PP [illegible]

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A (A = Add, C = Change, D = Delete) — Amendment Number: _____ — DOCUMENT CODE: 3

2. COUNTRY/ENTITY: AFRICA/REGIONAL

3. PROJECT NUMBER: 698-0424*

4. BUREAU/OFFICE: AFR/RA 06

5. PROJECT TITLE (maximum 40 characters): Energy Initiatives for Africa

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 09 DD 30 YY 87

7. ESTIMATED DATE OF OBLIGATION (Under "B." below, enter 1, 2, 3, or 4): A. Initial FY 82 B. Quarter 4 C. Final FY 86

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY 82 B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	868		868	13,500	4,000	17,500
(Grant)	(868)	( )	(868)	(13,500)	(4,000)	(17,500)
(Loan)	( )	( )	( )	( )	( )	( )
Other U.S. 1.						
Other U.S. 2.						
Host Country					2,650	2,650
Other Donor(s)						
TOTALS	868		868	13,500	6,650	20,150

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
(1) ST	7405	878				868		13,500**	
(2) SH	7405	878						4,000	
(3)									
(4)									
TOTALS						868		17,500	

10. SECONDARY TECHNICAL CODES (maximum 5 codes of 3 positions each): 371 | 873 | 874 | 876

11. SECONDARY PURPOSE CODE:

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code	BRW					
B. Amount	16,000					

13. PROJECT PURPOSE (maximum 480 characters)

To strengthen the institutional capabilities of African governments to plan and implement sound energy programs and projects, and to demonstrate and help disseminate self-sustaining public and private sector initiatives to address Africa's problems of deforestation, oil import dependence, inefficient energy use, and lack of development of indigenous energy resources.

14. SCHEDULED EVALUATIONS: Interim MM 06 YY 84 — Final MM 10 YY 86

15. SOURCE/ORIGIN OF GOODS AND SERVICES: [X] 000 [ ] 941 [ ] Local [ ] Other (Specify) 935

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a ____ page PP Amendment)

* Funds from a separate project account, 625-0956, will finance Sahel subprojects under Energy Initiatives for Africa.

** Funding for IFI subprojects will be loan funded, unless grant funding is clearly justified. The PP facesheet will be amended as IFI loans are identified.

17. APPROVED BY — Signature: Donald F. Miller — Title: Director, AFR/RA — Date Signed: MM 04 DD 29 YY 82

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM 04 DD 23 YY 82

AID 1330-1 (8-79)

PDAAN-960

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A (A = Add, C = Change, D = Delete) — Amendment Number: —— — DOCUMENT CODE: 3

2. COUNTRY/ENTITY: AFRICA/REGIONAL

3. PROJECT NUMBER: 698-0424*

4. BUREAU/OFFICE: AFR/RA | 06

5. PROJECT TITLE (maximum 40 characters): Energy Initiatives for Africa

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 09 DD 30 YY 87

7. ESTIMATED DATE OF OBLIGATION (Under "B." below, enter 1, 2, 3, or 4): A. Initial FY 82 B. Quarter 4 C. Final FY 86

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY 82 B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	868		868	13,500	4,000	17,500
(Grant)	(868)	( )	(868)	(13,500)	(4,000)	(17,500
(Loan)	( )	( )	( )	( )	( )	(
Other U.S. 1.						
Other U.S. 2.						
Host Country					2,650	2,650
Other Donor(s)						
TOTALS	868		868	13,500	6,650	20,150

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
(1) ST	7405	878				868		13,500**	
(2) SH	7405	878						4,000	
(3)									
(4)									
TOTALS						868		17,500	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 871 | 873 | 874 | 876

11. SECONDARY PURPOSE CO

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code	BRW						
B. Amount	16,000						

13. PROJECT PURPOSE (maximum 480 characters)

To strengthen the institutional capabilities of African governments to plan and implement sound energy programs and projects, and to demonstrate and help disseminate self-sustaining public and private sector initiatives to address Africa's problems of deforestation, oil import dependence, inefficient energy use, and lack of development of indigenous energy resources.

14. SCHEDULED EVALUATIONS: Interim MM 06 YY 84 | MM | YY | Final MM 10 YY 86

15. SOURCE/ORIGIN OF GOODS AND SERVICES: ☒ 000 ☐ 941 ☐ Local ☐ Other (Specify) 935

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* Funds from a separate project account, 625-0956, will finance Sahel subprojects under Energy Initiatives for Africa.

** Funding for IFI subprojects will be loan funded, unless grant funding is clearly justified. The PP facesheet will be amended as IFI loans are identified.

17. APPROVED BY — Signature: Donald F. Miller — Title: Director, AFR/RA — Date Signed: MM 04 DD 29 YY 82

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM 04 DD 23 YY 82

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

From: AFR/DR, Norman Cohen, Acting Director

Subject: Energy Initiatives for Africa (698-0424) - Project Authorization

Problem: Your approval is required to authorize a total of $17,500,000 - $13,500,000 from the Selected Development Activities (FAA Section 106) appropriation and $4,000,000 from the Sahel Development Program (FAA Section 121) appropriation - for the Energy Initiatives for Africa (EIA) project (698-0424). Of the stated authorized amount, an obligation of $868,000 from the SDA appropriation is planned for FY 1982.

Discussion:

1. Background: The Energy Initiatives for Africa project grew out of recognition of the need of the African countries for flexible, rapid response assistance in achieving near-term reduction in their dependence on expensive oil imports and in relieving pressures on their increasingly depleted fuelwood/forest resources. Bilateral and ST/EY assistance is limited primarily to large, specialized energy planning or implementation projects; and resources are insufficient to respond to needs of those African countries where specific projects have not been programmed. The urgency of most such countries' oil import and deforestation problems, relatively modest levels of assistance required to initiate movement toward solutions, and wide range of possible solutions all support the need for a flexible regional umbrella-type energy assistance project.

The final Project Paper incorporates the principal issues and recommendations of the December 1981 Nairobi energy workshop, which highlighted African countries' and regional institutions' lack of access on what technological or dissemination approaches have or have not worked in Africa and why. The assessment component of the project subsequently was strengthened to allow for more probing analysis of available technology choices.

2. Project Description: The purpose of the Energy Initiatives for Africa (EIA) project is: 1) to strengthen the institutional capabilities of African governments to plan and implement sound national energy programs and projects; and 2) to demonstrate and help disseminate self-sustaining public and private sector initiatives to address Africa's problems of deforestation, oil import dependence, inefficient energy use, and lack of development of indigenous energy resources.

EIA is an umbrella project. It is consistent with and builds upon the Africa Bureau's approved strategy for energy, forestry, and environment. EIA has four components:

> Planning, Policy Development and Technology Assessment (PPDTA), including detailed Africa-wide project evaluations in high-potential energy and forestry areas and provision of energy planning and asssessment assistance to host country governments.

- A Subprojects Fund, providing loans and grants for private enterprise development activities, project lending by national development banks, and other intermediate financial institutions (IFIs), initiation of CDA energy projects, and other initiatives.

- Training and Institutional Strengthening, providing grants for training, workshops, and related activities for African energy planners, IFIs, and energy/forestry practitioners and cooperative activities with the African Development Bank (AFDB).

- Information/Experience Sharing, establishing an informal information/resource-sharing network in Africa drawing heavily on existing informaton centers.

EIA is intended to fill gaps in A.I.D. and other donors' activities - in region-wide project evaluation, project preparation, energy conservation, and other areas - and to test alternative approaches which entail lower levels of long-term dependence on external financial intervention. Particular emphasis is placed on planning and project preparation to mobilize all potential public and private sector resources and on support of private enterprise initiatives.

The EIA project will operate in all sub-Saharan countries, including the Sahel, where A.I.D. provides assistance. The project will be managed by the Office of Regional Affairs, Africa Bureau, (AFR/RA), and will employ a single project contractor, with a U.S. headquarters office and field offices in Abidjan and Nairobi.

3. Financial Summary: The estimated cost of the project over five years (FY 82-86) is $20,150,000. A.I.D.'s contribution is $17.5 million. Participating African countries are expected to provide approximately $2,650,000 as 25% host country contributions to subproject grants.

Summary of Inputs

	U.S. 1st Year ($000)	U.S. LOP ($000)	Host Country LOP ($000)	Total ($000)
Prime Contractor T.A.	828	6,050	—	6,050
Other Consultants	40	150	—	150
Subprojects Fund		10,550	2,650	13,200
FAA Sec 106	—	(6,550)	(1,590)	(8,140)
FAA Sec 121	—	(4,000)	(1,060)	(5,060)
Training	—	350	—	350
Information/Experience	—	200	—	200
Project Evaluation	—	200	—	200
TOTAL	**868**	**17,500**	**2,650**	**20,150**

Of the $10,550,000 budgeted for country-level subprojects activities, up to a maximum of $4 million may be spent in Sahelian countries. Sahel subprojects funds will come from a separate account, 625-0956, set up for the purpose of the EIA program.

An as-yet-unspecified amount of subproject funds will be channelled through intermediate financial institutions (IFIs). The presumption is that these activities will be loan-funded, unless grant funding is clearly justified. The EIA Project Paper facesheet will be amended as IFI activities are identified.

The $200,000 budgeted for independent project evaluation will be reserved for contracting through an 8(a) minority firm. In addition, between $200,000-$300,000 of AID/W-sponsored subproject activities will be reserved for contracting through 8(a) firms over the life of the project. Funding for latter activities can be financed from either Section 106 or Section 121 of the FAA.

4. Findings: On the basis of the analyses contained in the Project Paper, the Acting Director of AFR/RA finds the project to be technically, economically and financially sound and consistent with all applicable A.I.D. directives.

5. Committee Action: The Project Review Committee met on May 19, 1982 and recommended that the project go forward to review by the Executive Committee for Project Review (ECPR). The issues raised during or after the ECPR, held June 8, 1982 were resolved as follows:

A. Loan vs. grant funding for IFIs: As noted in paragraph 2 above, funds made available to IFIs will be on a loan basis unless grant funding is clearly justified.

B. Relationship of the EIA project contractor to the two REDSOs: It was agreed that the contractor's Abidjan and Nairobi representatives will function independently but will develop a consultative relationship to the REDSOs. Management of the project and contractor will be the responsibility of AFR/RA.

C. EIA project contract: Should the TA/Training contractor be selected as a small business set-aside or open competition? The Africa Bureau has determined that it cannot demonstrate that small business firms do not have the technical and management capacity to effectively carry out the contract's scope of work. It appears that there may be a few small firms with the requisite technical qualifications. Therefore, the contract will be a small business set-aside, for competition within the small business community. If, however, the technical review panel determines that no adequate proposals have been received, the competition will be broadened.

D. EIA budget: AFR/RA recently re-calculated the EIA project budget to ensure that sufficient funds will be available for contract tasks — in particular the policy planning, technology assessment, and training components. The Regional Affairs Office determined that the planned LOP level of $16 million was inadequate to fully fund these tasks over the life of the project. Any funding shortfall would be detrimental to the project because of the critical role in project implementation to be played by the contractor. Rather than reduce funding in other project components such as the Subprojects Fund, the LOP amount has been increased by $1.5 million to a total of $17.5 million.

E. Berg report:. The question was raised on how the EIA project design fits with conclusions of the Berg report. Two chapters of the report deal with energy: Chapter 7, "Other Productive Sectors," and Chapter 8, "Longer-Term Issues." The report emphasizes the need to focus development efforts on the fuelwood scarcity problem, reforestation, renewable energies, hydropower, energy conservation, and energy planning — all concerns addressed in the EIA project. The report also urges regional cooperation in training of energy policymakers which is provided for under the training and institutional strengthening component of EIA. In sum, the project is consistent with the recommendations of the Berg report.

F. AFR/DP comments on the EIA Project Paper economic analysis: DP's major concern is that a thorough economic analysis be performed for each subproject approved under EIA to ensure that the financial/economic viability of new enterprises and technologies is carefully considered. This kind of economic analysis will be required for the preparation and review of every subproject proposal; relevant procedures for this are described in the EIA Project Paper in Annex E, "Subprojects Fund Award Criteria."

G. PRE Bureau comments on private enterprise investments under EIA: Discussion with PRE staff produced the following actions on their comments:

— In the contractor workplan, to be drawn up shortly after selection of a contractor, the contractor will be instructed to pay special attention to the commercial viability of energy technologies to be examined in multi-country technology assessments.

— Also in the workplan, the contractor will be required to make special efforts to recruit African and/or U.S. businessmen with experience in renewable energies and forestry technology as members of technology assessment teams.

— AID funds provided to intermediate financial institutions (IFIs) will normally be on a loan basis at rates which allow the IFI to exhibit discipline in its internal financial management and assure financial viability of commercial ventures supported. Rates not consistent with these criteria should be justified.

— Before a loan to any IFI is approved by AID, their financial and administrative capabilities will be assessed including the adequacy of interest rate structure and the projected demand for sub loans.

H. Frances Johnson comments on private sector involvement in EIA: Mrs. Johnson has prepared a detailed paper on how the U.S. private sector could effectively interact with the EIA project. We plan to implement her suggestions as follows:

— Advice from U.S. business community. We will follow up on Mrs. Johnson's recommendation that a one-day seminar be held before EIA implementation commences to solicit advice from U.S. businessmen on how best to plan technical assistance for the project. At this seminar, the group will also advise AID/W on methods for achieving project objectives, and on criteria for accepting activities for financing under the Subprojects Fund with special emphasis on their potential commercial and financial viability.

— Broaden LDC access through the project to U.S. business consultants. While we remain committed to contracting with one U.S. firm for the bulk of T.A., we will take actions to ensure that U.S. business energy experts are utilized as short term consultants. Also, AID/W will be sponsoring a limited number of subproject activities under EIA, and for these, T.A. would be procured from IQC firms and sources other than the prime contractor.

— Focus on profit-making enterprises. The IFI mechanism should enable the Subprojects Fund to reach small entrepreneurs. If this mechanism proves effective, we anticipate that a considerable portion of subproject monies will be channelled through IFIs to the private sector.

— More T.A. in National Planning and Policy Development component. As noted in paragraph 5E of this memo, we are increasing the contractor's budget in part to allow for stengthening the planning and policy development component. In a separate point relating to national energy planning assessments, AFR/DP/PPEA will be asked to review USAID requests for such assessments, as they are received in AID/W.

I. As concerns EIA, the project and the Africa Bureau plans to implement the GAO's three recommendations (page 13 of the report) as follows:

— Initiate energy training programs for AID mission staff. AID's training office will engage a contractor for design of a methodology for this kind of training. Also, AID staff training is explicitly called for in the Africa Bureau's Guide for Action on energy, forestry and environment.

