studies documented the technical, financial, and environmental feasibility of co-generation. The studies were followed by direct assistance to the factories, the utilities which are now buying the power, and the national agencies which regulate the power sector. In both cases, the Office of Energy provided assistance in drafting laws to permit the private sector to sell power to the grid. The project also assisted both the agro-industries and the utilities to determine a fair price for the power. Since bagasse is a very cost effective fuel (which is usually wasted), the price of power from co-generation can prove attractive to both buyer and seller. And, of course, the project assisted the factories in the technical, logistical, and financial aspects of producing power for sale to the grid.

The El Viejo plant is currently producing 4.7 megawatts for sale to the national grid on a seasonal basis, during and after the harvest; the Nong Yai factory is selling 4 megawatts, also on a seasonal basis. Both factories are pursuing plans to expand power production for the grid to a year-round basis, which will improve the price they receive. At the moment, the price received reflects only the short-run marginal cost of producing power at the utility. Once the private industries can prove year-round, reliable production of electricity however, they can receive a higher price based on long-run marginal costs (i.e., including the cost of expanding basic capacity which is saved by the utility when they can buy power continuously and reliably from the private sector). Toward that end, BEST is helping both agro-industries with the logistical problems of gathering and storing crop residues from the field. In the case of El Viejo, this may involve planting crops (or forestry plantations) specifically for fuel purposes.

In addition to the financial advantages of encouraging private investment in co-generation to expand grid capacity, bio-mass energy technologies have the environmental advantage of producing power with no net additions to greenhouse gases: carbon-dioxide that is produced when burning bagasses and other crop/forestry products is re-absorbed by the next crop.

The successes of El Viejo and Nong Yai are relatively young (1 - 2 years) and small scale, but they are already self-sustaining, and they show every indication of being expandable and replicable.

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MASSIVE SAVINGS RESULT FROM CLOSING INEFFICIENT ENERGY PARASTATALS

Several years ago, the Energy Planning and Policy Development Project of the Office of Energy sent its contractors to perform an assessment of the energy sector in Liberia. One of the most significant findings was that the nation's oil refinery, which was owned and operated by the public sector, was far too small to operate efficiently, and was operating at a large and chronic loss. Given the lack of economies of scale, it cost Liberia far more to refine its own petroleum products from imported crude oil than it would be to simply import the refined products.

However, the refinery employed a large number of people, and there was considerable pressure to keep it open. The assessors examined the alternatives: the market in Liberia for refined petroleum products was too small to expand the refinery to an efficient scale; nor were there viable export opportunities for Liberia within the region. However, other parts of the energy sector in Liberia were growing or in need of expansion, including several industries that would require personnel with skills in petroleum.

The assessors calculated that the savings from closing the refinery could be put to more productive use elsewhere in the energy sector, including personnel made redundant from the refinery.

In 1983, as a direct result of advice from the EPPD, the government of Liberia closed the refinery. The beneficial results were immediate: $15-20 million savings per year, which represented about 2% of Liberia's GDP. The A.I.D. mission director hailed the outcome as certainly the most cost-beneficial A.I.D. activity ever undertaken in Liberia, and perhaps one of the most cost-beneficial activities of any donor in any country.

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LOAD MANAGEMENT COLLABORATION WITH PRIVATE INDUSTRY YIELDS SIGNIFICANT ENERGY AND FINANCIAL SAVINGS

Many developing countries have had considerable difficulty keeping up with accelerating demand for electricity from industry and residences, resulting in an increasing frequency of brown-outs and black-outs at times of peak electricity demand. To avoid these "peak power" failures (which in turn lead to crippling industrial stoppages), power utilities have bought "back-up" generators, usually diesel fueled and relatively inefficient; and in many instances, have bought several such systems, which is a grossly inefficient use of scarce capital resources.

The problem is largely a one of load management, as a recent successful project in Costa Rica demonstrated. Left to their own devices, individual manufacturing plants and offices all have a tendency to start and stop production at about the same time: warming up machinery, firing up ovens, and turning on air conditioners at the same time in the morning, running them for 8 - 12 hours, and shutting down again at about the same time in the evening. This creates a high "peak" of demand, especially in the morning when work starts. For the utilities, firing up back-up generators to meet the peak demand, and then shutting them down again represents a tremendous waste of fuel - in addition to the capital cost of investing in unnecessary back-up hardware.

In Costa Rica, the Energy Conservation Services Project worked with the national electric utility and 22 large industries in load management. Industries agreed to stagger their work hours and implement other efficiency measures to flatten out the peak and smooth the load curve (see diagram below). In fact, the project achieved 16% reduction off peak electricity demand among the 22 industries (about 5 megawatts). Expansion of the project would mean that the utility would avoid having to invest in inefficient back up generators. Peak-load pricing would provide an incentive for industry to cooperate in demand management programs by passing on to them the savings with lower off-peak energy prices.

The project is now working with the Inter-American Development Bank, the Ministry of Natural Resources, Energy and Mines, the national electric utility, and manufacturers association to implement a large scale demand management program including more sophisticated electricity metering and peak-load pricing. The project should reduce system wide peak demand by at least 5%, thereby reducing the requirement to expand capacity by over 180 MW by the year 2005, with a net present value of savings of over $100 million, and a foreign exchange saving of about $10 million.

