ENERGY TRAINING PROJECT
936-5734

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ANNEXES

APPENDICES

A. Logical Framework

ACRONYMS AND ABBREVIATIONS

AID	Agency for International Development
S&T	Science and Technology
FY	Fiscal Year
PACD	Project Assistance Completion Date
LOP	Life of Project
LDC	Less Developed Countries
ETP	Energy Training Project
OYB	Operation Year Budget
IBRD	International Bank for Reconstruction and Development
OPEC	Organization of Petroleum Exporting Countries
TOEFL	Test of English as a Foreign Language

I. Recommendations

A. Proposed Funding

The Bureau of Science and Technology (S&T) recommends authorization of $15 million to fund the Energy Training Project (ETP), 936-5734. This is a world-wide energy training support program. The total cost of this project is estimated to be $38 million, which projects $15 million in operational year budget (OYB) transfers and buy-ins from regional and bilateral accounts, and $8 million from host country contributions. The S&T Bureau funding is planned to be incrementally obligated as follows:

FY	Section 106 Funding (000)	Section 103 Funding (0000
87	1,246	0
88	1,000	1,000
89	1,900	1,800
90	2,150	1,800
91	2,200	2.200
Total	8,500	6,500
Grand Total:	$15,000.	

B. Host Country and Private Sector Contributions

In-kind, host country contributions, will be encouraged and are expected to be equivalent to $8 million over the life of project (LOP). In-kind, contributions from private industry are expected in support of various training activities. The value of these contributions is difficult to establish, but a provisional figure of $2 million is assumed. Thus, the total contribution from sources outside AID may total $10 million in addition to the life of project (LOP) costs of $30 million.

C. Summary Description

1. Introduction

AID-assisted countries face a major difficulty in

affording the energy they need to develop due to continuing high imported oil bills and high capital costs of power systems development. Even with recent sharp declines in world oil prices, the balance of payments for less developed countries (LDCs) continues to suffer from the high cost of imported oil. Training in various aspects of energy technologies is important to help countries make the best possible energy investment decisions for short and long term considerations.

Energy is a critical input to achieving the AID goal of a world in which economic growth and development are self-sustaining and the extremes of poverty have been lessened.

2. Goal and Purpose

The goal of the ETP is to increase LDC technical competence to identify, explore, plan, manage, productively use, and evaluate a wide range of energy resources, which will increase economic growth within developing countries.

The purpose of the project is to provide targeted training to LDC personnel in energy resource identification, exploration, production and use.

3. Project Description

In order to achieve its purpose, ETP will train participants in energy management, policy analysis, resource and technology development and energy planning. The training will concentrate on specific country energy conditions. It will be accomplished through energy resource and manpower assessments, and specialized academic and non-academic training. Training courses will be conducted in the United States, and in selected countries for local and/or regional participants. Internships will range from 6 - 12 months with participants assigned to various private sector firms in the USA. At the end of the project, there will be an increase in the number of well trained energy professionals in LDCs who can assist in identifying and using the most efficient energy resources for specific productive purposes and national economic development.

4. Project Implementation

The project will be implemented by a private sector contractor who will be chosen through an open competition method. The contractor will establish an Advisory Council (not to exceed 10 members) which will assess, semiannually, project progress toward its stated goal and purpose and individual training programs. It shall also make recommendations for more effective project implementation. This council will consist of representatives from various technical areas (oil, gas, coal, wing, hydro, etc.) and universities. The AID Project Officer will be from the S&T Bureau Office of Energy (S&T/EY).

D. Analyses - Summary Findings

The ETP is considered economically, administratively, and technically feasible and socially sound without negative environmental impact. The cost estimates are reasonable and all applicable statutory criteria are met.

II. Project Rationale

Energy use and economic development are inescapably connected. Energy utilized in productive activity is an essential ingredient to economic growth; and, in turn, the proceeds of growth and rising income permit increased services. AID assisted countries face a major difficulty in affording the energy they need to develop due to continuing high imported oil bills and the high costs of power systems development. LDCs recognize the need to maximize energy utilization in order to free local currency and to secure foreign exchange requirements to further overall economic development.

LDCs rely most heavily on fossil energy resources - oil, gas, and coal - for urban and rural industries, electric power generation, transportation, and agriculture. Renewable energy sources have begun to play a crucial development role in providing power for remote areas for various uses in communications, health delivery, water pumping and education. The demand for energy is complicated by the decreasing private interest in domestic exploration and development. Many international oil companies have tabled exploration plans until world prices increase.

LDCs present varied energy pictures, but generally the inability of conventional energy sources to satisfy growth is due to geography and policies. Small amounts of land often support the majority of the people because of fresh water supplies, cultivated land, good roads and energy availability to support services, i.e. health and educational facilities, and places for employment. By contrast, there are large land areas with very limited agriculture and permanent habitation due to sparse fresh water supplies and no dependable energy resources.

In the coming years, commercial energy consumption in AID-assisted countries will grow faster than their economies.1/ Factors such as population growth, rural to urban population shifts, and inadequate fuelwood supply accelerate the use of commercial energy. It is expected that by the year 2000, developing countries will more than double their current commercial energy consumption levels. Thus, these countries must implement the most effective policies to develop indigenous energy resources and increase productivity.

Numerous policy barriers impede the efficient allocation of energy resources and, consequently, economic development. The most common examples of policy barriers include:

1. Aggregate petroleum products subsidization.

2. Electricity pricing policies that differ significantly from marginal cost.

3. Laws that restrict drilling access of foreign operators.

4. Tax systems that inhibit investments.

5. Presence of government monopolies that stifle the role of private enterprise.

1/ The income coefficient for commercial fuel consumption is 1.3 in AID-assisted countries -- a 1 percent rise in income results in a 1.3 percent rise in fuel consumption. Source: Analysis of Energy Prospects and Problems in Developing Countries, Joy Dunkerley, William Ramsey; Resources for the Future, 1983.

LDCs do not face an "energy crisis" per se, but a complex set of problems which must be addressed simultaneously from a balanced perspective. The energy future is open to choice, but the combination of possible decisions is multifaceted and replete with dilemmas. The challenge is to meet long-term needs while also providing ways to meet short-term problems by launching timely initiatives which address supply, demand, environemental, and policy considerations. With this as a framework, a technically trained cadre of energy professionals is critical to help countries make the best possible energy investment decisions.

Primary focusing of Energy Training Project (ETP) will be to expand and augument the benefits of energy projects which are being financed by AID in approximately 35 countries. Other countries will be included as needs change. ETP will fund target training which will help build technical, managerial, research and institutional capacities. ETP supports S&T, Mission and regional bureau energy plans and activities, as well as the policy reform, private sector, institutional building and technology transfer pillars of AID's development strategy.

III. Energy Training Project Description

A. Background

The Energy Training Project has been designed as a follow on activity to the Conventional Energy Training Project (CETP), 936-9997. CETP was implemented from August 1980 and trained 700 people in various aspects of energy. Annex B gives a summary of training imparted during CETP, and results of evaluation findings.

B. Goal

The goal of the Energy Training Project is to increase LDC technical competence to identify, explore, plan, manage, productively use, and evaluate a wide range of energy resources, which will increase economic growth within developing countries.