— Limit testing of energy devices to those which have reasonable cost/benefit ratios. The EIA project will focus on tried and true energy technologies which have a good chance of becoming self-sustaining and of spreading on their own. The private sector entrepreneurial element of the project reinforces this thrust. On this point, the project design is consistent with the GAO report recommendation.

— More evaluation before starting new projects. EIA is very strong on this point. Both the multicountry technology assessments and the national energy planning assessments, along with AFR/DR/SDP's soon-to-start technology evaluation program, will help insure that energy planners have access to up-to-date information on existing activities in their countries before initiating new ones.

6. Covenants and Conditions Precedent: There are no conditions, covenants or negotiations required with participating host countries prior to authorization of this project. Any special conditions or covenants that may be required with respect to individual subprojects will be determined in the preparation and design of the subproject.

7. Congressional Notification: The Congress was advised of A.I.D.'s intent to undertake this project on June 22, 1982. The notification period expired July 7, 1982 with no objections or questions being raised. No further notification is required.

8. Responsible Officers: The officer responsible for backstopping this project in AID/W is Mary Ann Riegelman (AFR/RA). A.I.D. field posts will assign officers responsible for specific countries.

Recommendation: That you sign the attached Project Authorization and thereby approve $13.5 million from the SDA account and up to $4 million from the SDP account to finance the Energy Initiatives for Africa Project.

Attachments: 1. Project Authorization
2. Project Paper

Clearances:

AFR/DR/CCWAP:RAnderson
AFR/RA:EButler
AFR/DR/SDP:MWard (subs)
AFR/DP:GCauvin (subs)
AFR/DP:IDCoker (subs)
AFR/SWA:FGilbert (subs)
AFR/EA:HJohnson (subs)
AFR/CA:JJohnson (info)
AFR/SA:JHicks (subs)
GC/AFR:EADragon
DAA/AFR:ARLove
DAA/AFR:FCorrel (info)
DAA/AFR:GPatterson (info)
AFR/DP:JMudge (subs)
AFR/DP:FJohnson
AFR/DR/EHR:HSteverson (phone)
PRE/I:BBouchard (subs)

MARiegelman:jd AFR/RA 7/1/82 X29821/GHazel:cel/AFR/DR/CCWAP 7/7/82.

PROJECT AUTHORIZATION

Name of Country: Africa Regional

Name of Project: Energy Initiatives for Africa (EIA)

Number of Project: 698-0424

1. Pursuant to Sections 106 and 121 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Energy Initiatives for Africa Project ("Project"), involving planned obligations of not to exceed $17,500,000 ("authorized amount") principally in grant funds (subject to the condition stated in section 4,b,(1) below) over a four year period from the date of authorization, subject to the availability of funds in accordance with the A.I.D./OYB allotment process, to help in financing foreign exchange and local currency costs for the project. The authorized amount will be charged to the cited appropriation accounts, as follows:

Section 106 $13,500,000

Section 121 $4,000,000

2. The Project is an umbrella project designed to assist sub-Saharan African countries to develop and implement national policies and programs which effectively address their pressing energy problems. The project has four components: 1) Planning, Policy Development and Technology Assessment, including detailed Africa-wide project evaluations in high-potential energy and forestry areas, and provision of energy planning and assessment assistance to host country governments; 2) Subproject Fund, providing grants and loans for government and private enterprise development activities, project lending by intermediate financial institutions, initiation of CDA fuelwood and energy projects, and other initiatives; 3) Training and Institutional Strengthening, providing grants for training and workshops for African energy planners and practitioners; and 4) Information/Experience Sharing, establishing an informal information/resource-sharing network in Africa drawing heavily on existing information centers. EIA will operate in all sub-Saharan countries where AID has assistance programs.

The project has two purposes: 1) To strengthen the institutional capabilities of African governments to plan and implement sound national energy programs and projects; and 2) to demonstrate and help disseminate self-sustaining public and private sector initiative to address Africa's problems of deforestation, oil import dependence, inefficient energy use, and lack of development of indigenous energy resources.

To carry out the objectives of the project, A.I.D. will provide financing for personnel, consultants, technical assistance, training, commodities, and other costs.

3. The various types of project agreements, contracts, and other agreements which may be negotiated and executed by the officers to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority, shall be subject to the following terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

4.a. Source, Origin and Nationality of Goods and Services.

(1) General.

Except as provided for in paragraphs a(2), a(3) and a(4) below, and except as A.I.D. may otherwise agree in writing, goods and services financed by A.I.D. under the project shall have their source and origin in the United States or in the Cooperating Country in which a specific activity takes place. In addition, ocean shipping financed by A.I.D. under the project shall, except as provided for in paragraphs a(2), a(3) and a(4) below and except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

(2) Rules for Relatively Least Developed Countries.

Except as provided for in paragraphs a(3) and a(4) below, and except as A.I.D. may otherwise agree in writing, goods and services for activities in a Relatively Least Developed Country, shall have their source and origin in countries included in A.I.D. Geographic Code 941 or in such Cooperating Country. In addition, ocean shipping financed by A.I.D. under the project for activities in a Relatively Least Developed Country shall, except as A.I.D. may otherwise agree in writing, be financed on flag vessels of the United States, other countries in Code 941 and the Cooperating Country.

(3) Grants to Certain Non-governmental Organizations.

For grants to United States and foreign private, nonprofit organizations and educational institutions, the rules set forth in A.I.D. Handbook 1, Chapter 16, Section 16B1c(4) shall apply. Where the total procurement element exceeds $250,000 in value, the basic rules stated paragraphs a(1) and a(2) above, will apply, as appropriate.

(4) Grants or Loans to Privately Owned or Government Owned Organizations.

(A) For grants to privately owned or government owned organizations, the basic rules stated in paragraphs a(1) or a(2) above, will apply, depending upon the geographic code applicable to the Cooperating Country in which an activity takes place.

(B) For loans: (i) the authorized source is Geographic Code 941, except as A.I.D. may agree otherwise in writing; (ii) ocean shipping will be financed under the project on vessels under flag registry of the United States, other countries in Code 941, and the Cooperating Country, except as A.I.D. may agree otherwise in writing.

b. Special Conditions.

(1) With respect to funds made available to intermediate financial institutions under the project (the Subprojects Fund component), such funds shall be provided on a loan basis, rather than on a grant basis, unless the providing of funds on a grant basis is clearly more advantageous than providing a loan, and a full justification for grant funding is made in the subproject paper.

(2) Loan terms (grace period, if any, repayment period, interest rates, or other terms) shall be those that are applicable to private borrowers or revenue earning organizations under A.I.D. policies as in effect at the time a loan or commitment therefor is made. At the time of writing of this Authorization, the criteria for loan terms to revenue-producing enterprises (both public and private) are set forth in Manual Order 1052.1, dated August 15, 1971.

Date: _____

_____
F. S. Ruddy
Assistant Administrator
for Africa

Clearances (As shown on Action Memorandum)

Drafted by: GC/AFR:EADragon:my:6/25/82:29218

TABLE OF CONTENTS

I. SUMMARY AND RECOMMENDATIONS

A. Facesheet (attached)

B. Recommendations

The following actions are recommended herein:

1. Authorization, in an amount not to exceed $868,000 in FY 1982, of a regional project to assist sub-Saharan African countries develop and implement national policies and programs which effectively address their pressing energy problems.

2. Approval of life-of-project (five years) funding, subject to the availability of funds, in an amount not to exceed $17.5 million.

C. Description of the Project

The purpose of the Energy Initiatives for Africa (EIA) project is to strengthen the institutional capabilities of African governments to plan and implement sound national energy programs and projects and to demonstrate and help disseminate self-sustaining public and private sector initiatives to address Africa's problems of deforestation, oil import dependence, inefficient energy use, and lack of development of indigenous energy resources.

EIA is an umbrella project. It is consistent with and builds upon the Africa Bureau's strategy for energy, forestry, and environment, entitled "A Guide to Action." EIA has four components:

- -- Planning, Policy Development and Technology Assessment (PPDTA), including detailed Africa-wide project evaluations in high-potential energy and forestry areas and provision of energy planning and assessment assistance to host country governments.
- -- A Subprojects Fund, providing grants for private enterprise development activities, project lending by national development banks, and other intermediate financial institutions (IFIs), initiation of CDA fuelwood projects, and other initiatives.
- -- Training and Institutional Strengthening, providing grants for training, workshops, and related activities for African energy planners, IFIs, and energy/forestry practitioners and cooperative activities with the African Development Bank (AfDB).
- -- Information/Experience Sharing, establishing an informal information/resource-sharing network in Africa drawing heavily on existing information centers.

EIA is intended to fill gaps in AID and other donors' activities -- in region-wide project evaluation, project preparation, energy conservation, and other areas -- and to test alternative approaches which entail lower levels of long-term dependence on external financial intervention. Particular emphasis is placed on planning and project preparation to mobilize all potential public and private sector resources and on support of private enterprise initiatives.

The EIA project will operate in all sub-Saharan countries, including the Sahel, where AID provides assistance. The project will be managed by the Office of Regional Affairs, Africa Bureau (AFR/RA), and will employ a single project contractor, with a U.S. headquarters office and field offices in Abidjan and Nairobi.

D. AID Inputs

1. Prime Contractor Technical Assistance, including: carrying out the PPDTA component; subproject design and monitoring; coordination of project components; and all logistical and administrative costs associated with establishing contractor offices in Africa and hiring and supporting staff.

2. Other Consultants. During the four-to-six months needed to contract with a U.S. firm, IQC assistance will be used for early subproject design and national energy assessments.

3. Subprojects Fund. Subprojects grants of up to $500,000 each ($1 million each for CDA initiatives) will support activities in a wide range of energy technologies -- e.g. cookstove improvement, reforestation, energy conservation, mini-hydro, and agro-forestry. AID/W will allot subproject funds.

4. Training for national and subregional energy planners, staff of IFIs, and practitioners the village and subproject levels. The contractor will administer training funds.

5. Information/Experience Sharing to cover costs of establishment of small libraries in the contractor field offices and limited contractor printing and distribution of informational materials to USAID missions, EIA grantees, and others in Africa.

6. Project Evaluation. These funds will finance overall project evaluation, including mid-term and final evaluations to be carried out by independent teams.

E. Financial Summary

The estimated cost of the project over five years (FY 82-86) is $20,150,000. AID's contribution is $17.5 million. Participating African countries are expected to provide approximately $2,650,000 as 25% host country contributions to subproject grants.

Summary of Inputs

	U.S. 1st Year ($000)	U.S. LOP ($000)	Host Country LOP ($000)	TOTAL ($000)
Prime Contractor T.A.	828	6,050		6,050
Other Consultants	40	150		150
Subprojects Fund	-	10,550	2,650	13,200
Training	-	350		350
Information/Experience	-	200		200
Project Evaluation	-	200		200
Totals	868	17,500	2,650	20,150

F. Project Implementation

AFR/RA will have overall management responsibility for implementation of EIA, including approval of requests for assistance from the field and proposals put forward by other AFR/W offices. AFR/RA will receive technical guidance from AFR/DR/SDP and ST/EY. USAID field offices will concur in all country-level activities sponsored by EIA -- national energy assessments, subprojects, and training -- and will administer subproject grants.

Functions of the EIA prime contractor include the following:

-- Stimulation of new EIA activities. Regular vists by contractor to Africa missions interested in participating in EIA will foster development of subprojects and training activities.
-- Design-phase technical assistance in identifying and structuring national energy assessments, subprojects and training activities.
-- Implementation-phase duties, such as drafting subproject grant agreements and training memoranda of understanding, carrying out technology assessments and national energy planning assessments, preparing commodity procurement documents, and subproject monitoring.
-- Coordination and overall monitoring of EIA field activities, through periodic workshops and the information/experience-sharing network.

AFR/RA and CM/ROD/AFR will initiate competitive contractor selection immediately following EIA project authorization. Each contractor field office will employ two expatriate experts in energy planning and project implementation, a local-hire extension/dissemination specialist, and a secretary/administrative assistant. The contractor's home office will employ a project manager responsible for liaison with AID/W, contract management, hiring and supervising staff and short-term consultants, commodity procurement and project logistics.

G. Findings

On the basis of the analysis contained herein, the Director of AFR/RA concludes that the project is technically, economically, and financially sound. The analysis reflected herein supports the conclusion that the project meets all applicable AID criteria and will not have an adverse impact on the environment.

H. Issues

The Project Committee raised two issues during the course of the preliminary review of the project. The first concerned the setting aside of a small amount of funds from the Subprojects Fund for AID/W-proposed studies and conferences. It was subsequently decided that AFR/RA will review requests annually and establish a budget ceiling for these activities. Studies and conferences will be consistent with and not duplicative of other EIA activities.

The second issue concerned training. There was discussion of the project design team's decision to make all training under EIA Africa-based. The Project Committee ultimately endorsed this decision, agreeing that in view of the project's objectives, U.S. training would not be cost-effective and might duplicate other training programs sponsored by AID/W offices, in particular ST/Energy.

II. PROJECT DESCRIPTION

A. Background

1. History of the Project

The Energy Initiatives for Africa (EIA) project grew out of recognition of the urgent need of virtually all African countries for flexible, rapid response assistance in achieving near-term reduction in their dependence on expensive oil imports and in relieving pressures on their increasingly depleted fuelwood/forest resources. Bilateral and ST/EY assistance is limited primarily to large, specialized energy planning or implementation projects; and resources are insufficient to respond to needs of those African countries where specific projects have not been programmed. The urgency of most such countries' oil import and deforestation problems, relatively modest levels of assistance required to initiate movement toward solutions, and wide range of possible solutions all support the need for a flexible regional umbrella-type energy assistance project.

As set forth in the PID (approved February 20, 1981), EIA was conceived as an umbrella project which would:

- Provide flexible technical assistance in national energy planning and policy development and "provide for a continuing systematic evaluation and comparative analysis of the effectiveness of ongoing energy projects in Africa, and feasibility for wide-scale replication in various countries;"

- "Conduct pilot activities to develop and/or test feasibility and capabilities for the host country to consider undertaking as large-scale long-term energy projects"

- Provide "a flexible mechanism to support training of host country personnel who will ultimately design and manage and evaluate renewable energy activities;" and,

- "Provide an exchange of information on energy issues."