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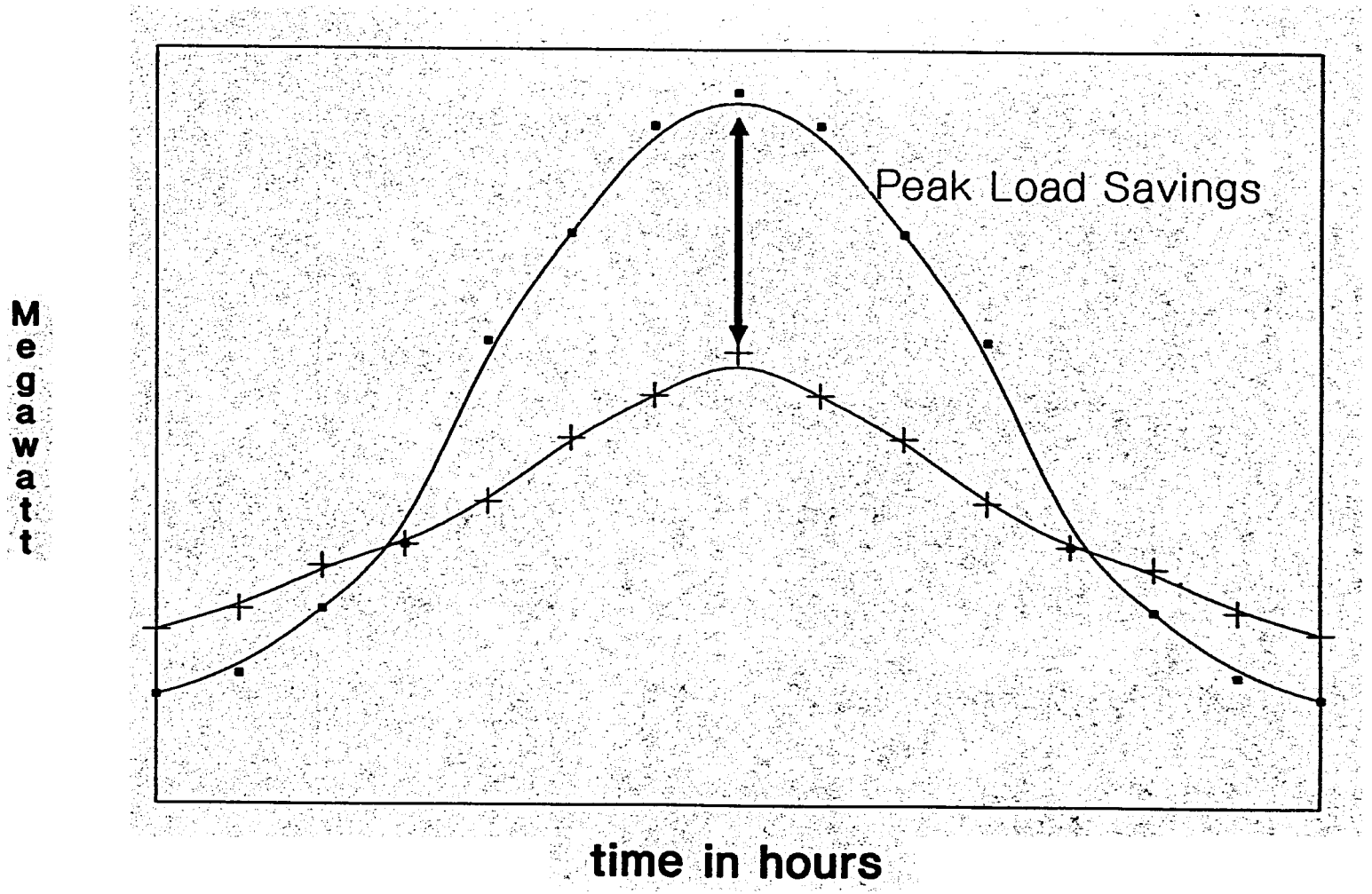
Load Management



PRIVATE SECTOR ENERGY REFORM LEADS TO INFLUX OF FOREIGN INVESTMENT AND SUBSTANTIAL INCREASE IN ELECTRICITY CAPACITY

During the early 1980s, the Philippines experienced a severe energy crisis that was crippling industry with frequent black-outs.

In 198*, the Private Sectory Energy Development Project sponsored a Private Power Workshop in Manila, which was well attended by private sector and public sector energy personnel, as well as participants from other donor agencies and multi-lateral development banks. Several top energy officials began to discuss private sector participation in the energy sector with enthusiasm; but others within the the energy bureaucracy and particularly the public sector labor unions, immediately criticized the idea and put up a stiff resistance.

The Office of Energy, the World Bank, the Asian Development Bank and the IFC all advised the government of the Philippines to allow private investment in power production and to sweep away policy constraints. Pressure from increasingly desperate private industry helped convince the government it was time to change; and the return of thousands of skilled energy workers from the Middle East mitigated the intransigence of the labor unions.

In 1988, Executive Order 215 (a presidential decree) legalized private power generation. The Office of Energy offered follow up assistance to the Office of Energy Affairs and to potential private investors in working out contracts for Build-Own-Transfer (BOT) and Build-Transfer-Operate (BTO) power projects.

The Philippines now has a 210 MW plant on line, built by Hong Kong investors with Westinghouse turbines, under the BOT system. A 300 MW project is currently being competively bid, and several smaller projects, some involving co-generation, are currently being negotiated with assistance from the Office of Energy.

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APPENDIX G

DISTRIBUTION OF OFFICE OF ENERGY ACTIVITIES BY REGION

APPENDIX G

DISTRIBUTION OF OFFICE OF ENERGY ACTIVITIES BY REGION

The Asia/Near East/Europe region has received about 60 percent of Office of Energy country funds. The other two regions, Latin America/Caribbean and Africa, each have received about 20 percent.

1. Activities in Asia, the Near East, and Europe

The Office of Energy has funded projects in 17 Asia/Near East countries (including Poland), in the last three years. In addition, $155,000 was provided by EPDAC for projects in the Near East Regional Office and $399,000 was given to the South Pacific Regional Office ($375,000 of the $399,000 was for conventional energy technical assistance in FY89). Figure G.1. provides estimated project funding levels by country and fiscal year.

Three countries in the Asia/Near East/Europe region have received by far the most funds from the Office of Energy over the past three years. The Philippines received $1.692 million, India received $1.415 million, and Thailand $1.212 million. Substantial funding has also been received by Indonesia ($785,000), Pakistan ($729,000), Egypt ($697;000), and Jordan ($583,000).