Technical knowledge will provide an increased institutional capacity to conceptualize problems and manage resources most effectively to alleviate development constraints. As needs in certain areas are decreased, economic productivity can be increased as the freed capital can be dedicated to other purposes.

C. Purpose

The purpose of the project is to provide personnel in energy resource, identification, exploration, production and use.

The goal and purpose will be achieved through two distinct activities.

1. Assisting missions and host countries in conducting energy manpower assessments to develop training plans.

2. Providing training in a broad spectrum of energy resources and technologies including economic, financial, management and planning aspects through academic and non-academic means. Non-academic training will be provided through internships, and short courses. Courses will be held in the USA, and in selected countries for in-country and regional training.

The development hypothesis being tested by this project is:

If there is a trained cadre of energy professionals in pricing and utilization policies will be formulated, and decisions will be made about the most appropriate energy form to use to meet various demands. This will result in:

1. Cost effective solutions to a large number of development problems;

2. Adoption of technologies which improve productivity and the quality of life in LDCs; and

3. Assistance in alleviating balance of payments issues.

Evidence of technical energy knowledge and planning in the socioeconomic development of countries like India, Pakistan, Thailand and the Philippines supports this hypothesis.

D. Implementation Strategy

The implementation strategy for ETP will emphasize:

1. Tailored internships and short-term courses to enable participants to directly apply techniques to in-country situations.

2. Academic training so that participants will earn Master's degrees from accredited American Universities in various energy fields.

3. In-country and regional training to enable more participants to enroll in geographically specific courses.

4. Direct involvement of participants in energy problem definitions and solutions.

5. Information and experience sharing among energy professionals from various countries and geographical regions.

E. End of Project Status

The ETP Project Assistance Completion Date (PACD) is September 30, 1991, at which time, it is anticipated the following will be achieved:

1. Eighteen hundred and thirty energy professionals will have been trained through short courses in the USA and through in-country and regional courses;

2. Sixty energy professionals will have been trained through internships in te USA;

3. One hundred energy professionals will have earned Masters of Science degrees in various aspects of energy;

4. Twenty-five energy manpower assessments will be completed, (12 funded by S&T and 13 funded through buy-ins);

5. There will be an established information and experience sharing network among ETP participants;

6. Approximately 1990 ETP participants will be able to contribute concretely in various energy area activities for their home institutions, (995 participants will be funded by S&T and an additional 995 through buy-ins); and

7. Trained participants will be employed in various productive and government sectors of the economy.

IV. Project Implementation

A. Training

The ETP will provide targeted training to energy professionals from selected AID-assisted countries. The training will cover energy aspects of several disciplines, including, but not limited to, science, engineering, economics, business, resource management, and law. There will be a core academic program and set of short courses which have been selected based on needs expressed by Missions and host countries, and findings from the CETP. Additional courses may be added if warranted by demand and if funds permit.

B. Types of Training

1. Academic Training

Academic degree requirements often are not as focused as the training objectives of professional non-academic training. Also, academic training is costly in terms of time as well as tuition and living expenses. In addition, based on experience gained through CETP, requests for academic training have not been as great as originally anticipated, 60 percent academic and 40 percent non-academic. The ratio has really been 40 and 60 percent, and has been dropping for the past 4 1/2 years. Academic training does have a limited role in this project, however, because some training cannot be accomplished in a non-academic setting. Geologists, economists and energy analysts may require university training. Academic training is essential when there is no feasible alternative.

2. Internships

Internships with U.S. utilities industry will be developed. Examples of such internships include joint funding with the California Energy Commission (CEC) to bring mid-level LDC utility people to the U.S. for 9-12 months training at the CEC and select California utilities on how to accommodate dispersed electrical generation in their systems and related topics; an internship in seismic stratigraphy at the Gulf Oil Exploration and Production Company in Houston; use of computers for seismic data processing and interpretation, also at Gulf; and well-log, open-hole log and acoustic log interpretation at Birdwell in Tulsa, Oklahoma.

3. Short Courses in USA

In some technical fields, there is a need for training in areas where courses do not exist. Where demand will be strong and where these areas meet with AID's policy, this project will with the agreement of the regional bureaus, AID Missions, Advisory Committee and AID Project Manager, develop courses in cooperation with technically competent organizations. These short term (from two to six months) courses will be made available through a broad range of U.S. industrial training organizations in petroleum, electricity, coal, renewables and other energy fields.

4. In-Country and Regional Training

In-country and regional training will be offered hen the following conditions prevail:

a. Special case: A special case where there is need for participants to stay in the country for professional reasons or the training would be most beneficial if conducted in the participant's native language.

b. Mission buy-in: A mission which provides the financing can request in-country training. Missions may feel that the training can be most effectively conducted in-country or that such training is important to support Mission

bilateral efforts. Final decision on conducting in-country training will be the responsibility of the Project Manager.

c. Favorable study climate: In-country training can be effective only if it is conducted in an interruption-free environment. Any break in attendance will significantly reduce the value of the training. Therefore, in-country training should take place only where the host country is willing to release personnel for the entire training period.

d. Unique circumstances There may be compelling reasons why the training should not be done in the U.S. Unique in-country circumstances regarding an energy resource or technology could require in-country training or make U.S. based training inappropriate. There is a range of such conditions; for example, an unfavorable U.S. economic or labor climate, cost factor, class size factor, and others.

e. Cost: In-country training may be more advantageous than U.S. based training in cases where it is substantially less costly to do the same training, and expect similar results, and where travel funds are not available. It may also be advantageous when more people may be trained.

Local training can provide an opportunity for institution building in AID-assisted countries. Institution building requires close working relationships with local institutions, strengthening them and providing a base for increased training capabilities and opportunities.

C. Participant Selection (Academic, Internships, Short Courses in USA)

All participants in the ETP must have a Bachelor's Degree or be experienced, trained technicians, and preferably have relevant energy work experience in the government or private sector.

AID Mission officers will discuss this project with host government and private sector officials. To ensure that all explanations given are consistent, S&T/EY will

dispatch a worldwide, detailed project summary cable to energy and/or training officers. Missions will be requested to advise S&T/EY:

1. Name, title and addresses of government and private sector contacts.

2. Priority areas identified for energy development and training needs.

3. Interest expressed in academic, internship, and short course training

Each Mission will be asked to seek candidates for energy training, an application as designed by the contractor, and agreed to by the Advisory Committee and AID, will be used. Information requested will ensure that employers know that their employees are applying for training, and employers accept responsibility for continuing to pay salaries for a stipulated amount of time. Employers and employees both agree to a time period for which the trainee will continue to work at the home institution. This process should also help ensure that candidates selected do indeed accept the training.

The AID Mission will forward all applications to S&T/EY. If the Mission has relevant information on the candidate, it will attach a statement to the application and may recommend acceptance or rejection of any application. The AID Mission will also be responsible for certifying language competency when a course is to be taught or internship sponsored in other than native language of the participant. The AID Mission certifying officer may forward the application prior to official results from the Test of English as a Foreign Language Examination (TOEFL).

S&T/EY will forward all training applications to the contractor, and send cables to Missions to acknowledge receipt of applications and notify if any information is incomplete.