The EIA project objectives remain essentially the same as set forth in the PID. However, the Project Paper takes into account experience with other AFR energy projects developed since the PID was prepared, new Cooperation for Development in Africa (CDA) fuelwood initiatives in five countries, and continued development of AFR's energy strategy, culminating in **"A Guide for Action," approved by the AA/AFR, April 29, 1982.**

2. Problem to be addressed

Annex C profiles the energy, environmental, and economic situation for sub-Saharan Africa. While problems and options vary widely by country and

even by district within a country, the basic dimensions of Africa's energy problem* are that:

- With the exception of much of the West African coastal region and a few highland areas, increasing consumption of fuelwood is, together with other causes (such as land clearing for agriculture), leading to rapid deforestation with accompanying environmental degradation and a decline in the position of the poor. This trend has particularly ominous implications for long-term agricultural productivity in most African countries.

- For all but a few countries (primarily West African coastal countries with offshore oil prospects and Southern African countries with abundant coal or hydro resources), oil import dependence is very high and projected to increase. Costs of such imports, exceeding 50% of many countries' entire export earnings and official development assistance flows, are diverting funds from needed investment for economic growth.

- The efficiency of conversion and utilization of both "commercial energy" (fossil fuels and electricity) and traditional fuels (fuelwood and agricultural residues) generally is very low. Efforts to introduce more efficient cookstoves, charcoal kilns, and industrial energy conservation measures are just getting underway and, while holding promise for the future, as yet have had little impact on energy consumption.

- The extent and utility of most countries' indigenous energy resources -- oil and gas, coal, lignite, peat, hydropower, geothermal, fuelwood, agricultural residues, or solar-based systems -- still are largely unknown, and progress to develop and utilize such resources is slow.

Underlying these problems is a general weakness of African institutions in energy. The consensus of the AFR Workshop on Energy, Forestry, and Environment (Nairobi, Dec. 1981) was that, institutionally, most African countries have only limited ability to respond to the energy problems facing them. Forest departments historically have been oriented to timber/pulpwood production and policing of watershed-protection forests and do not have the staff, extension-oriented experience, or supporting infrastructure (nurseries, transport, etc.) to mount the large-scale afforestation and agro forestry efforts necessary to achieve fuelwood supply-demand balance. Few governments have the ability to prepare projects sufficiently to receive outside financing or to devise policies and institutions to attract

*In this project, energy is defined broadly to include fossil fuels, electricity, fuelwood and other biomass, any of the technologies specified by the UN Conference on New and Renewable Energy (summarized in Annex G) and energy conservation measures. Any activity which produces fuelwood as an important output is included, even if -- as in the case of agroforestry or multipurpose leguminous trees -- fuelwood may not be the primary reason the trees are planted.

and oversee private sector resource exploration or development. Few local entrepreneurs have the information or experience necessary to link new energy technologies to local market opportunities. Finally, only a few countries have begun to introduce incentives, assistance activities, or technologies to stimulate energy conservation, even though in general this appears to represent the fastest, most economical, and most socially acceptable way to reduce dependence on oil imports and free up capital needed for productive investment.

A major institutional weakness highlighted at the Nairobi Workshop is countries' and regional institutions' lack of access to information on what technological or dissemination approaches have or have not worked and why. AID and other donors have funded many demonstrations in afforestation, agroforestry (which represents a major potential fuelwood source), and other renewable energy areas (Annex D); but there has been little evaluation of these demonstration projects. There also has been very little analysis of what pricing or other energy policies countries have adopted and what the effects of these policies have been. As a consequence, African countries facing energy policy or program choices have little or no information base on which to draw.

B. Africa Bureau Strategy and Objectives

1. Africa Bureau for Energy, Forestry and the Environment Strategy

The EIA Project is consistent with the Africa Bureau's strategy, entitled "A Guide for Action," based on the results of the Nairobi workshop. The Africa Bureau strategy recommends action in the following:

a) Energy Efficiency and Conservation, with emphasis on reduction in consumption of fuelwood and charcoal by focusing on improvements in traditional charcoal production, introduction of improved wood and charcoal stoves manufactured and marketed as an entrepreneurial activity, and "other conservation technologies that hold promise of widespread dissemination within the urban and rural private sectors".

b) Conventional Energy, with emphasis on provision of strategically selected training and technical assistance in such areas as policy and planning for conventional energy use; conservation and efficiency in the transportation, building. and industrial production sectors; fuel substitution to conserve scarce domestic and imported fuels; and programs for assisting conventional fuel development.

c) Institution Building in Host Countries and AID, addressed first of all to the short-term need for assistance to initiate policy planning. There also is a longer term need to strengthen institutional capabilities to carry out independent analysis and planning and to place energy within a broader context of national development. Specific

actions recommended include provision of long and short-term training, AID mission review of short and long-term planning needs, concentration on planning and analysis leading to implementable project proposals, and "that policies be formulated and projects designed to take explicity into account local institutional weaknesses by relying wherever possible, on encouraging private sector initiatives and by placing the minimum burden on public agencies and extension services".

d) Renewable Energy, recognizing that of the wide range of technologies AID has demonstrated, "very few of them appear to be capable of widespread replication due to technical problems, excessive costs in relation to benefits, social acceptability, or to maintenance and repair problems which appear to be beyond the capacity of African institutions and entrepreneurs." Specific action recomendations include focusing on identification and dissemination of a limited number of technologies holding both commercial promise and potential to have a national energy impact; concentrating on technologies which could substantially increase agricultural production; and devoting more attention to mini-hydro power as a financially viable alternative to diesel systems.

e) Forestry and Natural Resource Management, including improved management of existing forest resources as well as agroforestry, afforestation, and reforestation programs; introduction of "bridging fuels" as wood and charcoal substitutes to buy time for the regeneration of forest reserves, especially in Africa's semi-arid areas; more attention to urban woodfuel needs; and stress on the critical role of agroforestry in areas where small farmers could begin to integrate agriculture with tree cultivation. Specific action recommendations include assessment of forestry research (including economic and social research) in Africa; strengthened dissemination of information on seed sources, especially of genetically improved fast-growing trees; training of agriculturalists, foresters, and other natural resource managers; encouragement of the development of small private nursery and forestry services in Africa; and inclusion of forestry and natural resource conservation considerations in future AID agricultural and river basin project designs and evaluations.

2. Related Activities of AID and Other Donors

Annex D lists individual energy and forestry projects financed by AID, IBRD, and other donors in each African country. Together, these projects represent over $2.3 billion in donor energy and forestry investment in Africa since 1974, broken down as follows ($ millions)*:

Energy planning/technical assistance	35.4
Electric power sector	1803.4
Geothermal	63.9
Renewable energy	100.3
Forestry/fuelwood	228.8
Other (including nuclear, fossil)	127.0

*Sources: AID budget presentations, World Bank projects summary, and summary of other donors' projects prepared for UN Conference on New and Renewable Energy, Nairobi, 1981.

Over the same time period, AID and other U.S. Government organizations have provided $75.9 million for energy, forestry/fuelwood, and related bilateral projects in 21 African countries (listed by project in Annex B). Virtually all such projects are designed to demonstrate or implement specific renewable energy technologies or particular approaches to fuelwood plantation or social forestry initiatives. In addition, Table II-1 lists S&T multilateral energy and forestry projects with FY 83 funding totalling $11.4 million, a portion of which supports African countries or regional organizations. Also listed are African Bureau multilateral projects which may have a small energy or forestry component.

Despite what appear to be very substantial resources being allocated to energy and forestry in Africa:

- Such efforts are far from sufficient, especially in fuelwood/forestry (where the FAO/World Bank's estimated required level of planting in most countries is ten to twenty times the current rate);

- Some major areas of need or opportunity -- for example, selection and production/distribution of seeds of high-yield multipurpose trees, energy conservation, and improvements in traditional charcoal production -- have only begun to receive attention.

- There has been insufficient effort given to learning from the many isolated afforestation, agroforestry, cookstove improvement, and other energy-related projects underwritten by the various assistance organizations or to integrate results into national plans and policies;

- The primary strategies attempted so far have been heavily dependent upon donor and/or African government technical and financial assistance and extension efforts, with relatively less attempt to mobilize local smallholder, artisan/entrepreneur or other private sector initiatives; and,

- The costs of many such assistance-dependent strategies -- particularly in fuelwood production, where costs of $1000 or more per planted hectare are common -- implies that no reasonable level of assistance ever can solve the problems they address.

Finally, there is substantial unrealized potential for much closer cooperation between AID and other donors, oil exporting countries' development finance institutions, and private commercial banks and sources of risk capital.

TABLE II-1

AID Multilateral Projects Related to the EIA Project

Project Title	Project Number	Proposed FY 83 Obligation ($000)	Total Planned Project Cost ($000)
I. Office of Energy - Bureau for Science and Technology			
Energy Management Training	G 936-1160	750	3,475
Energy Technical Service Support	G 936-5702	450	3,150
Alternative Energy Training	G 936-5716	750	6,942
Conventional Energy Assistance	G 936-5724	2,000	7,750
Energy Planning Assistance II	G 936-5728	1,000	10,000
Conventional Energy Training	G 936-9997	2,000	14,650
Energy Policy and Planning Assistance	G 936-5703	254*	3,823
Technology for Rural Poor	G 936-5701	1,000	7,875
Bioresource-Energy Production	G 936-5709	900	8,100
Decentralized Hydropower	G 936-5715	800	4,500
		9,904	70,265
II. Office of Forestry and Natural Resources - Bureau for Science and Technology			
Forest Resources Management	G 936-5519	650	2,430
Agro Forestry	G 936-5545	500*	1,000
Forestry Sector Development	G 936-5546	300	2,515
		1,450	5,945
III. Office of Regional Affairs - Africa Bureau			
African Manpower Development	G 698-0384	1,000*	1,150(5%)**
African Manpower Development II	G 698-0433	4,000	1,350(5%)**
Envir. Training for Africans	G 698-0427	1,000*	1,325(20%)**
African Development Bank	G 698-0127	400*	500(10%)**
		6,400	4,325

*FY 83 proposed expenditure based on previous obligation.

**Estimated life-of-project (LOP) expenditures on energy or forestry. Percentages shown are percentages of the total LOP costs by project.

Source: FY 83 Congressional Presentation.

C. Project Objectives and Strategy

1. Project Goal

The goal of the EIA project is to assist sub-Saharan African countries develop and implement national policies and programs which effectively address their pressing energy problems.

2. Project Purpose

The EIA project is intended to strengthen the institutional capabilities of African governments to plan and implement sound national energy programs and projects, and to demonstrate and help disseminate self-sustaining public and private sector initiatives to reverse Africa's problems of deforestation, oil import dependence, inefficient energy use, and lack of development of indigenous energy resources.

3. Project Strategy

The EIA project builds directly on the Africa Bureau Strategy for energy, forestry and environment, while recognizing that EIA is but one tool for carrying out this strategy. The EIA project will:

a) Conduct and widely disseminate assessments of various approaches to afforestation, agroforestry, cookstove improvement, energy conservation, and other interventions. The project design team finds that there is a substantial potential payoff from thoroughly evaluating the results of the many disparate projects to, for example, develop and disseminate improved cookstoves and then aggressively seeking to use such evaluation information to influence both national energy planning and future project design. Without evaluation and information sharing, there is a high probability that African countries and AID and other donors will continue to adopt project approaches which have not worked elsewhere and overlook project successes where they have occurred.

b) Provide short-term "gap-filling" energy planning and project preparation assistance where such assistance is unavailable from ST/EY, the IBRD, African Development Bank, or other sources. Experience in Sudan, Kenya, Botswana, and elsewhere has shown that even modest planning assistance can achieve concrete short-term results in areas such as pricing and other policy mechanisms to stimulate energy conservation, forest resource development, or private sector cookstove improvement.

c) Provide short-term workshops or specialized conferences, on-the-job training, region-wide studies of African energy and forestry problems, informal experience and information sharing, and an informal referral network to foster closer interchange among African planners, practitioners, and project investors working in the energy and related fields. Currently, there is inadequate interchange among Africans in various countries working, for example, to promote agroforestry or cookstove improvement. Closer interchange could -- at very low cost -- reduce duplication of effort and hasten selection of successful

project and policy solutions. EIA will both use its own resources and also seek the close cooperation of other AID programs and projects such as ST/EY, the African Manpower Development Project, (AMDP) the Environmental Training for Africans (ETMA) Project, and others to foster such interchange.

d) Where appropriate, undertake cooperative activities with the African Development Bank (AfDB) in energy planning, energy project preparation, energy conservation, and training of host country energy project investment specialist. In so doing, the EIA project will take advantage of the AfDB's growing capacity, being strengthened through AID's AfDB Support Project (698-0127), in these areas. The AfDB is the regional African institution best suited to providing energy assistance to African countries. It also has the advantage of being committed to expanding both its technical and financial assistance in energy and forestry.

e) Demonstrate and evaluate promising energy technologies and dissemination approaches, with emphasis upon approaches which build upon and support local private sector initiatives. Limited experience with private sector afforestation, agroforestry, cookstove improvement, energy conservation, and other energy initiatives strongly suggests that there is untapped potential for private sector activities in these areas. While most African countries have a very small, highly protected modern industrial sector, smaller scale private enterprise -- artisans, market traders, private smallholders, and others -- is quite dynamic in most countries. There are many examples of rapid diffusion of new "technologies" -- hybrid maize and other smallholder crops for example -- through the private sector in Africa. To date, few donor energy and forestry projects have tried to take advantage of this private sector potential.

f) Act as an intermediary with existing information networks within and outside Africa to disseminate demonstration and evaluation results.

4. Coordination with Other AID/Donor Programs

The Energy Initiatives for Africa project is intended to fill gaps in AID and other donors' activities -- in region-wide project evaluation, project preparation, energy conservation, and other areas -- and to test alternative approaches which entail lower levels of long-term dependence on external financial intervention. Particular emphasis is placed on planning and project preparation to mobilize all potential public and private sector resources and on support of a variety of private enterprise development initiatives. The project also provides resources to initiate CDA or other multi-donor initiatives. Therefore, as described in the Project Components section below, the EIA project will be closely coordinated with AID and other donors' activities, including in particular:

- The energy planning assistance activities of ST/EY, as well as the IBRD, EEC, and other donors;

- ST/EY, ETMA, AMDP and other AID training programs encompassing energy, forestry or natural resource management;
- ST technical assistance activities in forestry, biomass energy, mini-hydro, energy conservation, and other energy-related areas; and,
- AFR/DR project development activities, including CDA activities, in these areas.