The majority of the funds through the region were through the ETP, EPDAC, and BST/BEST projects, with the distribution among the three being approximately equal.

The Philippines ($745,000), Egypt ($405,000), and Thailand ($229,000) received the most in training funds in the past three years. Funding for energy policy development and conservation was focused in India ($683,000), Jordan ($379,000), and Pakistan ($265,000). Biomass projects were funded mostly in Thailand ($823,000).

2. Activities in Latin America and the Caribbean

The Latin America and Caribbean region covers A.I.D.-assisted countries in Central and South America and the islands in the Caribbean. The Office of Energy provided project funds for at least 15 of these countries from FY88 through FY90. In addition, the Office supported projects in the Latin American Regional Office ($150,000 by ETP and $155,000 by CETA) and the Regional Office for Central America and Panama, i.e. ROCAP ($360,000 by EPDAC and $10,000 by REAT). Figure G.2. provides estimated project funding levels by country and fiscal year. Country funding provided by the Office of Energy focused on two countries: Costa Rica ($1,125,000) and the Dominican Republic ($429,000).

FIGURE G.1 : S&T/EY ACTIVITY WORKSHEET FOR FY88, FY89, AND FY90: AISA, NEAR EAST, AND EUROPE

COUNTRY	ETP (#5734)	CETA (#5742)	EPDAC (#5728)	REAT (#5730)	PSED (#5738)	BST (#5709)	BEST (#5737)
BANGLADESH	0/18/0		50/0/0				
BURMA	17/29/0				5/0/0		
EGYPT	182/150/73	0/0/95	80/35/50		0/0/32		
INDIA	24/54/72	9/0/80	209/174/300	0/19/50		5/0/0	0/0/419
INDONESIA	37/19/30		0/80/150		O/120/0	60/70/0	0/0/219
JORDAN	49/0/0	84/56/15	89/190/100				
MOROCCO		11/0/0	17/0/0		0/0/45		
NEPAL	36/122/57						
OMAN	0/0/267						
PAKISTAN		32/0/0	145/20/100	10/0/0		90/30/0	0/0/302
PHILIPPINES	121/281/343	38/98/75	0/134/50	40/65/0	0/140/0	60/0/0	0/0/247
POLAND				0/0/22			
SAUDI ARABIA						5/0/0	
SRI LANKA						5/0/0	
THAILAND-GENERAL	116/102/11	18/0/0	0/0/50			325/380/0	0/0/118
THAILAND-TRIALS							0/0/92
TURKEY	53/0/0						
YEMEN	213/0/0	8/0/0					
NEAR EAST REGIONAL			80/55/20				
S. PACIFIC REGIONAL	24/0/0	0/375/0					

FISCAL YEAR	ETP (#5734)	CETA (#5742)	EPDAC (#5728)	REAT (#5730)	PSED (#5738)	BST (#5709)	BEST (#5737)
1988	0.855	0.200	0.670	0.060	0.005	0.550	0
1989	0.746	0.529	0.688	0.089	0.260	0.480	0
1990	0.853	0.265	0.820	0.047	0.077	0	1.397
TOTAL	2.454	0.994	2.178	0.196	O.342	1.030	1.397

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ESTIMATES IN THOUSANDS OF U.S. DOLLARS, FORMATTED AS FY88/FY89/FY90. SOURCE: ST/EY REPORT A300CT06, DATEI

FIGURE G.2 : S&T/EY ACTIVITY WORKSHEET FOR FY88, FY89, AND FY90: LATIN AMERICAN & CARIBBEAN COUNTRIES

COUNTRY	ETP (#5734)	CETA (#5742)	EPDAC (#5728)	REAT (#5730)	PSED (#5738)	BST (#5709)	BEST (#5737)
BELIZE						5/0/0	
BOLIVIA	0/0/16		9/0/0	15/0/0	0/0/9		
COLOMBIA	0/37/57						
COSTA RICA	0/0/81	19/0/0	110/30/275	0/1/50		120/50/0	0/0/470
DOMINICAN REPUBLIC	12/19/8		20/100/100	20/0/0		150/0/0	
EL SALVADOR	12/18/8						
EQUADOR	0/0/43						
GUATEMALA			0/60/50		0/0/18		0/0/23
HAITI			10/0/0				
HONDURAS	0/77/35		9/0/0	5/0/0			
JAMAICA	36/0/0	12/0/0					
MEXICO	0/0/18						
PERU	24/48/18		40/0/0				
ST. VINCENT	0/0/17						
URUGUAY	36/0/0						
LATIN AM. REGIONAL	0/0/150	125/30/0					
REGIONAL OFF. CAP			100/110/150	0/10/0			

FISCAL YEAR	ETP (#5734)	CETA (#5742)	EPDAC (#5728)	REAT (#5730)	PSED (#5738)	BST (#5709)	BEST (#5737)
1988	0.120	0.156	0.298	0.040	0	0.275	0
1989	0.199	0.030	0.300	0.011	0	0.050	0
1990	0.451	0	0.575	0.050	0.027	0	0.493
TOTAL	0.770	0.186	1.173	0.101	0.027	0.325	0.493

ESTIMATES IN THOUSANDS OF U.S. DOLLARS, FORMATTED AS FY88/FY89/FY90. SOURCE: ST/EY REPORT A300CT06, DATED 4/27/90.

Three other countries received over $100,000 for all Office of Energy funding in the region; Guatemala ($151,000), Peru ($130,000 - about 70 percent of this amount was for training), and Honduras ($117,000). Nine countries received less than $50,000 for energy projects, most of which was for training under ETP.

The majority of the funding for this region was provided for the three major projects in the Office: $1,173,000 for energy policy development and conservation (EPDAC), $818,000 for biomass (BST/BEST), and $770,000 for energy training (ETP).