D. <u>Participant Training Assignment</u>

The contractor will establish a selection committee to evaluate all applications. The committee will determine whether academic, internship or short course training is most appropriate for the candidates. For those

candidates not selected for training, the selection committee will identify those it considers deserving of consideration in future years. S&T/EY will notify the AID Missions of the disposition of all applications. The Missions, in turn, will promptly notify the applicants.

The contractor will be responsible for providing written course synopses and orientation. Internship participants will receive preliminary information about the host institutions. Candidates will be requested to notify the AID Mission within a stipulated time period whether they will accept the prescribed program. The contractor will be able to substitute runner-up candidates for finalists who are unable to participate in the ETP.

E. Participant Orientation

The contractor will be responsible for providing a participant orientation package which will include general information on the location of the course (climate, social activities, etc.) and a suggested packing list. Living information, health insurance coverage, and full explanation of maintenance allowances will be provided. Emergency contact numbers will ensure that family and employers are always able to reach participants.

F. Participant Monitoring

The contractor will keep in touch with participants during training periods. Missions will be kept informed of participant progress and problems during training. The contractor will also follow-up trainees for two years after returning to their home institutions.

G. Information Exchange

A newsletter will be established to keep participants, participant's employer, and AID Missions abreast of developments within ETP. The newsletter will be circulated at least bi-yearly by the contractor, and will encourage direct article contributions from the participants. This medium of exchange will act as a catalyst to help facilitate continued information exchange and sharing among trainees worldwide.

2. Participant Selection (In-Country and Regional Training)

In-country and regional training courses will be designed and offered based on specific country demand. The participant selection process, therefore, is more simple than that needed for academic, internships, and short-courses in the USA

S&T/EY will dispatch regional cables to announce the courses and given synopses, including the language requirement. Missions will be asked to seek applications. An application, as designed by the contractor, and approved by the Advisory Council and AID, will be used.

3. Manpower Assessments

Manpower assessments, if not already done by Mission, are an important first step in the design of long-term training plans. Such assessments bring greater understanding and enable AID to identify key areas where training is needed in order to better allocate its resources. The target areas include participants from energy ministries, national and private sector petroleum enterprises, electric utilities, and organizations which deal with energy technologies.

A manpower assessment will be used to evaluate the existing employees skills and capabilities in an organization. Current skill levels will then be compared to an ideal level necessary to run the organization effectively and enable it to grow in a rational fashion. A training plan will be designed to improve the skill level of the staff without upsetting the operation of the company.

4. Course Offerings

The development of energy resources and technologies in the LDCs is partially a function of the available technical ability. The application of technologies in the energy field will require people educated in science, engineering, economics, business, finance and related disciplines at a level most appropriate for their position and country. This may be accomplished through industry internships,

on-the-job training, special courses and in-service academic (degree and non-degree) programs. In a broad sense the training courses will be based on well established technical disciplines: physics, chemistry, biology, geology, engineering architecture, business management, economics, and law. Annex C gives an illustrative list of courses for the ETP.

AID and Host Country Inputs

S&T/EY core funding consists of $15.0 million and projected Mission buy-ins and regional bureau OYB transfers of $15.0 million are expected for a total AID contribution of $30.0 million. As illustrated in Table I, S&T Bureau funding will be used to provide the following activities:

Participant training;

Manpower assessments;

Contractor services;

Newsletter; and

Evaluations and audits.

The host country contributions will be in-kind, and are estimated to be equivalent to $8 million. Contribution will be used to sponsor in-country and regional training programs. The in-kind contribution will cover the following elements:

- Basic salaries of participants.

Travel costs of participants.

Research center overhead and other indirect costs.

Local cost related to customs clearance (training materials, computers, etc.)

Local costs related to normal project implementation.

V. Relationships with Other Programs, Policies and Activities

A. Relationship to the AID Energy Strategy

The ETP supports the aim of AID's energy strategy of helping achieve a world in which economic growth and development are self-sustaining and the extremes of poverty have been eliminated. To attain development targets in per capita income and caloric intake will require energy growth rates of at least 7% per year. Therefore, without adequate attention, energy problems will continue to stifle economic growth in AID-assisted countries.

S&T/EY's analysis supports the conclusion that focusing on selected energy issues for local and national problems of socioeconomic value will benefit developing countries in terms of increased productivity, improved environment, and better use of indigenous and imported resources.

B. Relationship to the S&T Bureau CPSS

The S&T funded energy program is designed to help ensure adequate supplies of energy for economic growth by helping to alleviate underlying structural problems that inhibit energy development. It also provides technical assistance to energy producers and consumers in LDCs. Specific assistance activities are designed to: promote policy reform particularly with regard to energy prices and incentives for private investment; expand the role of the private sector in development, management and distribution of energy supplies including conservation, fossil fuels, electric power and renewable energy resources; and to expand the availability of energy for rural and household needs.

The energy program supports the objectives of developing new approaches to energy problems through research and adaptation and applying these approaches in LDC settings. The program concentrates on activities to develop indigenous energy sources to substitute for imported oil and fuelwood, increase efficiency of existing energy systems, and help countries make wide energy system choices and investment decision. A prerequisite for sound energy development and investment decision-making is dependable information about the problems and available options. Energy survey and

planning methods are addressed through energy policy development and conservation activities. Training and energy assessments are integral to achieving these objectives.

C. Relationship to Bilateral and Other Donor Projects

Training and energy assessments to be funded through the ETP are complementary to approximately 35 bilateral energy related projects. These projects cover all three of the geographic regions: Africa, Asia and Near East, and Latin America and the Carribean.

AID has placed emphasis on energy activities in its development portfolio. Programs have evolved from a concentration on power generation and distribution to an increasing concern for the current and projected imbalance of supply and demand in both conventional and renewable resources. Bilateral efforts have concentrated on technical assistance. The U.S. has relied on the multilateral development banks to assume the major share of capital financing of large energy systems.

Several donor organizations, such as the World Bank and the UN, have training and professional development programs. With few exceptions, none are as broad as the CETP and the proposed ETP. The program at the World Bank is in economic development and the UN programs have been postponed or cancelled due to lack of funds. World Bank and other donors augment short-term training undertaken by various organizations within the United Nations.

This program will focus a major part of its attention on supporting AID's policy and in-country energy projects. Continuous dialogues with Missions and host country officials will ensure that training efforts support the Agency's policy, and host country and Mission energy activities. Discussions with host countries will also consider training activities that will support other donor's in-country projects.

VI. Summary of Feasibility Analysis

A. Technical Analysis

The ETP will support targeted training to increase LDC technical competence to effectively utilize indigenous and renewable energy sources. As discussed in the project description this will be achieved through energy management, policy analysis, resource and technology development and energy planning. The training will concentrate on specific country energy conditions and will be accomplished through energy resource and manpower assessments, and special academic and non-academic training courses and internships.

B. Social Soundness Analysis

The social consequence of the ETP will vary among countries and the level of sensitivity to energy as a prime development input. There is a clear emphasis among AID-assisted countries on the process of modernization as they strive to improve the socioeconomic status of the population. The primary beneficiaries will be the participants themselves as their knowledge of energy will be increased through training. The efficiency of the spread effect will occur when trainees return to their home institutions and apply their knowledge to specific problems. The ultimate beneficiaries are the end users - the society at large - who will have more efficient utilization of energy and, thereby, increased services. The effects of energy training can be virtually universal on a society, depending on the specific technology involved, the efficiency of diffusion, the economic and social framework, and the equity with which that framework allows assets and income to be generated and shared.