D. Description of the Project

1. Project Components

Energy Initiatives for Africa (EIA) is a five-year project (FY 82-86) comprised of four interrelated components:

- Planning, Policy Development, and Technology Assessment -- including detailed Africa-wide project evaluations in high potential energy and fuelwood/forestry areas and provision of energy planning and assessment assistance to host country governments;
- A Subprojects Fund -providing grants for private enterprise development projects, initiation of CDA energy/fuelwood projects, in-country project lending by national development banks or other intermediate financial institutions (IFIs), and other initiatives;
- Training and Institutional Strengthening -- providing grants for training, workshops, and related activities for energy planners, IFI's and energy/forestry practitioners; and,
- Information/Experience Sharing -- establishing an informal information/resource-sharing network in Africa.

The EIA project will operate in all Sub-Saharan countries, including Sahelian countries, in which AID has field offices. The project will be managed by AFR/RA, with technical input from AFR/DR and ST/EY, and will employ a single project contractor with a U.S. headquarters office and field offices in Abidjan and Nairobi. Each contractor field office will interact closely with the appropriate REDSO. These and other implementation arrangements are described in Section V.

a) Planning, Policy Development, and Technology Assessment

Under this component, the project will provide for:

(1) Africa-Wide Technology Assessments: The EIA contractor will conduct detailed assessments of African countries' experience in implementing projects in at least ten high potential energy and forestry areas. The assessments, which will draw upon AID or other project evaluations where these exist, will address the technical, economic, sociocultural, and institutional/extension aspects of projects, with a view to providing all countries and donors with information on what technologies and dissemination approaches have and have not worked and why. At the December 1981 Nairobi Workshop, there was widespread agreement that such information should be generated as soon as possible,

since countries and donors currently risk committing themselves to approaches which are unlikely to achieve positive results. Table II-2 provides examples of assessment areas. For each area, a minimum three-person contractor team of experts will evaluate a representative selection of both AID and other donors' projects in all relevant ecological zones of Africa. Project selection and assessment planning will be coordinated with AID/W and the REDSO. Where appropriate, suitable institutions within Africa -- such as the International Council for Research in Agroforestry (ICRAF) in agroforestry -- will be subcontracted to conduct or participate in such evaluations. Results -- both favorable and unfavorable -- will be disseminated widely throughout Africa.

TABLE II-2

Examples of Technology Assessment Areas

- Village or individual smallholder woodlot extention
- Alternative agroforestry approaches in various ecological zones
- Arid zone legumes and other multipurpose trees or shrubs
- Improved charcoal kilns/retorts and alternative systems (e.g., briquetting agricultural residues)
- Biomass combustion, pyrolysis, and producer gas systems
- Cookstoves, cooking devices, and cooking systems
- Sectoral energy efficiency improvement experience (industry, transport, etc.)
- Alternative water supply/irrigation technologies
- Mini-hydro and other decentralized power generation
- Utilization/conversion experience with coal, peat, lignite
- Geothermal resource development and utilization

(2) National Energy Assessments: The EIA contractor, in concert with the appropriate USAID mission and REDSO, will quickly inventory the status of each country's national energy planning and policy development activities. The inventory will include a review of the planning assistance provided by ST/EY, AID bilateral projects, IBRD, African Development Bank, and other donors. For those countries whose existing energy plans are inadequate and which are not programmed to receive such assistance from any of the above sources, EIA will provide a modest level of contractor technical assistance (two-six person-months per country). This assistance will help develop initial energy assessments and policy recommendations and determine project priorities. Such plans and priorities, if none previously existed, will in most cases form a basis for considering subproject grant proposals. To the extent resources permit, the contractor may provide limited additional assistance (one person-month) to specify or analyze in greater detail priority projects or policies identified during the assessment. Where more substantial assistance is required, a mission or REDSO may request a subproject grant for a pre-project study (see below).

b) Subprojects Fund

(1) Subproject Grants: Grants of up to $500,000* will be provided to host country agencies or PVOs operating in Africa for projects to meet priority energy needs through market-oriented approaches or alternative approaches capable of being spread at a level of financial and/or extension intervention which is both cost-effective and within government and donor capabilities. Specifically included are projects which build upon an existing artisan, entrepreneurial, rural, smallholder and/or cooperative base and which have a high probability of expanding through the working of normal market forces. Also included are projects to establish cost-effective and sustainable long-term activities providing seeds, seedlings, or other inputs necessary to support expanded production, conversion, distribution, or utilization of fuelwood/forestry or other indigenous energy.

A primary purpose of the Subprojects Fund is to test a variety of dissemination approaches -- including particularly private enterprise development approaches -- which minimize the need for long-term commitment of scarce government or donor financial, manpower, organizational, or other resources and capabilities. A second purpose is to provide startup funding to initiate priority multi-donor initiatives -- particularly CDA initiatives -- in energy, fuelwood/forestry and related areas. A third purpose is to help provide within Africa those inputs -- particularly seeds of appropriate species -- or infrastructure without which broad, effective afforestation and agroforestry efforts cannot take place.

*Grants in excess of $500,000 can be awarded in exceptional cases, for example for large CDA fuelwood projects. The maximum per CDA subproject is $1 million. See Section V.

Annex E sets forth the Subprojects Fund award criteria, to be specified in greater detail by AFR/RA following EIA project authorization. Approval criteria address technical, economic, sociocultural and administrative feasibility, and environmental and resource management impacts. The criteria preclude grants directly to private for-profit enterprises, although -- as discussed in the next section -- grants can be made to financial intermediaries who in turn may lend to or contract with such enterprises. The criteria also make it clear that priority will be given to market-oriented or other approaches which require a minimum of long-term outside financial or extension assistance.

A 25% host country or PVO contribution will be required for all subproject grants. Any mission requests to waive or reduce the 25% contribution for a relatively less developed country (RLDC) must be approved by AID/W.

Section V describes the subprojects approval process. In summary, the Fund will utilize a two-step approval process roughly similar to that used for Improved Rural Technology (IRT) grants. PID-level approval authority rests with AID/W. The contractor, through its Abidjan and Nairobi offices, upon request will assist missions in PID-level preparation and, if approved, assist in subsequent project preparation and approval. Missions will negotiate, approve and authorize subprojects.

AID will initiate subproject grants and certain EIA project activities before the EIA contractor is engaged, using IQC contractor assistance as necessary. Examples of possible subproject grants, based on USAID mission cables received and proposed CDA initiatives, are shown in Table II-3.

As soon as the Fund is operational, IRT will cease considering energy project grant applications.

(2) Grants to IFIs*: The Subprojects Fund may be used to award grants to intermediate financial institutions (IFIs) in Africa, who will then lend to indigenous entrepreneurs or organizations for energy or forestry projects. IFIs may include national or subregional development banks, host government agencies with established facilities for lending to the private sector, or private voluntary organizations (PVOs) with established private enterprise development programs. Examples of candidate institutions are provided in Annex F.

Stimulation of many beneficial private sector energy activities will require initial provision of credit, as well as in some cases initial marketing and technical assistance. Examples include artisan fabrication and marketing of improved portable cookstoves, use of more efficient kilns by small charcoal producers, and fuelwood production for sale by smallholders. Limited donor and PVO project experience to date suggests that there is great potential for expanding these and other private sector activities by providing small amounts of credit at a country's prevailing interest rate. Many national development banks and a few PVOs with small enterprise loan programs have the lending

* Per change made at ECPR Meeting, IFI financing will be on a loan basis, unless grant financing is clearly justified.

experience, outreach network, and institutional capacity to establish and operate such a lending program. The Economic Analysis section addresses IFI experience and potential in greater detail.

Grants to IFIs are intended first as a vehicle for on-lending for relatively small-scale private sector and forestry activities. In addition, these grants will be used to test the approach of using IFIs for energy lending activities. As the Africa Bureau has found with the Entente Fund and other on-lending programs, use of the IFIs has great potential for reaching local entrepreneurs that AID cannot reach directly. However, some IFIs have encountered management problems which must be overcome if such potential is to be realized. The purpose of EIA grants is to draw upon and demonstrate use of the best IFIs, not to try to strengthen weak or marginal IFIs. For this reason, EIA grant awards to IFIs will be highly selective, based on thorough evaluation of the IFI's institutional capacity and lending history (see Section V and Annex E).

AID will award grants of up to $500,000 each to IFIs. Grant proposals from IFIs generally will specify individual subactivities representing approximately 50% of the grant request. Proposers also must provide a minimum 25% host country/PVO contribution. Any IFI loan over $100,000 must be approved by the USAID field office. AID may elect, based on favorable initial lending experience, to award additional EIA grants to an IFI, up to an aggregate funding limit of $1 million per IFI.

TABLE II-3

Partial List of Mission-Proposed Subprojects for Early EIA Funding

Country	Technologies or Project	Status
Mauritania	Improved cookstoves, solar stills, windmills	Under investigation
Central African Republic	Improved cookstoves	Pilot completed, estimated budget $150,000
Burundi	Hydropower, solar energy, CDA forestry and fuelwood initiatives*	- Planning underway, estimated U.S. funding level - $333,000 per year for 3 years
Malawi	CDA forestry/fuelwood*	"
Senegal	"	"
Upper Volta	"	"
Zaire	Two minihydro projects	Project proposal completed

* Somalia and Burundi planned CDA fuelwood/forestry projects to be funded bilaterally rather than through EIA.

(3) AID/W-Proposed Studies and Conferences: AFR/RA may use a limited amount of Subprojects Fund monies for studies conferences initiated by the Africa Bureau in support of EIA project objectives. Activities funded may include (a) pre-feasibility or project design efforts where there is a high probability of project implementation, (b) investigations of significant energy/forestry problem in order to improve design or implementation of future projects, and (c) meetings or conferences to discuss and disseminate results of such investigations. Studies or conferences may be undertaken independently by AID or in collaboration with the IBRD, AfDB, or other project financing institutions or multi-donor bodies such as CDA. Subprojects Fund support of AFR/W-initiated studies and conferences will be budgeted anually, based on proposals submitted by AFR/W offices.

c) Training and Institutional Strengthening

(1) Training Assistance: The project will provide grants or contracts up to $50,000* each for the following types of training activities:

(a) Short-term informal training sessions and workshops, conducted in Africa, for national energy planners or for energy planning staffs of such sub-regional organizations as the Economic Community of West African States (ECOWAS) or Comité Permanent Interétats de Lutte Contre la Sécheresse dans le Sahel (CILSS). Such training will be coordinated with that provided through the AfDB, the SUNY Stony Brook Energy Management Training Program and the University of Florida Renewable Energy Training Program, the AMDP, and other donors' training activities. The emphasis will be, to a much greater degree than in the above programs, on exchange of information, experience, and insights among the participants themselves.

(b) Training/workshops for those IFIs supported, or likely to be supported in the future, as part of the Subprojects component. These sessions will focus on energy and forestry project identification, analysis, and preparation; project financing; and post-financing assistance to help assure projects' continued viability. These sessions will be coordinated with, and where appropriate co-sponsored by, the AfDB, which currently conducts training and workshop programs for national development banks throughout Africa.

(c) Practitioner-oriented training and technical assistance, including in-country tradesman and technician training, national or subregional "hands-on" workshops among practitioners in particular areas (e.g., rural woodlots, artisan-made cookstoves, charcoal production, or commercial and industrial energy efficiency), or provision of an African and/or expatriate practitioner team to provide on-the-job training support to particular projects. Major purposes of such training will be to upgrade regional capabilities in areas such as agroforestry or improved cookstoves, to foster interaction among present or prospective projects funded under the Subprojects component, and to help develop the technical assistance capability of participating on-lending institutions.

*Proposed training costing more than $50,000 will require AID/W approval.

All training will take place in Africa, unless specifically approved for other locations by AFR/RA. The EIA project contractor, through its Abidjan and Nairobi offices, will assist the REDSOs, missions, and national governments to identify training needs, assess various African institutions' capabilities of meeting such needs, and design appropriate training activities. As described in Section V, training grants or contracts will be developed and administered by the EIA contractor, subject to concurrence by the USAID field office involved. Annex G describes the award criteria in greater detail.

(2) AfDB Cooperation: The African Development Bank (AfDB) currently conducts energy and forestry project feasibility studies, packages and co-finances energy and forestry projects, and provides technical assistance, funding and training to national development banks in energy and other fields. In addition, the AfDB presently is preparing a long-term plan to expand its role in energy, with emphasis on improving its energy planning and project preparation capabilities.

The AfDB, by virtue of its present sectoral planning expertise and unique ability to help arrange project financing drawing upon many capital sources, is in the best position to become the predominant African institution providing energy planning and project preparation assistance to national governments throughout Africa. Therefore, the Energy Initiatives for Africa project contractor will maintain a close cooperative relationship with the energy unit of the AfDB, both in energy planning and in helping African governments establish the capability to conduct commercial and industrial energy audits and identify opportunities to improve efficiency of energy use. EIA training grants will complement AfDB efforts by funding on-the-job training and multicountry workshops to build national energy audit and efficiency improvement capabilities. Where appropriate, such training may be co-sponsored with the AfDB.

Energy technical assistance required by the AfDB will be provided under AID's general AfDB support project. Phase II of this project will make appropriate provision for such expertise. Current plans call for provision of two long-term experts, one each in energy planning/project preparation and energy conservation, and related short-term consultant assistance. The EIA project team will liaise closely with these experts and with the AfDB African energy staff.

d) Information/Experience Sharing

The EIA contractor will use its Nairobi and Abidjan offices as centers for an informal Africa-wide information and experience sharing network in energy and forestry. The contractor will maintain a library of evaluation reports and other carefully selected information on specific projects, technologies, and extension/dissemination/enterprise development approaches. The EIA contractor will both directly support recipients of Subprojects Fund assistance and also solicit and respond to requests from African energy planners and practitioners generally. The contractor will help guide a request to the most appropriate sources of assistance, and thus must be able to draw upon or refer requestors to major information sources worldwide (Volunteers in Technical Assistance,

Inc, (VITA), Intermediate Technology Development Group (ITDG), Appropriate Technology International, etc.). Outreach -- through articles in others' newsletters (e.g., Sylva Africana), field visits, and periodic workshops -- will enable the contractor to build and maintain a network of practitioners and to stay abreast of their experiences. The contractor also will play an active role in building relations among national and subregional networking/information centers such as ENDA (Senegal), INADES (Ivory Coast) or the Botswana Technology Center. The contractor will coordinate with ETMA and other AID-sponsored networking activities in Africa. Rather than duplicate others' activities, the contractor will work with and through others to the maximum extent possible.