The BST/BEST projects provided 97 percent of their funding in the region to Costa Rica and the Dominican Republic. EPDAC provided over 78 percent of its funding for these two countries (excluding the $360,000 provided to ROCAP).

3. Activities in Africa

At least 17 country Missions in the African region received an estimated $2,293,000 for energy project funding from the Office of Energy. An additional $671,000 was provided to the Africa Regional Office for projects. Figure G.3. provides estimated project funding levels by country and fiscal year.

Most country funding in Africa (over 70 percent) has been in the energy training area. Funding for energy training projects has focused on four African countries; Tanzania ($562,000), Ghana ($448,000), Nigeria ($393,000), and Kenya ($163,000).

The Africa Regional Office funds were used relatively evenly in support of the other Office of Energy projects with the exception of private sector energy development, which received no funds.

FIGURE G.3 : S&T/EY COUNTRY ACTIVITY WORKSHEET FOR FY88, FY89, AND FY90: AFRICAN COUNTRIES

COUNTRY	ETP (#5734)	CETA (#5742)	EPDAC (#5728)	REAT (#5730)	PSED (#5738)	BST (#5709)	BEST (#5737)
BOTSWANA	0/30/50						
BURUNDI	17/29/0						
CAMEROON	0/0/29						
DJIBOUTI	25/0/0						
GHANA	88/123/237						
IVORY COAST	0/0/50						
KENYA	119/43/1			60/98/0			
LIBERIA	53/0/0						
MADAGASCAR	0/0/29			20/5/0			
MAURITANIA	14/0/0						
NIGERIA	0/78/315						
SUDAN	75/62/0		0/15/0	10/0/0			
SWAZILAND			0/26/0				
TANZANIA	61/250/251						
UGANDA	0/0/18						
ZAMBIA	0/0/6						
ZIMBABWE	0/0/6						
AFRICA REGIONAL		0/0/150	29/99/140	30/30/50		68/75/0	

FISCAL YEAR	ETP (#5734)	CETA (#5742)	EPDAC (#5728)	REAT (#5730)	PSED (#5738)	BST (#5709)	BEST (#5737)
1988	0.452	0	0.029	0.120	0	0.068	0
1989	0.615	0	0.140	0.133	0	0.075	0
1990	0.992	0.150	0.140	0.050	0	0	0
TOTAL	2.059	0.150	0.309	0.303	0	0.143	0

ESTIMATES IN THOUSANDS OF U.S. DOLLARS, FORMATTED AS FY88/FY89/FY90. SOURCE: ST/EY REPORT A300CT06, DATED 4/27/90.

APPENDIX H

PERCEPTIONS OF MISSIONS REGARDING S&T/EY PROJECTS

APPENDIX H

PERCEPTIONS OF MISSIONS REGARDING S&T/EY PROJECTS

1. Familiarity with S&T/EY Projects

Mission personnel responsible for energy sector projects are generally found to be aware of only those S&T/EY projects with which they had some involvement, or which were specifically marketed to them by S&T/EY management or contractors.
Descriptive project brochures are reportedly not readily available in the Missions, and therefore, cable traffic has been their main source of current project information. This is exemplified by the high-degree of awareness of ETP course offerings through informative cables received by Missions' Human Resource Development Division, followed by course-descriptive brochures; and the frequent lack of awareness of other projects due to the lack of literature received on a regular basis.

Familiarity with S&T/EY projects is strongest where Mission energy officers have had direct personal experience with S&T/EY managers or had been rotated to the S&T Bureau during a stateside tour of duty. But even in these cases, the Mission officers stated that they need frequent reminders on how to get involved, the range of services offered, etc. This is especially true for the smaller Missions.

2. Perceived importance/relevance of S&T/EY projects

To address the issues of project impact, the evaluation team conducted a survey of 21 Missions. The survey was designed to evaluate the perceived importance of the S&T/EY projects to A.I.D.'s field operations.

Designated Mission energy officers were asked by the evaluation team to rate each project they were involved with as it relates to twelve categories of S&T/EY objectives. Figures H.1 through H.4. summarize the Missions' responses.

Among the 21 Missions surveyed, the level of involvement with S&T/EY projects ranged from no participation to involvement in five projects. The responses reflect only the memory of the energy officer interviewed (in consultation with other current Mission personnel). Also, many respondents were not familiar with the S&T/EY project names. Identification under project names was obtained through inference, by reference to the contractor, the S&T/EY project manager contact, or the Mission's project name and description.

The range of responses were from "not useful" to "critical." Of all the responses, a total of five "not useful" responses were indicated among all seven projects.

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S & T ENERGY PROGRAM: MISSION RESPONSE SUMMARY

Conventional Energy Technical Assistance Project (CETA) (Project # 936-5724)

OBJECTIVE/ACHIEVEMENT	Not Useful	Useful	Very Useful	Critical
C.1 Follow-On Efforts				
C.2 Energy Planning			1	
C.3 Energy Policy Making		1	1	
C.4 Energy Innovations			1	
C.5 Improving Skills of LDC Energy Professional	1			
C.6 Leverage Private Sector Investment				
C.7 Increase Environmental Awareness				
C.8 Increase of Energy Supply/Savings			2	
C.9 Improvement of LDC Energy DataBase			1	
C.10 Cooperative Programs with:				
C.10.1 Other Donors				
C.10.2 Other Govt. Agencies			1	
C.10.3 NGO's				

Total Number of Missions Responding: 6

Energy Policy Development & Conservation Project (Project # 936-5728)
Energy Planning and Policy Development (EPPD) Project

OBJECTIVE/ACHIEVEMENT	Not Useful	Useful	Very Useful	Critical
C.1 Follow-On Efforts	1	2		
C.2 Energy Planning		2	1	
C.3 Energy Policy Making		1	1	
C.4 Energy Innovations			2	
C.5 Improving Skills of LDC Energy Professional		3	2	
C.6 Leverage Private Sector Investment			1	
C.7 Increase Environmental Awareness		1		
C.8 Increase of Energy Supply/Savings		3	3	
C.9 Improvement of LDC Energy DataBase		1		
C.10 Cooperative Programs with:				
C.10.1 Other Donors			1	
C.10.2 Other Govt. Agencies				
C.10.3 NGO's				