The Role of Women

Women will have equal access to project training and participation in energy assessments. Due to social environments, it is anticipated that more women will participate in short term, in-country, and regional training programs.

Under the predecessor project approximately 3 percent of the participants trained in the U.S. were women. The contractor shall be instructed to give special attention to

the promotion and selection of female participants in this program. Our target is a 20 percent increase in female participants over the next five year period relative to the preceding period.

C. Cost Effective Analysis

This energy training project does not lend itself to traditional approaches of economic analysis because the training applicability is not easily predicted, the costs of implementing specific technologies are speculative, and much of the training remains to be identified. Emphasis on tailored training applicability and its contribution to socioeconomic impact are important factors in the cost effectiveness of this training.

This project takes advantage of existing educational and training programs, rather than creating new programs. The latter is extremely expensive and can increase per participant costs three to four times. However where no adequate energy training program can be found, one will be created. By using existing courses, costs will be reasonable for the service being provided. The project will explore the feasibility of using relevant third country training facilities, thus lowering costs in the future.

D. Economic Analysis

Numerous studies have attempted to measure the economic impact of education and training. Benefits of investing in human capital are generally measured in terms of anticipated impact on future income and productivity. This type of analysis is beset with statistical problems and exogenous factors. For example, there is a high correlation between persons receiving advanced training and persons with other advantages i.e., high social and/or economic status, educated parents, high intelligence, etc. Thus it is difficult to distinguish benefits attributable directly to advanced education and training.

Measuring economic returns from data on salary tends to undervalue the returns on investment in graduate-level training acquired in the U.S. Two factors account for this: (a) the cost of higher education in the U.S. relative to salaries in LDCs, particularly those with

whom AID deals, is extremely high, and (b) salary levels of government and public sector employees, the main beneficiaries of this project, do not reflect the full value of their marginal productivity.

While ex post quantification of economic benefits of education and training is difficult, ex ante quantification is even more so. For this project, which covers a broad range of degree and non-degree academic training and internships, a realistic quantification of economic benefits cannot be carried out.

Nevertheless, one can be reasonably confident that the benefits will justify the investment. Few development professionals, whether economists or not, doubt that investment in human capital generates a high level of real economic benefits.

The economic benefits to society are more evident than those to the individual. In the energy sector, several organizations have noted the lack of trained personnel to conceptualize, design, present and implement projects. This lack has resulted in fewer investment opportunities being presented to external donors and investors. Inefficiency in government also exacts a high cost in terms of utilizing scarce human and financial resources. The limited ability of government and public sector employees to manage energy resources effectively not only hinders private sector investment but also limits energy alternatives. By improving the capability to develop indigenous energy resources, the project should have a large beneficial impact on LDC economies. As energy planning, decision-making and production is increasingly under national control, the audience for this project is likely to be quite influential.

This project places high value on in-service training, an area of human resource development where returns are generally the greatest. By emphasizing training related to post-training employment and by selecting mature, work-oriented individuals, benefits should be even higher. Officials on a career track will be more likely to return home and contribute their enhanced skills to national development. A potential brain-drain is thus minimized. Were the project to be justified solely in terms of economics return to the individual, it would be difficult to establish the value. Returns to

individuals, particularly those employed in the government or public sector, are constrained by salary levels.

The ETP is evaluated and certified as economically sound, based on the assumption that trained participants will contribute to overall energy planning and effective utilization in their countries, thereby increasing national productivity. The cost of the training itself, including designing courses, will be offset by the development contributions made by participants.

E. Administrative Analysis

The ETP will be implemented through a private sector contractor. The critical contributions of the project will be accurate energy assessments, and a trained cadre of energy professionals.

The ETP, through the contractor and Advisory Council, will:

1. Fund energy training consistent with individual country needs and development priorities.

2. Upgrade and strengthen the capacity of LDCs to solve energy related development problems through multidiscriplinary approaches.

3. Provide opportunities for energy information sharing among countries.

4. Provide opportunities for energy professional to collaborate.

The contractor will be expected to develop a strong but direct management system to ensure:

1 Applicants concentrate on defined energy priority areas.

2 Resource allocations are commensurate with geographical divisions and energy technologies

3 AID consultation and dialogue are sought and reflected in decisions.

4. Adequate advertising of the project induces the best energy professionals to apply.

5. Applications are reviewed and trainees selected in a competitive, sound and timely manner.

6. Satisfactory standards of technical and financial accountability are maintained.

7. Tax liabilities for participants are covered.

The S&T/EY project manager will ensure implementation in accordance with the project design, authorization, and contract(s).

F. Financial Analysis and Plan

ETP is a non-revenue producing effort whose major financial element is used for training. Projected budget totals are used in preparing the ETP budget. On the average, $6 million is used as the total project budget figure for each fiscal year. Thus, a figure of $30 million over the life time of the project is projected. Based on previous experience of the CETP and buy-in projections obtained from the regional bureaus it is estimated that buy-ins will total approximately $15 million from regional and bi-lateral accounts. The total S&T Bureau cost is $15 million for the five-year project. Projected buy-in levels will be updated periodically. Mission and regional bureaus buying into the ETP will share in the administrative costs of the program. Table I (page 27) provides a five-year budget summary, including types of program areas, numbers of students estimated per program area, cost per student, and total program costs.

The budget estimate is based on experience gained from the previous energy training project. The costs of the project are calculated on the basis of estimates compiled under the CETP, e.g., $3,277 per month for non-academic training, and $1,497 for academic training. These figures do not include overhead costs. Compared to the S&T/IT figures of $3,300 and $1,850 respectively, which do include overhead costs, the figures compiled from the CETP at first appear high. Administrative costs under CETP are roughly $600,000 per year for 260 participants (see Table II) and cover international travel to meet with Mission and host

country officials; an extensive application and review process in order to select applicants and match them to appropriate courses; follow-up visits to programs sponsored under CETP to meet with participants and instructors; follow-up with participants who have returned to their country; and designing and implementing energy training programs when necessary. Taking the above into consideration the administrative costs for CETP do not appear high. S&T/IT costs do not include an extensive participant selection process and do not include follow-up or course design.

The figures assume that international travel for participants will be provided by the participant's employer or, in some cases, the relevant USAID mission. They also assume that the participant's employer will continue to employ the participant after the training, and to pay full salary during training. For those countries whose economic or budgetary situation makes it impossible for them to pay international travel costs, the project, in exceptional cases, will pay travel from the closest point served by the host country's airline to the U.S.

Costs of industrial internships are figured at $1,000 per month where no tuition or training costs are levied by the training institution. These figures do not include English language training, orientation or special services. Orientation is covered under the administrative costs. Special services are covered under administrative costs or by host country or Mission. English language training is expensive and based on CETP experience, is not cost effective. The time and funds spent in an intensive language training program can be better spent on energy-related courses. In-country training can be more cost effective in this case.

The project will provide training which falls roughly in the following categories:

Nonacademic:	Average Duration	Average Cost
Special Courses	4 months	$3,300 per month *
Institute Courses	4 months	$3,500 per month *
Industrial Internships	6-12 months	$1,000 per month *
Academic:		
Master's Degrees **	18-21 months	$1,500 per month *
Ph.D. Degrees ***	36-44 months	$2,000 per month *

* Includes maintenance, tuition, insurance, books, shipping, supplies, and administrative. Does not include specialized manuals or equipment. Administration costs will be determined by the economics of scale realized (see Table II page 29). This will be determined by the budgetary funds available each year of the project and the number of participants trained, which will vary as ST/EY's budget varies.