2. End-of-Project Transition

As discussed in the Evaluation Plan section, an independent team will conduct mid-term and final project evaluations. A primary purpose of the mid-term evaluation will be to develop specific recommendations for the period following the end of the project. It is intended that by the end of the project, planning, policy development, assessment and information-sharing will be undertaken by African governments -- or, where appropriate by regional organizations such as the AfDB -- as ongoing well-established activities. The contractor, prior to project completion, also will transfer its information-sharing functions to appropriate African regional or subregional institutions. To foster the transition, the Implementation Plan (Section V) specifies that EIA contractor expatriate personnel in Abidjan and Nairobi are to be terminated, thus turning contractor field operations over to an all-African team, six - twelve months prior to overall contract termination. The desirability of adhering to or modifying this schedule will be assessed as part of the mid-term evaluation.

3. Summary of AID Inputs

AID will provide total project funding of $17.5 million, broken down as follows (see Financial Plan section):

	$ 000
° Prime Contractor Technical Assistance	6,050
° Other Consultants	150
° Subprojects Fund	10,550
° Training	350
° Information/Experience Sharing	200
° Evaluation	200
	$17,500

4. Expected Project Outputs

The EIA project is expected to result in the following project outputs.

(a) Planning, Policy Development, and Technology Assessment
- Assessments of African program/project experience in 10 energy or forestry technology areas

- National energy assessments completed in 10 countries
- 20 policy/project development assistance assignments completed

(b) Subprojects Fund
- Minimum 30 directly funded subprojects grants awarded
- Additional 5 grants awarded to IFIs and 20 IFI loans or contracts
- Minimum 15 subprojects (including IFI subprojects) completed and evaluated
- Evaluation of experience of all IFI grantees completed
- 3-5 Specialized studies completed and disseminated

(c) Training and Institutional Strengthening
- 5 short-term energy planning training sessions/workshops held, with minimum 20 African attendees each
- 5 IFI training sessions held, with average 12 attendees each
- 20 practitioner workshops held, with average 12 practitioners each
- Technical assistance/cooperation provided to AfDB. Of above training sessions, minimum 5 in conjunction with AfDB

(d) Information/Experience Sharing
- Results of 10 technology assessments and 5 subproject evaluations disseminated to African governments, IFIs, and PVOs

III. PROJECT ANALYSES

A. Technical Analysis

This section, like the Economic Analysis which follows, assesses primarily the feasibility of each of the EIA project components. Technical analysis of the specific energy and forestry technologies which are covered by the project are addressed only briefly. More detailed review of these technologies is provided in Annex G, "Comparative Costs and Prospects of New Energy Technologies for Africa."

1. Analysis of Project Components

a) Planning, Policy Development and Technology Assessment

Africa wide Technology Assessments. It is necessary to evaluate African experience in implementing projects in energy and forestry in order to focus AID efforts in areas which offer the greatest prospects of success and in order to improve subproject design by learning from past experience. Large-scale pilot projects in energy and forestry already are underway in Kenya, Senegal, Lesotho, Botswana, Niger,Tanzania, Mali and elsewhere in Africa. The record of success or failure appears to vary greatly by project, country (region), technology and extension approach -- yet little work has been done systematically to assess project performance and disseminate the results. Such assessment has the potential of contributing substantially both to overall energy development in Africa and specifically to the quality of EIA subprojects.

Rather than simply conduct broad evaluations of one or two examples of each of a number of different technologies, EIA provides for thorough assessments of several (six-eight) projects in the same technology area. Each project assessment will address economic, social acceptance, and market/institutional -- as well as technical -- factors. The number of projects selected in each of the ten areas to be assessed is large enough both to provide a clear indication of a particular technology potential and also to enable comparison of alternative extension/dissemination approaches.

Results of these assessments will be discussed with and disseminated to AID field offices, other donors, and African governments and regional organizations. The assessments will form a much needed basis for the design of EIA subprojects, for improved design and management of bilateral projects, and for national energy planning and policy development.

Energy Planning and Policy. For EIA activities to make the greatest contribution to energy solutions in Africa, they should be oriented towards the areas of highest priority. Energy planning is an important component in creating an understanding of the national energy situation, options and priorities. It is now widely accepted in developing countries that at least some level of energy planning is an essential first step to further energy initiatives.

The project does not incorporate funds for full-scale energy assessments or planning, as several other programs (both within AID and elsewhere) already serve this function. The project approach is rather to fill gaps -- that is, to provide the basic energy planning framework necessary in countries where it does not already exist -- and to provide limited assistance to develop priority policies or projects. EIA assistance will serve to identify both major planning/policy options and directions and follow-on planning assistance needs to be met through AID bilteral or other donors' programs.

b) Subprojects Fund. Energy, including fuelwood, encompasses a broad range of technologies which vary widely in terms of scale, cost, degree of technical and financial risk, mechanical complexity, complexity of the social/institutional structures necessary to support or absorb the technology, and many other factors. Annex G characterizes over 50 separate technology areas in terms of a few of these factors. From this broad list, subsection 2 below briefly summarizes a few technologies which the project design team believes both address priority energy needs in Africa and:

- Are technically proven, low-risk technologies, which are either "off-the-shelf" or require little local adaptation.
- Are financially, commercially, and economically attractive, for individuals, entrepreneurs, and nations.
- Rely primarily on existing trade, production and learning networks.
- Require a minimum of expatriate and public sector intervention.
- Are likely to be replicable on a large scale, taking into consideration sociocultural acceptability, marketing and distribution systems, competitiveness with alternatives, and other factors.

Despite the large number of AID and other donor energy demonstration or implementation projects already funded, the project design team views the Subprojects Fund as necessary in order to stimulate promising technologies or methods which other projects have overlooked (e.g., accelerated species selection and seed production) and to demonstrate combinations of technologies and extension/dissemination approaches which lend themselves to replication/expansion by the private sector or others without continued long-term dependence upon large-scale donor assistance. The relatively small size of EIA subproject grants, together with selection criteria emphasizing potential for self-sustaining replication/expansion, is expected to result in EIA projects with significantly different scale, technical, and extension emphasis than those typifying large-scale bilateral energy and forestry projects.

The project design team believes that Subprojects Fund grants to IFIs hold particular promise. IFIs are well-positioned to identify and stimulate small-scale private sector initiatives in both urban and rural areas. National development banks, PVOs, and others in a number of African countries have had successful lending experience in technology areas similar to those likely to be supported under EIA. Examples include:

- More efficient production of bricks and other building materials, in many cases using kiln technology similar to that used for more efficient charcoal production;

- Artisan metalworking activities similar to those fabricators of portable cookstoves; and

- Expanded small holder production of cash crops, in some cases including cash crops from trees (e.g., citrus or other fruits, bark of black wattle for tannic acid, and Eucalyptus fuelwood).

c) Training and Institutional Strengthening. The inadequacy of training at all levels, from policy and planning to maintenance, is one of the most serious impediments to successful energy project implementation in Africa. Human performance is both the most critical factor and the one least susceptible to prior control. The training in this project will contribute directly to improved project identification, design and implementation.

The most urgent training needs are in energy policy development, energy project preparation and practitioner technical training. Training support in project identification and design will be provided to national energy planning organizations and on-lending institutions. Practitioner training is intended to be small-scale, "hands-on" training designed to bring together individuals or institutions actually implementing EIA subproject, AID and other donors' bilateral projects, and other activities.

All project training will be short-term. This allows the greatest immediate impact, causes the least disruption of on-going activities

and institutions, and is best-suited to the very specific skills to be transmitted. The bulk of training will be carried out in Africa because the alternative of training in the United States appears too costly, less focused and would duplicate existing U.S.-based training programs. Training in the project is oriented to practical aspects rather than towards reseach and development activities because of the primary project objective of implementation and widespread use of energy technologies.

d) Information/Experience Sharing. Project personnel in energy projects throughout Africa have expressed the need for more directly usable, pre-processed information. Reliable information is needed on technical, economic, social and other aspects of technology and project performance in order to avoid repetition of past mistakes and to capitalize on past successes.

The EIA project contractor will establish an informal information network through which to disseminate results of technology assessments and subproject evaluations, as well as to provide information or referrals to subproject grantees, Africa institutions working in energy or others upon request. Rather than build up an independent information center, EIA will act as referral agent to existing information centers in Africa and elsewhere. There is considerable evidence that the key shortage is not of the required information itself, but of the means of selecting, pre-evaluating and disseminating it. A number of excellent sources of energy information already exist in the United States and in Africa. The EIA approach will reduce "Africa's" current difficulty of day-to-day access to usable prescreened information which appears to be the most urgent weakness in current information systems.

2. Analysis of Energy Technologies

a) Fuelwood and Forestry. As shown in Annex C, substantial areas of Africa face "wood deficit" situations as defined by the FAO, and the situation is worsening. Deforestation is accelerating not only due to the expanding need for fuelwood but also because an expanding population is using inappropriate agricultural technologies in a fragile environment. Excessive clearing of forests and cropping of unsuitable marginal lands have led to large-scale erosion, and overutilization is rapidly exhausting the land. Because these problems are interrelated, efforts to promote increased fuelwood production cannot be undertaken in isolation from efforts -- particularly in soil conservation and watershed protection -- to conserve and strengthen Africa's agricultural production base. Operationally, this means that fuelwood production should not be limited to intensive plantation silviculture on isolated forest reserves in areas considered unsuitable for agriculture and to improve management of existing plantations and natural forests. There also is a very important role for integrating tree production into agricultural and livestock management systems.

Fuelwood-related "technology" needs most frequently cited by AID and other organizations' foresters are summarized briefly below.

(1) Seed Production. There is an urgent need for large-scale production and distribution of tree seed, particularly of species other than those historically used by colonial forest departments. This function could be performed by the private sector, as it is already in many countries. A few African countries already have well-established private companies for production and distribution of agricultural seed (e.g., Kenya Seed Company and East Africa Seed Company), while others rely at least partly on smallholder tree seed collection or seed orchards.

Experience in Tanzania and elsewhere clearly shows that seed production cannot be separated from consideration of farmer incentives, seed prices (where government controlled), and other factors. These must be addressed in conjunction with planning for expanded seed production.

(2) Decentralized Nurseries. CDA and other investigations have found centralized government nursery provision of seedlings to be a major constraint to expanded afforestation. Also, most African countries experience very high mortality rates in distributing seedlings from centralized nurseries. Options include -- besides direct sowing -- decentralized village nurseries, small decentralized private nurseries (in some countries, managed by women as a cash crop), and small farmer nurseries for their own use. All require fairly extensive technical assistance initially, in seed collection and storage (if collected locally), nursery management, and post-planting maintenance.

(3) Improved Management of Government Forests. The FAO estimates very substantial returns from improved management of both existing sawtimber/pulpwood plantations (which could produce fuelwood as a by-product) and natural watershed protection forests. "Logs and tops", thinnings and intermediate cuttings, and improved management of existing charcoal concessions all provide potential for increased fuelwood production from existing growing stock without adverse environmental consequences. In the great majority of cases, operations could be carried out by the private sector under contract to (and with oversight by) the forest department.

(4) Smallholder Agroforestry. Agroforestry -- the simultaneous growing of trees and food or fodder crops -- holds great potential for both expanded fuelwood production and resource conservation. Smallholder agroforestry in West Africa is typified by vegetables grown in association with a mixed stand of coffee, cocoa, tree fruits, kola, and oil palms. Other agroforestry models include "alley cropping" and multistory agroforestry combining tall trees with relatively open canopies, medium-scale cash crop or leguminous trees, and field crops. The traditional bush fallow system and Taungya system are examples of traditional agroforestry systems.

Demonstration and assessment of alternative smallholder agroforestry is needed to broaden knowledge of the range of trees and their multiple outputs -- fuelwood, poles, fodder, etc. -- which can be grown in close

association with crops. In the increasing competition for land to grow food and to provide for energy needs, agroforestry systems offer an integrated approach to meeting the needs of the rural population. The EIA project can play an important role in assisting in the development and testing of agro-silvicultural methodologies, in disseminating information and promoting proven systems, in bringing together the "forester" and the agriculturalist, and in evaluating existing agricultural and rural development projects to determine where forestry and tree planting can be integrated into them.

(5) Species Selection for the African Ecological Zones. Planning and subproject activities under this project should identify existing species and provenances of fast growing trees in each of the ecological zones of Africa and collect basic data on management history, species and seed source, as well as characterization of soil and ecological conditions for each planting. Social acceptability should be assessed to determine the receptivity by potential consumers of those tree species identified under this activity. New species should be compared to species presently used to determine qualities such as drying and burning characteristics, existence of undesirable odors, existence of noxious oils or resins and smoke problems. Emphasis should be placed on multi-purpose trees since fuelwood seems to be regarded by most smallholders as a byproduct rather than primary product.

b) Energy Technologies. Annex G provides a summary state-of-the-art comparison of a wide range of energy technologies, based on data collected for the UN Conference on New and Renewable Sources of Energy in Nairobi in August 1981. The stage of development, cost, social and environmental constraints, place of equipment manufacture, proposed sector for utilization, and prospects are summarized for each energy technology.

Table III-1 summarizes this information for those technologies judged most promising for this project, according to the criteria above, in five categories. Selected technologies are described by end-use sector: biomass fuels; power generation; water lifting and agricultural processing; housing, cooking, and food processing; and other industrial and commercial sources. Those believed to have the most potential for household, artisan, national industrial sector, and developed country manufacture are also identified. Each of these "selected" technologies is discussed in Annex G.