Total Number of Missions Responding: 9

S & T ENERGY PROGRAM: MISSION RESPONSE SUMMARY

Energy Policy Development & Conservation Project (Project # 936-5728)
Energy Conservation Services Project (ECSP)

OBJECTIVE/ACHIEVEMENT	Not Useful	Useful	Very Useful	Critical
C.1 Follow-On Efforts	1	2	2	
C.2 Energy Planning		3	1	
C.3 Energy Policy Making		1	2	
C.4 Energy Innovations			2	
C.5 Improving Skills of LDC Energy Professional		3	3	
C.6 Leverage Private Sector Investment			1	
C.7 Increase Environmental Awareness		1		
C.8 Increase of Energy Supply/Savings		3	6	
C.9 Improvement of LDC Energy DataBase		1	1	
C.10 Cooperative Programs with:				
C.10.1 Other Donors			2	
C.10.2 Other Govt. Agencies			1	
C.10.3 NGO's				

Total Number of Missions Responding: 11

Renewable Energy Application & Training Project (REAT) (Project # 936-5730)

OBJECTIVE/ACHIEVEMENT	Not Useful	Useful	Very Useful	Critical
C.1 Follow-On Efforts		2		
C.2 Energy Planning		2		
C.3 Energy Policy Making				
C.4 Energy Innovations			2	
C.5 Improving Skills of LDC Energy Professional		1	1	
C.6 Leverage Private Sector Investment				1
C.7 Increase Environmental Awareness		1		
C.8 Increase of Energy Supply/Savings				
C.9 Improvement of LDC Energy DataBase				
C.10 Cooperative Programs with:				
C.10.1 Other Donors			1	
C.10.2 Other Govt. Agencies				
C.10.3 NGO's				

Total Number of Missions Responding: 3

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S & T ENERGY PROGRAM: MISSION RESPONSE SUMMARY

Energy Training Program (ETP) Project (Project # 936-5734)

OBJECTIVE/ACHIEVEMENT	Not Useful	Useful	Very Useful	Critical
C.1 Follow-On Efforts			1	
C.2 Energy Planning		3	1	
C.3 Energy Policy Making		1	1	
C.4 Energy Innovations			1	
C.5 Improving Skills of LDC Energy Professional	1	4	6	1
C.6 Leverage Private Sector Investment				
C.7 Increase Environmental Awareness		2	1	1
C.8 Increase of Energy Supply/Savings				
C.9 Improvement of LDC Energy DataBase				
C.10 Cooperative Programs with:				
C.10.1 Other Donors				
C.10.2 Other Govt. Agencies				
C.10.3 NGO's				

Total Number of Missions Responding: 13

Biomass Energy Systems & Technology (BEST) Project (Project # 936-5737)

OBJECTIVE/ACHIEVEMENT	Not Useful	Useful	Very Useful	Critical
C.1 Follow-On Efforts				1
C.2 Energy Planning				
C.3 Energy Policy Making				
C.4 Energy Innovations	1			
C.5 Improving Skills of LDC Energy Professional				
C.6 Leverage Private Sector Investment				1
C.7 Increase Environmental Awareness				
C.8 Increase of Energy Supply/Savings				
C.9 Improvement of LDC Energy DataBase				
C.10 Cooperative Programs with:				
C.10.1 Other Donors				
C.10.2 Other Govt. Agencies				
C.10.3 NGO's				

Total Number of Missions Responding: 4

S & T ENERGY PROGRAM: MISSION RESPONSE SUMMARY

Private Sector Energy Development (PSED) Project (Project # 936-5738)

OBJECTIVE/ACHIEVEMENT	Not Useful	Useful	Very Useful	Critical
C.1 Follow-On Efforts		2		2
C.2 Energy Planning			2	
C.3 Energy Policy Making			1	
C.4 Energy Innovations				
C.5 Improving Skills of LDC Energy Professional				
C.6 Leverage Private Sector Investment			1	
C.7 Increase Environmental Awareness				
C.8 Increase of Energy Supply/Savings				
C.9 Improvement of LDC Energy DataBase				
C.10 Cooperative Programs with:				
C.10.1 Other Donors			1	
C.10.2 Other Govt. Agencies				
C.10.3 NGO's				

Total Number of Missions Responding: 6

Only six of the Missions used the services of **CETA**. This is likely due to the large financial requirement involved in assisting large power-generation facilities. However, Missions that used the services of CETA found it to be "very useful" in obtaining its objectives. Perhaps the most significant finding is that none of the Missions felt that CETA was useful in increasing environmental awareness or in leveraging private sector investment. The former will be a major emphasis of its replacement project, ETIP.

Nine of the Missions used the service of **EPPD**. An increase in environmental awareness was claimed as an outcome of this energy planning and policy development project in only one Mission. All involved Missions reported the project as "useful" or "very useful" in meeting the S&T/EY objectives, with the improvement of skills of LDC energy professional and the increase in energy supply/savings as the most pertinent outcome.

ECSP was used by eleven Missions. All responses indicated objective achievement in the "useful" or "very useful range. Four Missions found this project to be "useful" or "very useful" in developing follow-on Mission projects. Six Missions rated their involvement as "very useful" in increasing energy supply/savings. Six Missions found it "useful" or "very useful" in improving the skills of LDC energy professionals. Three Missions identified this project as "very useful" in developing cooperative programs with other agencies.