** Unless other degrees are requested by individual missions.

*** When funded by missions.

Tables I through V give breakdowns of project costs; Table VI lists project buy-ins.

The financial analysis in this project paper does not delineate precisely what S&T core funding will support and what will be supported by Mission buy-ins. Such a delineation is not possible at this preliminary stage given the uncertain nature of training activity to be undertaken by Mission buy-ins.

In principle, S&T core support will be used to design courses; track course progress and modify, if necessary; integrate training activities with other AID energy assistance programs and, in general, provide overall coordination and conceptual development of the project. Core support will also provide manpower assessments and participant training costs; in most cases, this support will be cost shared with Missions.

We anticipate that approximately 15% of energy short courses will be held in the host countries themselves. According to S&T/EY calculations, in-country training will be less costly than U.S. training, but not significantly less. The costs listed in Table I are not overly sensitive to US versus host country training location.

G. Environmental Analysis

ETP, because of its research and educational nature, does not require an Environmental Impact Statement or the preparation of an Environmental Assessment. The project meets the criteria for a categorical exclusion under 22 CFR 216.2 (c) (2) (i) (ii), which is recommended and requested in Annex D.

TABLE I

FIVE-YEAR BUDGET SUMMARY
(Includes Administrative Costs)

No. of Participants	Type of Program	Cost Per Student	Total Cost	
FY '87				
218	Special Courses(1)	@ 13,200	$2,876,000	
24	Institutes (2)	@ 18,667	448,000	
20	Academics (3)	@ 38,850	777,000	
12	Internships(4)	@ 12,000	144,000	$4,245,000
296				
FY '88				
271	Special Courses(1)	@ 13,200	$3,300,000	
24	Institutes (2)	@ 18,667	448,000	
20	Academics (3)	@ 38,850	777,000	
12	Internships(4)	@ 12,000	144,000	
327	Evaluation		50,000	
	Manpower Assessments and course Development*		277,000	$4,996,200
FY '89				
373	Special Courses(1)	@ 13,200	$4,923,600	
24	Institutes (2)	@ 38,850	448,000	
20	Academics (3)	@ 38,850	777,000	
12	Internships(4)	@ 12,000	144,000	
429	Manpower Assessments and Course Development*		508,400	$6,700,000
FY '90				
400	Special Courses(1)	@ 13,200	$5,280,000	
24	Institutes (2)	@ 38,850	448,000	
20	Academics (3)	@ 38,850	777,000	
12	Internships(4)	@ 12,000	144,000	
456	Manpower Assessments and Course Development*		301,000	$6,950,000

FY '91

426	Special Courses(1)	@ 13,200	$5,623,200	
24	Institutes (2)	@ 38,850	448,000	
20	Academics (3)	@ 38,850	777,000	
12	Internships(4)	@ 12,000	144,000	
	Evaluation		100,000	
482	Manpower Assess-ments*		97,800	$7,100,000
			FIVE-YEAR TOTAL	$29,912,000

*Funds not used for Energy Assessments or Course Development will go for additional participants.

(1) Special courses include both US and in-country non-academic courses and for the most part, will meet specific AID identified needs in LDCs.

(2) Institute courses are usually on-going courses established by energy related institutions in the US.

(3) Academic training refers to degree oriented programs only, not to university based short courses.

(4) Internships are individual placements at US centers of energy expertise.

TABLE II

ADMINISTRATIVE COSTS PER YEAR
based on No. of Participants)

No. of Participants	No. of Contractor's Staff	Administrative Cost
260	6	$600,000
300	7	650,000
350	8	700,000
400	9	750,000
450	10	800,000
500	11	850,000

TABLE III

M.S. DEGREE PROGRAM
(21 months)

Country	AID	Host
Tuition, Maintenance, Books, Supplies, Insurance, Contingency, Administration ($1,850/month)	$38,850	
International Travel		$2,500
Participant Salary		Variable
	$38,850	$2,500

TABLE IV

NONDEGREE PROGRAM
(4 to 6 months)

	AID	Host Country
Maintenance, Supplies, Insurance Contingency, Administration ($3,300/month)	$13,200-$19,800	
International Travel		$2,500
Participant Salary		Variable
	$13,200-$19,800	$2,500

TABLE V

INDUSTRY INTERNSHIPS
(12 months)

	AID	Host Country
Maintenance @ $900/month	$10,800	
Insurance @ $40/month	480	
Domestic Air Travel	500	
International Air Travel		$2,500
Local Transportation	200	
Participant Salary		Variable
	$11,980	$2,500

TABLE VI

PENDING MISSION BUY-INS

Country	raining Areas	Participants	Amount
Pakistan	one Identified	52	$ 850,000 *
Yemen	pplied Petroleum Exploration Technology	40	1,000,000 *
ASEAN Management	Energy Planning Policy	12	162,000 **

Other Indicated Mission Buy-Ins:

Egypt
Burma
Morocco
Jordan
Africa Bureau

* Includes administrative fee.

** Includes administration and international travel.

VII. IMPLEMENTATION PLAN

A. Administrative Arrangements

1. AID

The project Authorization will be signed by Dr. Nyle C. Brady, Senior Assistant Administrator for the Science and Technology Bureau.

2. Host-Country Implementing Agencies

There will be various host-country implementers who will be responsible for candidate applications, and ensuring that knowledge gained through the project is applied upon return. They will also be responsible for targeting when energy manpower assessments are necessary.

3. Project Disbursements

Disbursements will follow procedures set forth in implementation letters. An annual operating plan will be prepared by the S&T/EY project manager which will include a review of the previous year's activities, a description of the overall thrust of the coming year's activities, a specific work plan, and an operating budget. The plan must also address any proposed changes in selection criteria. Annual funding levels will be within the constraint of authorization amounts.

4. Buy-In Provisions

This project describes a broad, five-year, energy training program in support of regional bureau and mission energy programs. S&T expects to contribute up to $15 million toward the costs of this training program. Regional bureaus and missions are expected to contribute up to $15 million to the program as well. S&T funds may be used to fund all the categories of activities authorized under the project, including direct participant costs, and will be obligated under a single prime contractor on an annual, incremental basis.

Regional bureaus and missions may contribute their funds for any activity described under the prime contract. In general, these "buy-in funds will be

provided to the contract office under the following modes:

a. PIO/T requesting specific technical assistance, such as consultant services or a manpower assessment.

b. PIO/T requesting training for a specific individual.

c. PIO/T requesting the contractor to put together a specific training program for the country, such as an in-country course or a special course in the United States.

The contracts office will commit buy-in funds to the contract as follows:

a. Funds obligated initially under a bilateral project agreement will be committed to the prime contract under orders for technical services.

b. Funds administratively reserved in the PIO/T will be obligated under the contract as an incremental funding action.

The estimated cost of incremental funding actions under the contract is $20 million. The estimated cost of orders for technical services is $10 million.