TABLE III-1: PROMISING NEW AND RENEWABLE ENERGY TECHNOLOGIES FOR AFRICA

TECHNOLOGIES	COST RANGE	USAGE RURAL	USAGE URBAN	MANUFACTURING*	IMPORT PARTS (P) OR UNITS (U) MAY BE REQUIRED
BIOMASS FUELS:					
Densification	$15-25/ton production costs	R	U	M	P
Pyrolysis	$75,000-80,000 for 6 tons input/day	R	U	LI	P,U
Gasification	Depends on design; $200(for 5 Kw unit) and up	R	U	M,LI	P,U
Biomethanation	$1200-2800 for 20-42 m^3 digester	R	U	H,SI	
Charcoal making	$50 and up; $2000 for 31 m^3 metal kiln	R		SI,LI	
POWER GENERATION:					
Wind Electric -					
up to 10 Kw	$0.10-0.20/Kwh; $1000-2000/Kw investment cost	R		M,LI	P
Over 10 Kw	$0.05-0.16/Kwh; $ 500-1600/Kw investment cost	R	U	M	P,U
Hydropower -					
up to 1000 Kw	$0.05-0.10/Kwh; $1000-2000/Kw installed	R		M,LI,SI	P
over 1000 Kw	$0.02-0.13/Kwh; capital costs site specific	R		M	P
Direct Biomass Combustion	$0.05-0.10/Kwh; dependent on feedstock costs	R	U	M,LI	P,U
Diesel - 15 Kw	$0.38-0.48/Kwh; using diesel at $0.45/liter	R	U	M,LI	U
125 Kw	$0.21-0.24/Kwh; using diesel at $0.45/liter	R	U	M,LI	U
WATER LIFTING/AG. PROCESSING					
Hand/Pedal/Animal Pumps	$5-100 or more depending on size and type	R	U	SI,LI	
Hydraulic Rams	About $100 or more, depending on size & design	R		SI,LI	
Wind Pumps	$2000-4000 per unit	R		M,SI,LI	P
PVC Pumps	$10-30/peak watt; pump costs variable	R		M	U
Water Wheels	$100-300	R		SI	
Hand/Pedal grinders, threshers	$18-100 or more depending on type and design	R	U	SI,LI	
PVC grinders	$10-30/peak watt; grinder cost variable	R		M	U
Water and Grain Storage	$5-20/$m^3$ for up to 100m^3 tanks	R		H,SI	
HOUSING/COOKING/FOOD PROCESSING					
Solar: Ovens	$30-70	R	U	SI	
Dryers	$5 and up, $2-3/$ft^2$ for solar cabinet dryer	R	U	SI,LI	
Water heaters	$1 and up, depending on design-batch (flat plate)	R	U	M,SI,LI	P
Refrigerators	$400-5800 for adsorptive and PVC types	R	U	M	U
Evaporative Coolers	$10 and up, depending on site and design	R		H,SI	
Cookstoves: Wood	Highly variable; high mass mudstoves: $15-20	R	U	SI,H	
Charcoal	Highly variable; $3-20	R	U	SI,H	
Hayboxes	$1-10	R	U	SI,H	
OTHER INDUSTRIAL/COMMERCIAL SOURCES					
Conservation	Very low percentage cost of system		U	SI,LI	P
Retrofitting	Varies greatly according to application		U	SI,LI	P
Kilns/Ovens	" " " "	R	U	M,SI,LI	P
Cogeneration	" " " "	R	U	M,SI,LI	U

* MFG, BY HOUSEHOLD (H), SMALL INDUSTRY (SI), LARGE INDUSTRY (LI), OR IMPORTED (M)

Source: Appendix G

B. Economic Analysis

The EIA project encompasses a number of components, including planni and assessments, training and institution building, information/experience sharing, and a number of as yet unspecified subprojects. These activities cannot simply be attributed some rate of return as an economic justification for project implementation, yet economic considerations have played a pivotal role in the EIA project design. This section discusses why the project approach selected -- which emphasizes learning from project experience to date in energy and forestry, helping create a national energy planning framework, and fostering self-sustaining dissemination -- is thought to be more cost-effective and economically feasible than other alternatives.

An important starting consideration is the limited amount of funds for EIA -- $16 million over five years for 20-30 countries. Clearly, EIA can only complement regional or national energy strategies. Large-scale individual subprojects are necessarily precluded if coverage of all or even most recipient countries is to be maintained. EIA's primary contribution, given resource limitations, will come from leveraging project funds by demonstrating innovative implementation approaches which others (especially the private sector) then can replicate, and by removing specific obstacles to the achievement of national energy objectives. The project also provides mechanisms for mobilizing private public sector resources (including other donors, development banks, commercial financing sources, etc.).

The major thrust of the EIA project design is to set in motion self-sustaining activities which are financially viable and which place a minimum of recurrent resource burdens on the public sector. If projects in fact are to be self-sustaining (that is, sustained without long-term government or or donor support), financial attractiveness to prospective investors must be the key economic component in project appraisal (see below).

1. Cost Effectiveness of Private Sector Thrust

The economic hypothesis underlying EIA project design is that private sector dissemination of energy technologies and implementation of decentralized energy systems solutions is far more cost-effective than exclusive reliance on the public sector. In the first place, the record of success of public sector technology dissemination in Africa is not encouraging. In the second place, even if public sector efforts were more often successful, the high recurrent budgetary cost of replicating them would itself impede technology spread in most African countries. Finally, throughout Africa, there is strong evidence that public agencies simply do not have the human and managerial resources to carry out large-scale technology diffusion.

A rough indicator of the potential budgetary burdens of public sector energy technology diffusion in Africa can be extrapolated from the results of economic analyses in specific countries. A recent evaluation of mud stoves in Botswana showed that dissemination of this particular cookstove technology would require a large-scale donor or government extension effort.

Even if such extension were assumed to be successful, the costs are very high. Under highly optimistic assumptions about extension success rates, the incremental budget costs for government extension and training were estimated at approximately $7.60 per stove, while the total budgetary burden (including fixed costs of an extension system) was in the range of $10-$15 per stove. If a $12 figure is extended to some 30 million target households in Africa, the implied budgetary burden for extension and training time alone (exclusive of all foreign technical assistance, set-up costs, transport and logistical costs, technology design, testing and adaptation) is on the order of $360 million. Inclusion of all costs would push that figure much higher. Also, based on examination of mud stove extension requirements versus Botswana government resources and capabilities, it appears highly unlikely that the requisite amounts of skilled manpower and institutional support could be provided. Selection of a cookstove technology which can be bought and sold commercially -- for example, artisan-made metal or pottery stoves -- and reliance on existing market and other dissemination mechanisms would be more cost-effective by several hundred million dollars.

Similarly, analysis of government rural afforestation programs in Mali found that extension costs per capita were on the order of $16-$18. Even using a target population of only 70 million persons whose annual wood needs would be met by rural afforestation schemes, the implied budgetary burden would be $1.2 billion over the l[illegible]of afforestation efforts. Initiatives which use existing market mechan[illegible]s and institutions to foster the spread of energy tree planting as self-sustaining private sector efforts potentially would require only a fraction of this cost.

While the private sector in Africa is weak in many respects, private enterprise is relatively vibrant at a small scale. There is a strong trading tradition in a number of countries, with trading networks which reach even the remotest rural areas. In most African countries, there is a basic artisan/manufacturing base in small-scale metal fabrication, clay working and pottery-making. Finally, in [illegible]rtually all countries there is an active private smallholder sector which has shown itself ready to move into the production of new cash crops where local markets and infrastructure exist. In sum, there is ample reason to believe that the private sector approach is at least as viable as that of using public agencies.

While it is doubtful if the private sector alone can achieve truly wide-spread adoption of energy solutions, it certainly is clear that the dissemination objective is unattainable without tapping the large and complex network of private economic intermediaries that already exist in Africa. The EIA project seeks to tie into that network and to mobilize private (especially small to intermediate scale) resources. This crucial link has received much less emphasis than it deserves in donor assistance projects. Also, mobilizing this sector appears to be not only more cost-effective than alternatives, but also the only economically feasible way of effecting the transition from pilot/demonstration energy initiatives to widely implemented energy solutions.

The public sector has an important role to play in incorporating appropriate pricing and other incentives into national energy and economic policies, helping stimulate initial market development, perhaps providing some initial training or extension assistance, and so forth. However, such a role should be both less costly and less dependent upon scarce government manpower resources than the more aggressive public sector intervention roles which characterize most current donor energy and forestry projects.

2. Cost Effectiveness of Project Components

a) Planning, Policy Development and Technology Assessment. This component will make two major contributions to the EIA project's cost-effectiveness. First, the multi-country assessments of technologies and dissemination approaches will provide important feedback as to which technologies tested/demonstrated in Africa have a record of being cost-effective, reliable and economically advantageous to users and intermediaries -- and which do not. Second, the energy planning/policy development sub-component will help focus future activities in those areas which are likely to make the greatest energy/economic contribution to national energy problems in host countries.

There is ample evidence that even modest expenditure on energy planning and assessment can result in significant economic benefits. For example, planning in Botswana led to implementation of inexpensive energy conservation programs which have reduced industrial consumption of petroleum products by an estimated 12%. AID-supported energy planning in the Sudan has led to elimination of subsidies on petroleum products, policy changes to improve access of foreign exchange earners to needed fuel (which in the past has restricted agricultural and agro-industry production), and initiation of short-term electric power system reliability improvements. Policy analysis and debate in Kenya and a few other African countries have led to the top-level government commitment which is a necessary first step to reverse alarming deforestation trends.

b) Subproject Grants. The major EIA funding component is the Subprojects Fund, which will be used to initiate self-sustaining approaches to solving Africa's energy problems. Appendix I outlines a methodology for the economic evaluation of EIA subprojects. It differs from a standard cost/benefit framework in that it includes criteria which measure a project's implied budgetary burdens on the public sector and assess a project's susceptibility to being implemented and replicated as part of a self-sustaining process. The methodology also seeks to make effective use of qualitative as well as quantitative project information and to integrate it into a systematic analytical framework. Essential criteria are very briefly stated below.

- From the investor perspective:
  - The project should be financially attractive to users and intermediaries over a broad range of possible outcomes.
  - There should be strong evidence of demand for the project output.

° From the social/economic perspective:
- The project should be economically attractive to society over a broad range of possible outcomes.
- The project should be consistent with national energy policy objectives, as well as with broader development objectives as reflected in the CDSS.
- Subprojects should be designed to economize on such scarce resources such as skilled manpower, capital, foreign exchange, and government institutional resources.

° From the efficiency of dissemination perspective:
- There should be clear prospects for long-term, self-sustaining dissemination. This criterion should be given precedence over other criteria such as local production, level of involvement of target groups, etc., which are important but which should not be allowed to obstruct the adoption/dissemination process itself.
- Projects should not rely on creation of new institutional mechanisms - whether government outreach services or cadres of local entrepreneurs. The record shows such mechanisms to be slow to materialize and/or costly to maintain. High priority should be given to reliance on existing markets, trade networks, extension services, educational institutions, and so on. New infrastructure required should be viewed principally as a catalyst to activating existing structures.
- The total impled public budgetary and manpower burdens should be consistent with realistic government resource assumptions.

A number of technologies exist which, with proper project design, potentially could meet the criteria provided in Appendix I. In the absence of site-specific information, Appendix I provides detailed illustrative economic information on a number of such technologies, to establish that economically attractive technologies are available. A few of these technologies are summarized in Table III-2.

National development banks, PVOs, and other IFI organizations are particularly well suited to identifying and supporting activities which fit the above criteria. By its nature, the requirement to repay IFI loans both automatically imposes a discipline on the borrower which incorporates many of the above criteria and also forces the lending institution to incorporate such types of criteria into their loan approval and monitoring process.

While IFI loans typically are at the high end of those likely under EIA, there also are a number of IFIs which make key small loans. For example, African IFIs supported under AID's PISCES ("Program for Investment in the Small Enterprise Sector") in some cases make loans of under $100. Most such loans are under $500*.

*PISCES, "Assisting the Smallest Economic Activities of the Urban Poor, Phase I Case Studies -- Africa," 1980.

TABLE III-2

Economics of Selected Energy Technologies and Fuelwood/Forestry Initiatives

Description	Approxinate Capital Costs	Financial Return	Basis (NPV/IRR)*	Site of Analysis
Mud Stoves	$10-$12/stove	$ 95	NPV	Botswana
Solar Mud Oven	$40-50/oven and supplies	600	NPV	Botswana
Windmills for Water Pumping	$ 8,500	2,400	NPV	Botswana
Village Woodlots	$13,600/woodlot	($10,000)-$ 1,000	NPV	Mali
Agroforestry on Private Lands	$ 200/farm	$ 320	NPV	Mali
Small Industry Energy Conservation	$30-40/bbl oil saved/year	15-25%	IRR	Multi-country
Industrial Retrofitting for Conservation	$58-60/bbl oil saved/year	25-35%	IRR	"
Minihydro Development	$1,000/installed kw	15-20%	IRR	"
Wood Farm for Electricity Generation	$1,500/installed kw	30-40%	IRR	"

* NPV = net present value
IRR = internal rate of return. See Annex G.

The quality of IFIs varies widely in Africa. A prime indicator of IFI performance -- the percentage of IFI loans coming due which are repaid -- varies from under 20% to close to 100%. One perhaps could argue that even a 20% repayment rate would, by permitting that money and subsequent monies repaid to be relent, achieve some multiplier effect and thus be more cost-effective than grants (which have no repayment). However, IFIs that do not have substantially better than average loan repayment experience will not be awarded Subproject Fund grants, both because leveraging of the initial grant amount increases and because poor repayment experience generally indicates serious underlying problems of mismanagement, corruption, etc.

c) Training and Institutional Strengthening. There is a general shortage of trained energy planners, energy project financial analysis specialists, and experts in energy and forestry technologies or dissemination. The lack of trained manpower can result in misguided selection of national energy policies and projects and inability to implement

desired project approaches because of manpower constraints. The potential costs of such results far outweigh the direct costs of training to alleviate such problems. At the same time, because of most African countries' general lack of skilled policy analysts or practitioners, there is a significant opportunity cost which a country incurs when such people are sent for long-term training abroad -- a cost seldom considered in economic analysis of training programs. The opportunity cost is particularly high in energy, where the next two-three years will be critical to most countries in Africa. To minimize such cost -- and in recognition of the substantial opportunities for long-term training already offered through existing AID projects -- EIA concentrates on short-term training in Africa. The project will fund three forms of training: short-term training of enery planners, training/workshops for on-lending institutions, and practitioner training and technical assistance (see Project Description Section).

d) Information/Experience Sharing. The EIA contractor will collect and disseminate a limited amount of pre-screened information on technologies and dissemination experience of specific interest to EIA participants. The information sharing component will not maintain a general energy library or "information bank", since this would be be both too costly and duplicative of the roles played by a number of existing institutions, both in Africa (such as ENDA in Senegal, INADES in Ivory Coast, the BTC in Botswana) and abroad (VITA, ITDG, ATI, etc.). Rather, the EIA contractor will provide both useful information and referrals for assistance to the appropriate existing institutions. The cost-effectiveness of this component is felt to rest on three factors: the relatively high benefits of bringing directly useful pre-processed information to bear on African energy problems, the low cost of serving as an information intermediary, and the project's stress on coordination with rather than duplication of existing energy information resources.

C. Social Soundness Analysis

1. Sociocultural Feasibility of Energy Initiatives in Africa

Various energy initiatives in Africa have foundered because of inappropriate expectations regarding such social factors as motivation, producer/marketer incentives and social preference. A number of technologies meant to benefit various social groups have turned out not to be attractive to those groups. In other cases, producer or marketer motivation to spread technologies has been lacking. Still others have depended upon unrealistically high levels of government or donor extension intervention.