The **REAT** project, which started in 1985, was used by only three Missions. Several Missions stated that their host governments would rather extend the distribution of power from large central facilities than develop a new system involving hundreds of individual private power units. Note that one of the three Missions felt that its involvement with REAT was "critical" in leveraging private sector investment. The **ETP** project was the most used project in the S&T/EY portfolio, with thirteen of the Missions surveyed using its services. This high degree of use may reflect the ease of participation, and good communication through distribution and good information dissemination mechanisms. As there are no courses specifically related to private sector investment or increase of energy supply/savings, it is logical that no Missions perceived benefit toward leveraging private sector investment and increasing energy supply/savings.

The relatively new **BEST** project was used by four of the Missions surveyed. Its use has been mainly in the industrial private sector, where it was noted to be "critical" in the development of Mission follow-on project and "critical" in leveraging private sector investments.

The **PSED** project was used in six Missions. Again, it is a new project that has involved in-country workshops to promote participation of LDC governments and the private sector. Two Missions reported these workshops as "critical" to follow-on project development.

In conclusion, S&T/EY is considered by the Missions as the main source of technical assistance in the energy sector.

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The importance and relevance of S&T/EY projects depend on the energy sector commitment of the host government, and the Missions' consideration of energy as a "priority sector".

Without host government enthusiasm for change in the energy sector, S&T/EY project initiatives will most likely fail, due to non-implementation of required institutional or policy changes.

3. Perceived achievements/impact of S&T/EY projects

Most Missions with any significant involvement with S&T/EY projects reported positive change by the host government in their acceptance of new renewable technologies in the energy sector, especially in energy conservation/efficiency applications. Unfortunately, institutional changes necessary to accommodate these new technologies has often not been forthcoming. Private sector energy development has also been accepted by several LDC governments.

As discussed under the previous section on perceived importance, S&T/EY project accomplishments are summarized in Appendix D.3.

APPENDIX I

TRAINING AND INFORMATION DISSEMINATION ACTIVITIES

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TRAINING AND INFORMATION DISSEMINATION ACTIVITIES

A. CURRENT TRAINING PROGRAMS

1. Energy Training Project (ETP)

ETP provides an applied, hands-on learning experience to participant trainees. Under this project, the ETP contractor IIE designs a four week to six month training module for trainees nominated by USAID Missions and host countries. In addition, it sub-contracts to course providers and publishes an alumni newsletter. The contractor also monitors training programs through discussions with participants and instructors, and makes necessary mid-course corrections.

The ETP contractor designs training programs in consultation with the S&T/EY, the Regional Bureaus, Missions, and host country governments. The contractor has no control over who is nominated or the degree of interest in specific courses. There must be 20-25 students for a course to be cost effective.

The Office's budget for this project is leveraged by additional funding; generally from Missions, host governments, in-country institutions, and private businesses. Based on past experience and discussions during the most recent planning exercise, these "buy-ins" are estimated to be approximately $1.8 million in FY 90 and $2.5 million in FY 91.

The ETP has designed or is planning more than 100 programs (including 30 intensive courses, 56 internships, 10 academic degrees, and 8 training courses overseas), and trained 512 participants.

The energy and environmental training program of ETP for FY 90 -91 includes the following completed or planned courses and activities:

a. Energy Policy and Analysis Courses

- National Energy Policy and Planning - prepares participants to solve national and institutional energy planning problems in efficient and cost-effective ways.
- Economic and Financial Analysis of Energy Projects - provides participants with practical experience on procedures for analyzing the economic and financial viability of energy projects.
- Energy Project Financing - focuses on means of financing energy investments.

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b. Power Industry Development Courses

Electric Utility Engineering - covers engineering practices and technologies for generation, transmission, and distribution of electricity by fossil-fuel and hydro-power systems, with attention on long-term planning.

Power Systems Protection - provides practical training in effective techniques of power systems protection, including microcomputer-based protective relay systems.

Mechanical Maintenance of Electric Power Plants - focuses on procedures and practices for optimizing mechanical efficiency and reliability of electric power plants.

Electrical Maintenance of Power Systems Equipment - focuses on procedures and practices for optimizing electrical efficiency and reliability of power plants.

Diesel-Based Electric Power Generation - provides training in techniques required to maximize the availability, reliability, and performance of diesel-powered generators.

General Management of Electric Utilities - demonstrates how to manage a company, combining technical capabilities and managerial skills in order to optimize performance of personnel and equipment.

c. Energy Conservation and Efficiency Courses

Utility and Industrial Energy Conservation - covers implementation of in-house energy conservation programs.

Refinery Energy Conservation - provides comprehensive training in techniques to reduce energy consumption and improve operational efficiency of refineries and petrochemical plants.

End User Energy Conservation - focuses on energy conservation on the demand side.

d. Indigenous Fossil Fuel Development Courses

Structure and Management of the Natural Gas Industry - provides practical information for intelligent decision-making in exploration, development, production, processing, transportation, and utilization of natural gas resources.

Natural Gas Policy - focuses on policy issues related to the development of gas resources.

Natural Gas Engineering - provides training in technical aspects of natural gas exploration, development, production, processing, and transportation.

Oil and Gas Exploration and Production Technology - applies the principles and techniques of geology, geophysics, and engineering to petroleum exploration and production.

Petroleum Management - provides an overview of the petroleum industry and examines key managerial functions; including principles of management, economics, accounting, finance, computer applications, decision making, organization and supervision.

Management of a National Petroleum Enterprise - covers how to promote cooperative oil and gas ventures with international oil companies and financial institutions, and negotiate productive and equitable contracts.

Lignite-Coal Utilization - covers the complete cycle of development and utilization of lignite and sub-bituminous coal.

Clean Coal Technologies, including Fluidized Bed Coal Combustion - covers the fundamentals of fluidized bed combustion, the information needed to evaluate current technologies, and methods for determining the technology that best fits a particular application.

e. Alternative Energy Systems Courses

Solar Electricity (Photovoltaic) Technologies - provides comprehensive, hands-on training in all aspects of designing and utilizing PV-powered equipment; as well as technical, economic, and practical information necessary to design a PV-based project or to set up a PV-based commercial enterprise.