B. Implementation Plan AID Management

Project implementation management and monitoring of AID inputs will be the responsibility of S&T/EY. A Project Officer will be assigned responsibility for the ETP and will be assisted as needed in monitoring, evaluating and reviewing all project components. The officer will dispatch cables to Missions, serve as an ex-officio member of the Advisory Council, and monitor the work of the contractor. AID will have access to all documents issued by the contractor. The AID role, then, is purely one for review/approval as opposed to that of implementer.

1. AID Contractual Arrangement

The contractor for this project will be chosen through an open-competition mechanism. The Request for Proposal (RFP) will make clear the

responsibilities of the contractor, which include development of short-courses, identification of existing training courses, development of internships, selection and follow through on trainees, energy assessments, and information exchange.

It is anticipated that AID will let one contract for the ETP.

2. Gray Amendment

As part of being responsive to the RFP, all proposing companies will be required to submit subcontracting plans which address how they will have Gray Amendment firms involved in implementation. Such plans must also address the ways in which Historically Black Colleges and Universities (HBCUs) will be used as training facilities.

C. Evaluation Plan

The ETP is innovative and, as such, may require periodic readjusting of training foci. For example, are the participants utilizing the training received upon returning to their country. If not, what can be done to better identify the training needs of the country and to identify appropriate individuals for training.

Evaluations will be the responsibility of AID. The contractor, the Advisory Council, regional bureaus and host country governments will participate in the evaluations as necessary.

Periodic evaluations will be held during the Advisory Committee Meetings and at other times when deemed necessary to look at selection procedures, fields of study and use of returned Energy Fellow. The Advisory Council, meeting at least semi-annually, will review the program of the contractor in all phases of the project and make recommendations where appropriate. In addition, the project budgets $150,000 for two external evaluations, one in FY 89 and one in FY 91.

Semi-annual review meetings will be held with representatives from the regional bureaus, PPC, S&T/EY, S&T/IT, as appropriate, and the contractor to review past activities and discuss upcoming and future

activities and travel plans. Additional meetings will be held, when appropriate, to discuss new programs or activities or any problems that arise that are of any significance.

Annual internal reviews will assess progress, serving as a basis for the development of the annual work plan and corresponding budget. The reviews will update and consolidate the information from semi-annual reviews, and will focus on:

1. Candidate application rates.

2. Participant selection.

3. Training effectiveness.

4. Training applicability.

Specific questions to be addressed in the mid-term and final evaluations include, but are not limited to:

1. General Program Effectiveness and Impact

   a. To what extent is the project meeting the objectives and goals of the original project paper? To the extent that the program has evolved in ways not fully foreseen at the time of project approval, have these changes enhanced the effectiveness of the program?

   b. Has the ETP been targeted to meeting critical needs in the developing countries, as determined by review of national energy problems, needs and priorities and by consultations with AID Missions and host government officials?

   c. Is the ETP duplicative of any other program? If fellowships for U.S. study in energy fields were not available under ETP, would they be available from other sources?

   d. How is the ETP promoting private sector involvement in LDC energy development? How has the private sector been involved in the implementation of the program?

e. Is the ETP responsive to U.S. foreign policy interests? How? How can this responsiveness be improved?

f. How is the ETP related to AID's interest in promoting institutional development and sound energy policies in the developing countries?

g. What levels of future funding are needed to ensure the project's efficacy in meeting stated goals and objectives? Should the project continue? Should current contracting arrangements be continued? If so, should some modifications be made in contractual requirements?

h. Given budgetary constraints, how can the effectiveness and impact of the ETP be enhanced within current levels of financial resources? How can cost-sharing with Missions, other donors, host countries and other sources be encouraged?

2. Academic Participant Selection and Placement

a. Are the Missions given appropriate and adequate guidance by the contractor and S&T/EY regarding the ETP's target candidate pool, nomination procedures, and admission requirements and procedures of the ETP and the universities involved in the ETP?

b. Is travel abroad by the contractor to meet with AID Mission personnel and host government or private-sector officials useful for improving communication? Is it sufficiently important to justify a major commitment of the contractors administrative budget (i.e., $25-40,000) and staff time (4-8 person-weeks annually)? How often should each region be visited?

c. Are the training application forms designed to provide all information necessary to find an appropriate match between the candidate's needs/interest and a U.S. training program? How can the form be improved?

d. Are the contractor's credential analysis services adequate in giving the contractor's staff guidance and universities the required interpretations of previous academic records?

e. What procedures does the contractor follow in deciding which universities to apply to for specific candidates? Are the procedures adequate for ensuring that the participants' desired specializations (not just major fields of study) can be provided at those institutions? Do the universities find the applicants sent to them by the contractor to be appropriate and qualified for consideration?

f. Are missions and candidates kept adequately informed about progress toward placement? Are they informed immediately when required document, test scores, letters of recommendations, etc. are missing? Are they informed in timely fashion if candidates are not qualified?

g. Are competitive selection criteria and procedures for academic candidates appropriate, workable and fair in both fact and appearance?

3 Selection and/or Development of Non-Academic Training Activities

a. Does the contractor's staff appear to be knowledgeable about the broad range of existing non-degree training programs in various aspects of energy that are offered by private industry, national laboratories, trade associations, professional societies, research institutions, universities, government agencies, consulting firms and others? Are there networks, professional affiliation, directories, data banks or other mechanisms available through which these programs could be made known to AID and the contractor?

b. How does the contractor determine whether these existing programs are appropriate or (adaptable to) the needs of LDC participants?

c. Has the contractor identified apparent gaps in available training within the fields covered by the ETP? How has it sought to fill those gaps? How effective has the contractor been in "commissioning" specific courses, developing their curricula and locating institutions and/or individuals to conduct them?

d. What is the ETP's record to date with respect to individually tailored internship programs? Have participants found them satisfactory? Have participating companies derived benefits from their participation? How can the general receptiveness to such requests be enhanced? Is there a need for better communication with potential participating companies? How can the advisory committee help?

4. Participant Monitoring and Support

a. How does the contractor stay in touch with participants in the field? Do the participants find the contractor to be accessible and responsive to special needs as they arise?

b. Does the contractor communicate with (and receive communications from) participants' institutional training advisors on a regular basis? Are written progress/grade reports received on timely basis? Do advisors keep informed of special problems? Do the advisors find the contractor responsive to the institutions' and participants' needs?

c. Do participants have an opportunity to meet and compare experiences with other ETP participants?

d. What improvements does the team recommend in each of the above areas?

5. Post-Training Evaluation Mechanisms and Procedures

a. Does the contractor conduct exit-briefings with all participants? If so, what records are kept of those interviews?

b. Are participants required to provide written reports evaluating their training experiences? If so, are these narratives or questionnaires? What questions are included? To whom are the results provided?

c. How does the contractor evaluate the programs (as opposed to the participants or their individual experiences) to which it has sent participants? Is the evaluation an interactive one, allowing the contractor to suggest program modifications

for future sessions? How do these evaluations affect decisions about sending participants to future sessions?

d. Has the contractor kept in touch with participants after they have returned home? How? Has it communicated with their employers? Can the contractor/ETP assess whether returned participants are using their training effectively in their jobs?.

e. What plans should the contractor and S&T/EY make now for future long-term evaluation of the impacts of the training on participants' future employment and performance, on national energy programs, and on U.S. interests (including but not limited to private sector interests) and involvement in LDC energy activities?