A major EIA objective therefore is to use EIA technology assessments and subproject evaluations to identify technologies and dissemination approaches that have worked and understand why and to use planning, subproject grant, training, and information-sharing assistance to foster adoption of such approaches where appropriate.

The EIA project covers a range of African societies and conditions. A guiding principle in the project therefore is to thoroughly assess both African experience with a range of technologies and dissemination methods

and then to make subproject resources available only where there is ample evidence that the technology and dissemination approaches are sound and that active interest and participation of key social groups will be forthcoming. Other sociological criteria are discussed below.

Consistency with Economic Arrangements: The "fit" between the particular subproject intervention proposed and prevailing arrangements for the allocation of productive resources (land, tools and other productive goods), for the organization of work, and for product distribution will be analyzed. In reforestation efforts, for example, access to productive resources, particularly land, will be especially critical. How labor time is allocated, the importance of sex and age in the assignment of tasks, the role of kinship in labor mobilization, the presence or absence of coercion, traditions of voluntary community-wide labor cooperation, the role of rank, labor contract traditions, and the existence of a wage labor market, all will influence the likely degree of local participation. Prevailing systems of distribution, especially measures to ensure equity in the allocation of project benefits, will be equally critical.

Social Acceptability: The suitability and probable impact of a particular energy intervention can be assessed in the context of the existing network of kinship-based and associational ties, and of other types of stratification such as class, caste, ethnicity and gender. For example, the kin group often collectively holds and works land that may be needed for reforestation, and it is through the kinship system that most goods, including fuelwood, are distributed. Systems of stratification can affect everything from individuals' right to participate in making decisions on a community forestry project to their right to share in the benefits of such an enterprise.

Political Acceptability: For energy interventions to succeed, the process by which decisions are made -- at the level of national government and among local leaders -- must be taken into account. Failure to win leaders' commitment to a proposed intervention can predetermine project failure. Comprehension of traditional legal systems is equally important -- in order to understand the law on usufruct, for example, or how disputes over access to forest lands are adjudicated.

Cultural Acceptability: To be accepted and diffused, each new energy intervention must be in at least minimal accord with the values and religious ideas and practices of the African population in question. Everything from ideas about which sex should gather firewood and prepare food to determining who has the right to allocate community-held land for reforestation derives from or is influenced by this system of beliefs.

Time Allocation Decisions: Subproject labor demands must be evaluated in terms of competing local demands, particularly seasonal demands, for labor. Even rural areas with severe underemployment typically have seasonal labor shortages at periods of peak agricultural demand -- often the same periods when labor is required for tree planting or

care. Women in most urban and rural areas generally have inadequate time for present tasks, let alone new tasks. Men may be unwilling to expend their labor time on tree planting or cookstoves where they perceive that the resulting labor savings will accrue to women and children in the family.

Taking these and other sociocultural factors into account, those aspects likely to be most critical to local acceptance of proposed EIA subprojects can be stated more explicity. There are:

- Structural simplicity and smallness of scale
- Use of customary materials
- Employment of familiar techniques
- Integration with traditional technolgy
- Meeting locally perceived technological and/or economic needs within a locally acceptable time frame
- Compatability with traditional work organization and allocation of productive resources
- Adaptation to existing patterns of distribution
- Integration with the existing social structure
- Accommodation to the system of authority
- Harmony with prevailing values and religious beliefs.

2. Implementation Considerations

Target Groups: In general terms, since the rural population of farmers and herdsmen constitutes the overwhelming majority of Africa's population, it is they who will be affected in nearly every instance -- either directly by those projects which foster the more efficient use of fuelwood or the development of agroforestry projects -- or indirectly by energy interventions in the urban and/or industrializing sector which, by reducing the need to import fossil fuels, may free government revenues for development investment in the rural sector. Women and children also will benefit from the proposed interventions -- women because of their responsibility for the increasingly arduous task of fuelwood collection and food preparation, and children because of their ancillary role as fuelwood collectors and the long-term benefits of reforestation.

Motivation and Responsiveness to Participants' Needs: Participation of the target population in project identification, planning, and implementation of the subproject will help assure that a proposed intervention is responsive to locally perceived needs. Where such other needs -- especially for food, farmland, or improved access to medical attention -- etc., are seen as having a higher priority, project designers may be able to develop appropriate motivational strategies such as agroforestry "packages" that include improved seed or fertilizers as well as provision for reforestation. For many technologies intended for the rural population such as agroforestry efforts, the introduction of fuel saving measures in food preparation, etc., people in both rural and urban areas already possess the skills necessary to undertake the modest changes in behavior these innovations entail. Far more critical is the issue of achieving "fit" between these new behaviors and other aspects of traditional African life, so that people will be motivated to make the changes needed.

Diffusion of Innovations: To maximize potential for diffusion of new technologies beyond those sites where they are initially established, subproject designers should develop a plan for the monitoring and evaluation and further adaptive modification of those interventions supported. Technologies that can be diffused with minimal external financial or technical assistance, e.g., agroforestry, individual woodlots, and locally marketed cookstoves, are likely to spread most rapidly. Conversely, the greater the complexity of the technology, the greater the investment required, the more extensive the need for operation and maintenance, the greater the reliance on new government inputs or infrastructure, the slower will be the rate of diffusion. Identification of constraints to diffusion of each specific energy intervention should be a product of the evaluation process.

3. Monitoring of Equity and other Impacts

Access to Resources and Opportunities: Subproject designers should assess the impact of proposed energy interventions on prevailing land tenure and other resource ownership arrangements, to ensure that credits necessary for the development of renewable energy resources do not unwittingly go solely to already well-off entrepreneurs and large landowners. It is especially critical that small-scale landholders are not alienated from the lands held under traditional law. Where land used for farming or livestock raising is reallocated for reforestation, the potentially adverse effects on the local food supply should be carefully monitored.

Employment: For women, the reduced labor required for fuelwood collection can be reallocated to improve childcare and household maintenance. For farmers of both sexes, the restoration of the environment resulting from reforestation can increase productivity while releasing time for craft specialization and the development of small scale industry. In the urban sector, availability of cheaper energy can enhance industrialization and increase job opportunities. Markets for artisan and small-scale traders can be expanded. Those who acquire new skills through participation in the early stages of project implementation may find their position in the job market improved as new technologies spread. Such employment impacts should be carefully monitored.

Rural Displacement, Migration and Urbanization: As economic conditions in rural areas are improved as a consequence of environmental rehabilitation and the profitability of agroforestry, the result should be to slow rural-to-urban migration. However, these outcomes will not be the automatic result of the energy interventions proposed. They will result only from a combination of successful technological innovation and a political/economic policy that projects the interests of the rural and urban poor and safeguards the status of women and other subordinate groups within the population.

Changes in Power and Participation: If women whose fuelwood gathering burden is eased are permitted to reallocate the released labor time to activities over which they have control, the result can be an increase in economic independence. However, this result will not be automatic. The impact on women, including how women are able to use any time savings, should be carefully monitored and necessary political or other interventions to complement the energy project interventions should be carefully identified.

IV. FINANCIAL PLAN

A summary cost estimate and project obligation schedule for both AID and host country inputs to the EIA project are presented in Tables IV-1 and IV-2. The total estimated cost of the project is $20,150,000, of which AID will provide $17.5 million and host countries approximately $2,650,000. This latter figure represents 25% of the cost of country-level subprojects to be supported by the Subprojects Fund. Of the planned U.S. contribution of $17.5 million, approximately $868,000 million is scheduled for obligation in FY 82, with the balance to be obligated at the rate of approximately $3-4 million per year over the next four fiscal years. The project is scheduled for completion on or about September, 1987.

Several project activities to be undertaken with EIA regional funds will benefit AID-assisted Sahelian countries. Essentially short-term in nature, these activities will include training programs, multi-country technology assessments, and national energy assessments, where regional approaches and knowledge will be adapted to individual country situations.

EIA subprojects for the Sahel will be financed by the special Sahel appropriation, from funds allocated to bilateral programs. As requests for subprojects are received from Sahel field offices and approved, Sahel funds will be deposited in a separate project account (625-0956) on a case-by-case basis. AFR/RA will backstop and AFR/SWA will monitor the programming of Sahel subprojects. Evaluation costs of Sahel subprojects will be included in subprojects budgets. Responses to audit reports of Sahel subprojects will be the responsibility of AFR/SWA.

As shown in Table IV-1, approximately 35% of total AID funds will be used for technical assistance under the prime contract ($6,050,000) which includes most of the training funds; the Subprojects Fund will consume approximately 60% ($10.6 million) of AID funds. Remaining AID funds will support other consultants to be hired under IQC arrangements (see below), collection and distribution of information materials, and independent project evaluation.

As set out in the Project Description section, the EIA project has four components Planning, Policy Development, and Technology Assessment (PPDTA); a Subprojects Fund; Training and Institutional Strengthening; and Information/Experience Sharing. This Financial Plan breaks out these components plus project evaluation in terms of five categories of inputs Prime Contractor Technical Assistance, Other Consultants, the Subprojects Fund, Training, Information/Experience Sharing, and Project Evaluation.

Following is a brief description of each input line item.

A. Prime Contractor Technical Assistance

AID/W will contract with a single U.S. firm for assistance in implementing EIA. This line item covers funding for carrying out of the PPDTA component,

TABLE IV-1

ILLUSTRATIVE

SUMMARY COST ESTIMATE AND FINANCIAL PLAN (U.S. $ 000)

	AID			HOST COUNTRY Public/Private	PROJECT TOTALS		
Project Inputs	FX	LC	TOTAL	LC	FX	LC	TOTAL
Prime Contractor T.A.	6,050		6,050		6,050		6,050
Other Consultants	150		150		150		150
Subprojects Fund	6,050	4,000	10,550	2,650	6,550	6,650	13,200
Training	350		350		350		350
Information-Sharing	200		200		200		200
Project Evaluation	200		200		200		200
TOTAL	13,500	4,000	17,500	2,650	13,500	6,650	20,150

TABLE IV-2

ILLUSTRATIVE

PROJECT OBLIGATION SCHEDULE (U.S. $ 000)

	1st Year		2nd Year		3rd Year		4th Year		5th Year		TOTAL	
Project Inputs	AID	Host Country	AID	Host Country	AID	Host Country	AID	Host Country	AID	Host Country	AID	Host Country
Prime Contractor	828		1600		2000		1622				6050	
Other Consultants	40		110								150	
Subprojects			1600	500	2200	450	3100	775	3650	925	10550	2650
Training			90		90		90		80		350	
Information/ Sharing			30		50		60		60		200	
Evaluation					75				125		200	
	868		3430	500	4415	450	4872	775	3915	925	17500	2650

with use of short-term consultants and subcontractors as necessary; subproject design and monitoring; coordination of various project components; and all logistical and administrative costs associated with establishing contractor offices in Africa and hiring and support of contractor staff.

B. Other Consultants

To ensure progress in implementation during the four-to-six months needed to contract with a U.S. firm, AID will use IQC assistance for early subproject design and national energy assessments.

C. Subprojects Fund

Subprojects will be developed according to criteria set forth in Annex E. Potential subprojects are expected to vary in cost from $50,000 to $1,000,000 for larger CDA activities. Each subproject will require a 25% host country contribution which may come from public or private sector funds. AID/W will allot funds for subprojects.

D. Training

Training funds will support short-term training for national and subregional energy planners, training for staff of IFIs, and practitioner-oriented training at the village and subproject levels. The prime EIA contractor will administer training funds, as described in the Implementation Plan.

E. Information/Experience Sharing

Funds in this line item will pay for establishment in the contractor field offices of small libraries of reports and newsletters on energy projects and technologies in Africa. Also covered will be costs of printing and distribution by the contractor of informational and evaluation materials.

F. Project Evaluation

These funds will finance overall project evaluation, including mid-term and final evaluations to be carried out by independent teams.

V. IMPLEMENTATION PLAN AND ADMINISTRATIVE FEASIBILITY

A. Administrative Structure

As in other multi-function regional projects, management of Energy Initiatives for Africa will be a cooperative effort, involving various AID units, the EIA contractor, the African Development Bank, and energy agencies of African countries. Implementation procedures for each component of EIA are described in Section B below. The overall administrative structure of the project breaks down as follows:

1. The AID Role

USAID field offices will concur in all country-level activities sponsored by EIA -- national energy assessments, subprojects, pre-project studies, and training. For subproject activities in particular, missions, with the EIA contractor's help, are responsible for developing country-level requests and forwarding these to AID/W (see discussion below of Implementation Procedures for details). REDSO may develop appropriate subproject requests for regional and subregional organizations.

The Office of Regional Affairs, Africa Bureau (AFR/RA) will have overall management responsibility for implementation of EIA, including approval of requests for assistance from the field and proposals put forward by other AFR offices. AFR/RA will receive technical guidance from AFR/DR's Office of Special Development Problems (AFR/DR/SDP) and the energy and forestry offices of the ST Bureau (ST/EY and ST/FNR). The PP Project Committee will reconvene periodically and as needed to review the project's progress in achieving objectives.

In developing EIA subactivities, the contractor will consult as appropriate with REDSO energy, forestry, and environmental advisors.

2. The Contractor

A strong U.S. contractor presence in Africa is critical to the effective functioning of EIA. The contractor, to have offices in Abidjan and Nairobi, will play a key role in implementation of all four EIA components, as described in Section B below.

In summary, the contractor's functions include:

a) Stimulation of new EIA subactivities. Regular visits by the contractor to Africa missions interested in participating in EIA will foster generation and development of subprojects and training activities. The contractor also will contact and follow up with potential local users of EIA project services, such as indigenous and U.S. PVOs, private entrepreneurs, host government agencies, Peace Corps, etc. Such visits, generally no less frequently than semiannually, also will enable the contractor, host country counterpart organizations, and the USAID field offices to review overall project progress and identify priority subactivity opportunities.

b) Design-phase technical assistance in identifying and structuring national energy assessments, subprojects, and training activities. Experience with the IRT project has shown that even small subactivities can be technically complex, requiring expert design assistance. Given existing heavy workloads of REDSO, missions and AID/W, plus the often time-consuming requirements of arranging individual IQC assignments, the project contractor seems the most appropriate vehicle for design services.

c) Implementation-phase responsibilities such as drafting subproject grant agreements and training memoranda of understanding (see below for details); carrying out multi-country technology assessments and national energy planning assessments; preparing commodity procurement specifications and documents; designing and assisting in performance of subproject evaluations; and general subproject monitoring. Involvement of the contractor in these tasks should help relieve management burdens on limited USAID staffs and contribute to more timely achievement of subactivity objectives.

d) Coordination and overall monitoring of EIA field activities Periodic workshops and the information/experience sharing network to be established by the contractor will be critical elements of this function. Also, the contractor will use its periodic field visits to follow up with host countries and missions on progress in implementing, planning and policy recommendations, to share information on what other countries are doing in similar fields, etc. Finally, the contractor will monitor all subactivities and provide semiannual monitoring reports to AID.