Geothermal Exploration - covers the development and utilization of geothermal energy sources.

Small Hydro Power Generation - covers identification and assessment of prospective sites, feasibility studies, installation, operation, and maintenance of micro- and mini-hydro facilities.

Biomass Energy Development - covers the development of energy systems utilizing biomass as source of fuel.

f. Private Power Development Courses

Private Power/Cogeneration - examines the benefits and potential role of private power in developing countries and allows participants to study successful initiatives in the U.S.

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g. Environmental Training Courses

Environmental Policy Development and Regulation - provides training in alternative approaches and methodologies for pollution control and enforcement.

Pollution Control Systems for Industrial Facilities and Power Plants - provides training in media-specific pollution control technologies.

Environmental Data Collection and Analysis - provides training in all aspects of empirical data management for environmental regulation.

Ambient Air Pollution Monitoring - provides practical training on ambient air pollution modelling, monitoring, measurement, analysis, and reporting.

Stationary Source Air Pollution Monitoring - provides training on point source monitoring, chemical analysis, data collection, analysis, and reporting.

h. Other Training Activities

ASEAN Private Power Workshop - provided training in technical, financial, policy, and institutional aspects of cogeneration and independent private power projects.

Egypt Energy Manpower Development Project - its goal is to improve the technical and managerial capabilities of the country's petroleum and electricity sectors in the design, use, and adaptation of human resource and career development systems for human resource planning.

Academic Training - places engineers and scientists from developing countries in Master of Science programs at U.S. universities.

Internships - places professionals from developing countries at selected U.S. companies for "hands-on" internships.

Alumni Network - promotes long-term professional relationships among course graduates and provides opportunities for periodic updating of their knowledge and skills through workshops, a newsletter, and other activities.

Training of USAID staff on environmental topics.

Environmental Training Needs Assessments - to be undertaken within key industries and institutions of developing nations and Eastern Europe.

Study Tours - for energy and environmental professionals from developing countries and Eastern Europe to acquaint them with available technologies, processes, and institutional policies; and programs for dealing with environmental problems.

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2. Training Activities under other S&T/EY projects

The S&T/EY energy projects have training mandates somewhat different from ETP: They generally conduct in-country workshops and seminars, and sponsor study tours. This type of training is instructional, and has information dissemination as a sub-purpose. The section that follows focuses on the ETP training program.

3. Training in Support of Other Projects

Some S&T/EY training activities are carried out under **ETP**, while some are carried out under the other projects. These are not necessarily coordinated.

a. Energy Planning and Policy Development Project

ETP courses and activities relevant to the **EPPD** Project include courses on National Energy Policy and Planning, Economic and Financial Analysis of Energy Projects, Energy Project Financing, Natural Gas Policy, Electric Utility Engineering, Power Systems Protection, Mechanical Maintenance of Electric-Power Plants, Diesel-Based Electric-Power Generation, General Management of Electric Utilities, Environmental Policy Development and Regulation, Pollution-Control Systems, Ambient Air Pollution Monitoring, Stationary Source Air Pollution Monitoring, and (Environmental) Data Collection and Analysis.

b. Energy Conservation Services Project

Courses relevant to the **ECSP** include Structure and Management of the Natural Gas Industry, Electric Utility Engineering, Power Systems Protection, Mechanical Maintenance of Electric-Power Plants, Electrical Maintenance of Power of Systems Equipment, Diesel-Based Electric Power Generation, General Management of Electric Utilities, Utility and Industrial Energy Conservation, Refinery Energy Conservation, End-User Energy Conservation, Environmental Policy and Regulation, Pollution Control Systems, (Environmental) Data Collection and Analysis, Ambient Air Pollution Monitoring, and Stationary Air Pollution Monitoring.

c. Renewable Energy Applications and Training Project

ETP offers four courses on alternative energy systems - Solar Electricity (Photovoltaic) Technologies, Geothermal Exploration, small Hydro Power Generation, and a Biomass Energy Development course. The Electric-Utility Engineering course also covers hydro power.

d. Biomass Energy Systems and Technology Project

The Biomass Energy Development course is relevant to **BEST**.

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e. Private Sector Energy Development Project

The only ETP activities directly relevant to the PSED are an ASEAN workshop on private power and a course on Private power/cogeneration.

f. Conventional Energy Technical Assistance Project

There are numerous courses on conventional energy; including Oil and Gas Exploration and Production Technology, Lignite-Coal Utilization, Structure and Management of the Natural Gas Industry, Natural Gas Policy, Natural Gas Engineering, Clean Coal Technologies, Management of a National Petroleum Enterprise, Petroleum Management, Electric-Utility Engineering, Power Systems Protection, Mechanical Maintenance of Electric-Power Plants, Electric Maintenance of Power Systems, Diesel-Based Electric-Power Generation, General Management of Electric Utilities, and Refinery Energy Conservation.

g. Energy Technology Innovation Project

ETP courses relevant to activities planned under **ETIP** include National Energy Policy and Planning, Economic and Financial Analysis of Energy Projects, Structure and Management of the Natural Gas Industry, Clean Coal Technologies, Natural Gas Policy, Natural Gas Engineering, Management of a National Petroleum Enterprise, Petroleum Management, Electric Utility Engineering, Power-Systems Protection, Mechanical Maintenance of Electric-Power Plants, Electric Maintenance of Power Systems Equipment, Diesel-Based Electric Power Generation, General Management of Electric Utilities, Geothermal Exploration, and Pollution Control Systems.

4. Training in Support of S&T/EY Goals

All **ETP** program activities are relevant to S&T/EY's goals; however, not all stated goals are covered by the training program.

a. Energy Efficiency Improvements

Several courses are relevant to the objective of increasing power generation, transmission, and distribution efficiency; including National Energy Policy and Planning, Electric Utility Engineering, Power Systems Protection, Mechanical Maintenance of Electric Power Plants, Electric Maintenance of Power Systems Equipment, Diesel-based Electric Power Generation, and General Management of Electric Utilities.