6. The Contractor's Program Administration and Staffing, AID Backstopping

a. Are the contractor's personnel working on the project of appropriate professional calibre and background? Are their individual responsibilities appropriate to their skills, and do they appear to be fulfilling their individual responsibilities effectively?

b. Is the contractor/ETP project staff effective as a team? How can the contractor's overall effectiveness be improved through reorganization, improved office automation, additional hiring or other changes? If so, how?

c. Are the contractor's procedures relating to participant call-forwards and travel, provision of monthly living allowances, payment of tuition, processing of insurance claims, responding to emergencies, and meeting other logistical needs adequate, appropriate and effective? Are there recommendations for improvements?

d. Is there a need, as candidate and participant case loads grow, to improve the contractor's record-keeping systems for easier access to up-to-date records on individual participants, on the total project population, on project budgets and expenditures? Can new approaches to

automation (e.g., use of microcomputers with commercially available software for spreadsheets and data base management) help in these areas?

e. How well are communications procedures (physical transport between the contractor and AID by messenger; editing, clearance and transmission by S&T/EY) working? Can telecommunications technology improve these procedures?

f. Are existing communication/consultation channels between the contractor and S&T/EY adequate? Are other AID entities (regional bureaus, S&T/IT, Missions, and PPC) brought into the communication/consultation loop at appropriate points?

g. Are changes needed in S&T/EY's backstopping and management of the ETP? If so, what changes are recommended?

h. Is interaction between the contractor and AID adequate in areas relating to Handbook 10 requirements and procedures such as approval of extraordinary expenses, processing of insurance claims, provision of visas and travel allowances, etc.? How can these procedures be carried out more smoothly?

ANNEX A

IMPLEMENTATION SCHEDULE

Major project events are summarized below. The S&T Project Officer will be responsible for monitoring the achievement of these targets, and work closely with the regional bureaus, contracts office, and S&T Program Office to help ensure smooth project implementation.

Action	Responsibility	Completion Date
Prior Action		
PP Approved	AID	February 1987
Project Authorization Signed	S&T	February 1987
RFP Prepared	S&T/EY	Feburary 1987
CBD Announcement	SER	March 1987
RFP Issued	SER	March 1987
Selection Panel Appointed	S&T/EY	February 1987
Proposals Due	SER	April 1987
Proposals Reviewed	AID	April 1987
Contractor Selected	AID	May 1987
Contract Negotiated, Awarded	SER	June 1987
Advisory Council Established	Contractor	June 1987
Advisory Council Meets	Contractor	July 1987
Applications Accepted	Contractor	July 1987
Mid-Point Evaluation	S&T	March 1989
Second Evaluation	S&T	July 1991

ANNEX B

CONVENTIONAL ENERGY TRAINING PROJECT SUMMARY

The S&T Bureau has supported energy training since 1980. The Conventional Energy Training Project (CETP) increased the technical capability of LDCs to develop and use indigenous conventional energy sources (fossil fuels and non-nuclear electricity). Participants were placed in academic and technical training programs at universities (M.S. degree level), private energy companies, non-profit institutions and national laboratories (see Tables I-IV). Training ranged from two months to two years. The project supported approximately 150 participants per year, 40 percent of whom were in academic programs. Special courses were designed to meet specific needs.

A Participant Follow-up Study was conducted in May, 1985 and stated, "the CETP has accomplished a high degree of productivity during its brief history. The quality and contents of its offerings have been positively appraised by the majority of participants, the trainees, their employers, and countries are experiencing a diverse range of benefits."

Based upon findings in the Participant Follow-up Study, the evaluation team made seven recommendations and related suggestions to increase CETP's impact and maximize AID's return on its training investment, in terms of programmatic benefits. These are:

- o Improve the selection process through greater overseas AID Mission involvement;
- o Disseminate program information more vigorously, systematically, and widely;
- o Find ways to make more technical materials, information, and contacts available to participants both during training and after their return home;
- o Place renewed emphasis on the importance of English language qualifications;
- o Continue emphasis on practical and specialized courses
- o Encourage in-depth employer evaluations of participant training; and

- o Increase efforts to promote private-sector interests and relations, including sales of U.S. goods and services.

The proposed Energy Training project incorporates these recommendations, allowing for training in all aspects of energy activities, and emphasizing the allocation of limited funds to the areas of highest priority as articulated by S&T/EY, Mission and host-country ministries. It incorporates lessons learned from CETP.

Target areas for training under the Energy Training project have been identified from feedback provided through CETP, various bilateral projects, and specific requests from Missions. These include, but are not limited to: petroleum accounting; renewable energy information systems; development, conversion and storage of solar energy; electricity management in industrial facilities; and power systems rehabilitation.

ANNEX C

ILLUSTRATIVE COURSE LIST

Whenever possible the Energy Training Project will use established courses. In addition, every effort will be made to use Historically Black Colleges and Universities (HBCUs) where courses are being offered in energy or energy related matters. It is anticipated, however, that a number of new training activities will be offered. Established courses include, but are not be limited to, the following courses:

A. Short Courses

- o <u>Utility and Industry Energy Conservation</u>

  This eight-week practical training energy conservation seminar is designed for utility and industrial plant engineers and supervisors. The program includes classroom study, field training and work in-plant, and gives the participants a solid theoretical and practical background in the implementation of in-plant energy conservation programs. Resulting energy savings have been outstanding according to reports received from previous participants.

- o <u>Electric Utility Engineering</u>:

  This course will provide electric utility engineers with practical knowledge of engineering practices and technology in the fields of fossil and hydro-power production, systems operation, transmission and distribution and long-term power planning. The first nine weeks will be spent in classroom training on all aspects of power production, followed by a seven-week period of specialized training in selected areas of study.

- o <u>Advanced Training In Power Engineering</u>:

  This intensive thirteen-week course is designed to give utility engineers a comprehensive view of power generation, transmission, distribution, operation and system planning. It consists of formal classroom work, workshops and visits to research facilities. All classes are taught at graduate level and are coordinated to provide a broad-based comprehension of those electric utility problems which are subject to engineering and mathematical analysis.

o Power Systems Engineering Course:

A thirty-week program on power system engineering designed for mid-level utility engineers. The first semester covers power systems fundamentals (advanced circuit analysis, synchronous machines, economics and planning, reliability, thermal cycles, and distribution systems engineering). The second semester deals with power systems computations, operations, protective relaying, surge phenomena, stability, and special topics.

o Managing A National Petroleum Enterprise:

This twelve-week course is designed to improve the participant's ability to promote cooperation with international oil companies and financial institutions on oil and gas ventures, and to negotiate prudent, productive and equitable contracts. Applicants will be senior level officials from private or public sector, petroleum or financial companies, ministries, and other appropriate entities.

o Applied Petroleum Exploration and Production Technology:

The course objective is to provide nondegree applied training in petroleum technologies (petroleum exploration, geophysics, engineering and economics) to mid-level technical personnel

o Coal Technology Training:

This sixteen-week course focuses on the utilization of lignite and low-rank coal in electric utilities and in industry. Participants will be trained in lignite coal analysis, testing and preparation; coal handling; combustion; boiler design and modifications; and environmental control technologies.

Courses in various renewable technologies are:

University of California/Davis	Gasification
Boiler Efficiency Institute (Auburn, Alabama)	Boiler Efficiency (Biomass Combustion)
Georgia Institute of Technology	Biomass
New Mexico State University	Windmills: Water and Electrical

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University of Massachusetts	Wind Energy
Denver Research Institute	Small-Scale Hydro Development & Management
MIT	Water Resources and Environmental Engineering
University of Colorado	Water Resources Engineering
Florida Solar Energy Center	Photovoltaics Applications Seminar
Cleveland State University	Photovoltaics Specialization

This is just a short list of programs offered in renewable energy technologies. Most last from 2 days to several weeks.

B. Academic training will be offered in response to requests by missions and LDC institutions who are able to financially support such activities (through buy-ins). Representative fields of study include, but are not limited to, the following:

- o Chemistry
- o Geology and Geophysics
- o Petroleum Engineering
- o Coal Mine Engineering
- o Energy Management and Planning
- o Energy/Natural Resource Law
- o Energy Economics
- o Natural Gas Engineering

Four types of education will be offered under this project:

- Industry and government internships
- Special courses training (including in-country and regional training)
- Non-degree University and University-Like Training
- M.S. degree training

A. Industry and Government Internships

Internships which provide on-the-job training may be the most useful training for those persons who have the requisite academic qualifications but lack practical experience of working in energy industries. In addition to those coming solely for an internship, the project will enable students taking an M.S. degree or in-service academic training to spend up to 12 months

interning in an industry as part of their academic training. This will enable the student to gain practical experience as well as the necessary academic background.

Internships will be sought with non-profit government contractors, national laboratories, federal agencies, academic institutions and the private sector. Organizations will be chosen on the basis of a strong capability in an energy technology. Examples of institutions are:

Federal Government

Department of Energy's National Laboratories
- Brookhaven National Laboratory
- Oak Ridge National Laboratory
- Argonne National Laboratory
- Solar Energy Research Institute (SERI)
- Lawrence Berkeley Laboratory
- Lawrence Livermore Laboratory

Department of the Interior
- Bureau of Mines
- Bureau of Land Management
- U.S. Geological Survey

Tennessee Valley Authority

Non-Profit Private Sector

- Florida Solar Energy Center
- Stanford Research Institute (SRI)
- Electric Power Research Institute (EPRI)
- Institute for Gas Technology (IGT)

U.S. Utilities

- Florida Power and Light
- Southern California Edison
- Pacific Gas and Electric

Private Sector

- A.D. Little
- Booze-Allen
- Bechtel
- Chevron Research Company
- Dow Chemical Company

Exxon
General Electric Company
International Business Machines (IBM)
Mobil
Standard Oil
Stone and Webster Engineering
Westinghouse

Typical internships may include:

Well Logging
Well Cementing
Computer Analysis/Energy Planning
Electric Load Management
Computer-Aided Reservoir Analysis
Seismic Analysis and Interpretation
Enhanced Oil Recovery

B. Special Training Courses

Special energy training courses will be designed to fill training needs not already available. These needs will be determined by interviews with relevant officials of AID missions, LDC ministries, and other energy organizations in the developing countries. These recommendations will be considered within the context of AID energy policies and programs and, more recently, the context of the program plan developed by the Office of Energy (S&T/EY) in consultation with other relevant agency offices.

Once the need has been established and agreed upon, the contractor will seek advice and counsel from professionals on the advisory committee involved in this program to learn what components should be included in the course being developed. At that point one or more energy training organizations will be contacted to determine interest and subsequently to develop a detailed curriculum and budget. The contractor and S&T/EY will work closely with such organizations in developing curricula and teaching manuals.

Typical short courses might include:

- <u>Fundamentals of Petroleum Engineering and Economics</u>

- <u>Promoting Investment in Indigenous Oil Exploration and Development</u>

- Power Systems Planning
- Economic Evaluation of Renewable Energy Systems
- Refurbishing And Rehabilitation of Power Plants
- Financial Management of a Utility
- Construction Planning and Management
- Cogeneration and Decentralized Power Generation
- Operation and Maintenance Of Diesels
- Coal Mining and Production
- Gas Management
- Economic Assessment of Renewable Energy Systems

ANNEX D

INITIAL ENVIRONMENTAL EXAMINATION

Project Location:	Worldwide
Project Title:	Energy Training Project
Funding:	15.0 Million Grant
Life of Project:	5 years
IEE Drafted by:	J. B. Sullivan
IEE Reviewed by:	J. Vanderryn
Environmental Action Recommendation:	Categorical Exclusion

Concurrence: _____
Nyle C. Brady
Senior Assistant Administrator

Environmental Officer's Decision

Approved: _____
Disapproved: _____
Date: _____

S&T/EY:SAToth:aed:02/18/87:09940

D 1020-20 (7-71)
PPLEMENT I

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 87 to FY 91
Total U.S. Funding $30.0 Million
Date Prepared: Feb. 11, 1987

oject Title & Number: _____

PAGE 1

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
rogram or Sector Goal: The broader objective to hich this project contributes:	Measures of Goal Achievement:		Assumptions for achieving goal targets:
To increase, LDC technical competence to identify, explore, and use, a wide range of energy resources for productive use and economic development.	Number of participants that complete training programs successfully and assume employment positions in which skills/techniquer acquired by training can make a contribution to host country and AID related programs and activities.	Contractor records of follow-up acticitivies. AID records LDC records Projects Evaluation at end of FY 1989 and FY 1991.	(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.

1020-20 (7-71)
ELEMENT 1

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

ject Title & Number:

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
ject Purpose: To provide targeted training to LDC personnel in energy resource in fields identification, exploration, production, 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 records based on follow-on activities. Contractor's reports and Project Managers'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.

AID 1020-28 (7-71)
SUPPLEMENT 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: _____

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

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs:	Magnitude of Outputs:		Assumptions for achieving outputs:
(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.	Up to 1990 LDC professionals trained. (995 funded by S&T and an additional 995 through buy-ins).	Contractor's periodic reports.	(A) Sufficient funds are available.
(B). Energy assessments performed.	Up to 25 assessments completed (12 funded by S&T and 13 funded by buy-ins)	AID/Contractor/LDC records.	(B) Sufficient number of training candidates exist with adequate prerequisites of skills, language, and secured relevant employment.
(C). Better trained personnel in private-sector energy activities: finance, investments, and supporting enterpreneurial initiatives.		Project Manager's Annual Report.	
(D). Trained personnel as requested and funded by Missions and LDC institutions.			

AID 1025-26 (1-71)
SUPPLEMENT 1

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

Project Title & Number: _____

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs: (A) From S&T/EY: professional training in support of AID's ongoing and planned activities and programs. (B) From Missions & Bureaus: funding (including overhead) in support of specifically requested training activities. (C) From LDCs: full or partial funding (including overhead) in support of specifically requested training activities.	Implementation Target (Type and Quantity) (A) Funding of up to $15.0M over the LOP. (B) Funding of approximately $15.0M as buy-ins over the LOP. (C) To be determined on a need/request basis	Contractor's Vouchers and AID's records. LDC's Governmental and Institutional records.	Assumptions for providing inputs: AID Congressional budget authority LDCs Foreign exchange for international travel, per-diem, salary, and local currency for locally procurred activities and services.

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