The Utility and Industrial Energy Conservation, the Refinery Energy Conservation, and the End-User Energy Conservation courses support the objective of improving energy efficiency in the industrial sector. There are no courses under ETP addressing directly the objectives of improving energy efficiency in the transportation and building sectors.

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b. Energy and Rural Development

There are no courses under the training program directly addressing rural energy development issues.

c. Private Sector Energy Development and Management

ETP's course on Private Power/Cogeneration and the private power workshop for ASEAN countries, are the only activities directly relevant to this goal. The Energy Project Financing course would also cover private power projects.

d. Increased Consideration of Environmental Criteria

Several courses support this goal. The environmental training component of ETP supports the objective of integrating environmental criteria into energy planning through courses on Environmental Policy Development and Regulation, Pollution Control Systems for Industrial Facilities and Power plants, Data Collection and Analysis, Ambient Air Pollution Monitoring, Stationary Air Pollution Monitoring, Environmental Policy Development and Implementation, training programs for USAID staff, environmental training-needs assessments, and study tours. The promotion of efficient energy conversion systems is supported by a Clean Coal Technologies Course.

e. Reduction of Economic Instability Caused by Oil Shortages

There are numerous courses on fossil fuel energy systems (based on either indigenous or imported fuels), including Economic and Financial Analysis of Energy Projects, Oil and Gas Exploration and Production Technology, Lignite-Coal Utilization, Structure and Management of the Natural Gas Industry, Natural Gas Policy, Natural Gas Engineering, Clean Coal Technologies, Management of a National Petroleum Enterprise, Petroleum Management, Electric Utility Engineering, Power Systems Protection, Mechanical Maintenance of Electric Power Plants, Electrical Maintenance of Power Systems Equipment, Diesel-Based Electric Power Generation, and General Management of Electric Utilities.

Four courses address renewable energy systems - Solar Electricity (Photovoltaic) Technologies, Geothermal Exploration, Small Hydro Power Generation, and Biomass Energy Development.

B. INFORMATION DISSEMINATION ACTIVITIES

1. Overall Information Dissemination Program

The objectives of the information dissemination program are to disseminate program and energy sector information systematically and in a timely fashion to A.I.D. senior staff, Regional Bureaus, Missions, other donors, research institutions, and private sector organizations throughout the world; and to involve outside private and public sector

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parties in program planning and implementation. These objectives are carried out through cutreach efforts of ad-hoc groups of experts from other international donors; private and non-profit sectors; other U.S. agencies with the purpose of program planning; publication of newsletters and reports; Mission and Regional Bureau briefings; private sector technology transfer through teams; and workshops, conferences, tours, and energy data bases.

2. Publications

Materials published under S&T/EY projects include reports, newsletters, brochures, and other items.

a. Reports

S&T/EY, under its various projects, publishes over 20 reports each year. These include: reports on research projects in renewable energy systems, including biomass and advanced technologies; case studies, assessments, and feasibility studies of specific power projects; global, regional, and country energy surveys and assessments; private power opportunity databases; various handbooks, planning and analysis tools, including software programs; energy planning, programming, and strategy reports; summary reports on workshops, seminars, conferences, symposia, and meetings; and other project related reports. Copies of these reports are distributed selectively to interested persons included in mailing lists of S&T/EY.

b. Newsletters

Newsletters published by S&T/EY include the Private Power Reporter, published about twice a year under the PSED Project, the Energy Conservation Services Program Update, published about twice a year under the ECSP Project, and an ETP newsletter. These newsletters are distributed to several thousand persons included in the mailing lists maintained by these projects. S&T/EY also prepares weekly reports covering all its project activities, which are assembled and distributed to USAID Missions and other parties 3-4 times per year.

c. Other Publications

S&T/EY and its contractors have developed and distributed to Missions a number of brochures describing its program offerings.
Other publications that receive S&T/EY co-funding support include those published by other energy organizations and committees/ agencies, such as the "Renewable Energy for Agriculture and Health" and the "Improving the Quality of Life with Renewable Energy" brochures, and the "Directory of U.S. Renewable Energy Technology Vendors".

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3. Workshops, Conferences and Tours

Beyond announcing the availability of S&T/EY project assistance opportunities directly to Missions, the S&T/EY Director and senior management confer, through various forums, with Mission Directors and other field personnel when they assemble in Washington, D.C., and sometimes in the field.

S&T/EY organizes and conducts more than 20 workshops, conferences, and symposia; and several study tours annually, covering private power, alternative energy systems, energy efficiency and conservation, institutional reforms (including energy pricing), environmental and other issues.

These activities are generally well attended; often by more than 300 representatives of LDC government utilities and private firms, U.S. private firms, and other development organizations.

These workshops and conferences are often critical in keeping knowledge of S&T/EY services current in the minds of Mission and host country players, especially considering the high turnover of local participants.

4. Energy Databases

S&T/EY maintains databases on private power and other opportunities, and plans to develop one on renewable energy. Most
notable are the private power database country profiles for India, Pakistan, Philippines, and the Dominican Republic. These include background data on each country and its energy sector; government policies, rules and regulations; and private power projects, opportunities, and contacts. However, these data bases are not updated frequently.

To date, computer databases can not be accessed electronically.

5. Other Dissemination Activities

Information on the activities of S&T/EY is also disseminated and exchanged through interface (meetings, telephone calls, cables, correspondence) of its and contractors' staff with representatives of A.I.D., LDC governments and private sector, U.S. government agencies and private sector, development agencies, and other interested groups.

Program Planning Outreach Activities in 1990 included participation in the Multi-Agency Group on Power Sector Innovation (MAGPI) and the interagency Global Energy Efficiency Initiative (GEEI) working group.