To foster development of African capacity to carry out the above functions and to reduce contract costs, the EIA project provides for phasing out the contractor's expatriate personnel six months before the contract completion date. By that time, functions previously performed by contractor expatriate staff should have been picked up by the contractor's African staff, African regional organizations, and/or host country institutions.

3. African Development Bank

As discussed in the Description of the Project section, the EIA project will liaise closely with the AfDB, as the AfDB builds up its capabilities in energy planning and project preparation and associated training. Planning of EIA technology assessments and national energy assessments will be coordinated with the AfDB, both to prevent duplication and where appropriate to provide for AfDB participation. The Abdijan office of the EIA contractor also will coordinate energy conservation, energy project preparation, and IFI training activities with the AfDB staff. The EIA contractor and AfDB will work together to identify opportunities for cooperation in the above areas and in undertaking energy and fuelwood/forestry feasibility studies where there is strong AfDB interest in co-financing the projects resulting from such such studies.

4. Host Government Energy Agencies

Host country organizational arrangements for energy and forestry vary widely by country. AFR/RA will seek to have each USAID field office designate a single host country government agency as the EIA counterpart organization. Where an energy ministry exists, this ministry should be the counterpart. Where energy responsibility is spread among a number of agencies, the one with primary national energy planning responsibility normally should be designated as counterpart. The EIA contractor will use its periodic field visits to hold joint progress review meetings with the counterpart agency and others as appropriate. These meetings also will be used to review the overall status of the host country's national energy planning, policy development, and policy program implementation.

B. Implementation Procedures

1. Early Stages

Immediately following authorization of the EIA project, AFR/RA and CM/ROD/AFR will initiate steps to select a contractor. A preliminary contractor scope of work and job descriptions appear as Annex I. Once the contract has been awarded, the contractor will establish its Africa field offices. The Nairobi office, to be set up first, will service East and Southern Africa. The Abidjan office, to start operations approximately six months later, will handle West Africa, including the Sahel.

Each office will employ one senior expatriate expert in energy planning, project design and related areas; one mid-level expatriate specialist in energy engineering or forestry; a local hire extension/dissemination specialist; and a secretary/administrative assistant. The contractor's U.S. home office will be responsible for liaison with AID/W, overall contract management, and logistical arrangements concerning hiring of short-term consultants, commodity procurement, etc.

Meanwhile, Africa USAID missions will have been notified that the EIA project mechanism is operational and ready to accept subactivity requests (see following paragraphs for specific procedures). In anticipation of a four-to-six-month delay in bringing the contractor on stream, AFR/RA will arrange to provide IQC assistance to missions requesting national energy planning assessments or design services for subproject starts. For the latter, the project design team foresees probable early starts on CDA fuelwood projects in Somalia, Senegal, and Malawi, all countries where sufficient national level energy planning work has been completed, in the view of the project design team, to justify prompt initiation of subprojects.

Africa-wide technology assessments, training activities, and establishment of the information/resource-sharing network will begin after the contractor has commenced work.

2. Implementation of EIA Project Components

Once the project contractor is on board, implementation of the four EIA project components will proceed approximately as follows:

a) Planning, Policy Development, and Technology Assessment. The contractor will administer funds for technology assessments and energy planning, subcontracting out or engaging individual consultants when necessary. Management of the two kinds of subactivities break down as follows:

-- Africa-wide technology assessments. The EIA contractor will perform detailed assessments of Africa-wide project experience in various technology areas, such as cookstoves. Such assessments will focus not only on technical but also on economic, social acceptance, dissemination/extension, and other aspects of individual projects. These assessments will start immediately following engagement and installation of the contractor and will continue throughout the life of the EIA project. The contractor will prepare annual schedules for technology assessments, including recommendations on countries to be visited, projects to be evaluated, and proposed team members. AFR/RA, in consultation with AFR/DR/SDP, and ST/EY, will review and approve proposals. A typical assessment should consume approximately 24 person weeks.

In view of the strong field office demand for such assessment information, the contractor will give priority to completing three technology assessments within the first year of the contract. Each such assessment will include on-site evaluations of 6-9 individual projects, including not only AID but other donor-supported or privately initiated projects. The contractor will disseminate the results of each technology assessment widely throughout Africa, not only to USAID field offices but also to African government agencies, PVOs, and other donors. See subsection (d), "Information/Experience Sharing" below.

-- National energy assessment. As discussed in the Description of the Project section, existence of a satisfactory national energy planning base will in most cases be a prerequisite to initiation of any subproject. Following commencement of work, the contractor will inventory the status of national energy plans, policies, or assessments in Africa, country by country. Much of this information is available in Washington, at the REDSOs and should require an average of only two-three days per country to compile. If important data is missing, USAID missions will be asked to help supply the needed information for their countries.

Results of these country-specific inventories will be forwarded to each mission, with the contractor's recommendations as to whether a sufficient energy planning basis already exists, needs more work, or should be started from scratch. The contractor also will have determined whether ST/EY, the IBRD, AfDB, or others have programmed further planning or assessment work in a particular country. Missions in countries requiring further energy assessments not programmed by others will cable requests for assessments to AFR/RA. Working with ST/EY and AFR/DR/SDP, AFR/RA will authorize the contractor to proceed on particular country requests. A national energy assessment should take up approximately 16 person weeks. Such assessments will

compile basic information on national energy supply and consumption, identify major energy issues, provide preliminary analysis of major options, and recommend next steps for the host country government.

EIA assessments are viewed only as a first step toward development of a national energy plan and supporting policies and priorities. To be of value, they must be developed by a joint host country - EIA contractor team, must stimulate dialogue among host country government decisionmakers, and must lead to follow-up activity -- generally including both further policy analysis and some implementation steps -- by the host country. The national priorities identified as part of the assessment process also will provide a basis for evaluating subproject grant proposals.

To the extent resources permit, the EIA contractor may provide limited additional assistance to follow up on specific recommendations in a national energy assessment. Such assistance, generally requiring no more than two-three person-weeks, could include more detailed development of specific energy policies or pre-design specification and structuring of a particular energy project. No such follow-up assistance will be provided until the initial round of national energy assessments is completed. USAID field offices will forward requests for assistance to AFR/RA, who will approve or reject such requests.

b) Subprojects Fund

New subproject requests. AFR/RA will administer all subproject funds. All requests for country-level assistance from the Subprojects Fund will come through the local USAID mission. Host government agencies, local government organizations, indigenous or U.S. PVO's operating in Africa, cooperatives, and other officially constituted not-for-profit organizations are eligible for subproject grants. For requests of $500,000 or less, the approval process for subproject grants starts with the Subproject Approval Request Cable (SPARC), which goes from the mission to AFR/RA, with a copy to the appropriate REDSO. Presumably, the proposed grant recipient will have worked closely with the mission and in many cases with the EIA contractor in composing the SPARC. The SPARC, a one-to-two-page cable, is the PID-level document which will provide basic data on the proposed subproject: brief description, purpose, outputs, inputs, beneficiaries, procurement arrangements, budget total, etc.

Working with AFR/DR/SDP and other technical reviewers in AID/W, AFR/PA will evaluate the SPARC against the established criteria for subprojects (see Annex E). AID/W will cable approval or rejection of the SPARC within three weeks of its receipt.

Approval of the SPARC means that funds will be reserved in AID/W for the subproject. Once the mission has received the approval cable, it should proceed with preparation of the Subproject Paper, in essence a mini-PP. If requested, the EIA contractor will be available, at no

cost to the mission, to assist the mission and prospective recipient in drafting the Subproject Paper. Following approval of the Subproject by the Mission Director, AID/W will allot funds to the mission, which will negotiate, authorize and sign a grant agreement with recipient. The contractor will help the mission, during the life of the subproject, to monitor subproject activities and ensure that objectives are being met according to the terms and schedule of the grant agreement. The contractor also can assist with evaluations at the mission's request.

These approval procedures will be expanded upon in a set of guidelines to be issued by AFR/RA, immediately following authorization of the EIA Project

Larger subprojects. For subprojects over $500,000 (limited to CDA countries), missions will submit a standard PID for review in AID/W. The contractor will be available to provide design technical assistance for both the PID and the follow-on Subproject Paper at the mission's request.

IFIs. Grants* of up to $500,000 each may be awarded to IFIs to provide loans for energy or forestry project. Approval of grants to IFIs -- national development banks, PVOs, or host government agencies -- will follow approval procedures similar to those described above for direct subproject grants. To assure award of EIA grants to highly qualified IFIs, AFR/RA will institute the following sequential approval process (to be further detailed in guidelines issued after EIA project authorization).

- A USAID field office interested in an EIA grant to an IFI will request, through the appropriate contractor field office, a contractor check of that IFI's experience and references (e.g., for a national development bank, the IRBD, AfDB as references).
- If reference/experence check indicates IFI is highly qualified, USAID field office will request on-site contractor assistance to help prepare SPARC.
- USAID field office will submit SPARC to AFR/RA for AID/W review and approval, with review copy also sent to appropriate REDSO.
- If SPARC is approved by AID/W, USAID field office will prepare Subproject Paper with contractor assistance as needed.

In the case of IFIs, the SPARC must describe initial activities to be supported in sufficient detail for AID/W to evaluate how grant funds are likely to be spent. Normally, the SPARC should individually describe expected initial loans accounting for approximately half of the total proposed grant to the IFI. See Annex E for more details.

AID/W Proposed Studies and Conferences. A small amount of Subproject Fund monies may be used to finance AFR/W-initiated studies and conferences which directly support EIA project objectives. Such studies and conferences will require AFR/RA approval on the basis of proposals submitted to it by AFR/W offices.

* Per change made at ECPR Meeting, IFI financing will be on a loan basis, unless grant financing is clearly justified.

Following EIA project authorization, AFR/RA will issue guidelines for Subprojects Fund support of AFR/W-initiated studies and conferences. Guidelines will reflect a requirement that such studies or conference have a high probability of leading directly to project implementation (for feasibility or project design studies) or to tangible improvements in design and implementation of future EIA subprojects and/or AID bilateral projects. Also, studies and conferences should be consistent with and not duplicate other energy activities undertaken through EIA or centrally funded progress.

AFR/RA will establish an annual budget ceiling for Subprojects Fund funding for AFR/W-initiated studies and conferences. This budget ceiling will be based on AFR/RA assessment of short pre-proposals submitted by AFR/W offices. Establishment of the budget ceiling will not obligate AFR/RA either to spend up to the ceiling for such studies/conferences or to support any specific activity for which a pre-proposal was submitted.

c) Training and Institutional Strengthening. Training funds will be administered by the contractor, who will be responsible for developing in-Africa training programs with concerned host country governments, regional training centers, private institutions, and IFI grantees. USAID missions will be encouraged to inform the contractor of priority areas of training support in-country.

The contractor will obtain approval of training programs from the USAID in the country involved (or REDSO, for Abidjan or Nairobi-based regional training). USAID will assure themselves that the training is not duplicative of planned or ongoing training programs supported by other projects (e.g. ETMA, ST/EY, AMDP). The contractor will keep AFR/RA informed of plans for future training and approved training activities. the contractor will prepare a memorandum of understanding -- similar to that used for the ETMA Project -- with the recipient organization, setting forth particulars of the training program, such as preparation of course syllabus, instructors, logistical support, participant selection criteria, travel and per diem, etc. The memoranda of understanding will spell out in detail the responsibilities of all concerned parties, including host institutions, the contractor or subcontractor, and the USAID mission (if involved). The USAID mission (or REDSO, if the training is regional and to be carried out in Nairobi or Abidjan) will be a signatory of the memorandum of understanding, along with the contractor and the recipient organization.

d) Information/Experience Sharing. EIA contractor personnel in Nairobi and Abidjan will provide information/experience sharing services upon request to host country government energy planners, EIA subproject grantees, and others in Africa responsible for energy or forestry project design or implementation. In order to limit the potential for duplication of services of existing information networks, the contractor will act primarily as a referral agent to such other networks. Sufficient resources will be provided to enable the contractor to (a) collect screen and disseminate a limited amount of information on technology and extension experience in Africa; (b) publicize technology assessment,

subproject evaluation, and other results through others' newsletters and information centers; (c) maintain small libraries in Nairobi and Abidjan containing only materials which the contractor needs to support its technical assistance and training activities; and (d) establish and maintain ongoing relations with ENDA, INADES, VITA, ITDG, and other information 'centers/networks' within and outside Africa.

C. Procurement Arrangements

1. EIA Contractor

As discussed previously, AID/W will engage a single prime contractor for implementation of those components of the EIA project indicated above; a preliminary scope of work is provided as Annex J. The contractor will be a qualified U.S. firm chosen in accordance with AID procurement regulations.

2. Procurement Associated with Subproject Grants

Each Subproject Paper will stipulate procurement arrangements to be used for that subproject. For all subproject grants except those to PVOs, the normal AID procurement source, origin, and nationality rules apply -- i.e., the source, origin, and nationality of goods and services will be Code 000 for all countries, except that Code 941 is the authorized code for the Relatively Less Developed Countries.

Local cost financing rules are those in AID Handbook 1, Supplement B, Chapter 18, except that for shelf items having their origin in Code 899 countries but not in Code 941 countries, the limitations are $25,000 or 10% of total local cost financing, whichever is higher.

For PVOs receiving EIA subproject grants with a procurement element of $250,000 or less, the order of preference established in AID Handbook 1, Supplement B, Chapter 16B1c(4) is applicable -- i.e. U.S., host country or Code 941, and Code 935. For PVO grants with a procurement element in excess of $250,000, the usual source, origin, and nationality rules apply, as described earlier.

3. Evaluation

AID/W will contract with either a single contractor or individual consultants for the following independent evaluation services:

- Development of a detailed evaluation plan (by Month 12).
- A mid-term evaluation, to be carried out by a three-person evaluation team to include an energy planning or technical expert, an economist, and a sociologist/anthropologist (by Month 30); and
- A final project evaluation, preferably by the same team that conducted the mid-term evaluation (date to be determined, based on status of subprojects).

See the evaluation plan for more details.

D. 611(a)

611(a) concerns will be addressed in the context of individual subprojects. The Subproject Paper format will have a specific section for 611(a). Missions, prior to subproject authorization, will assure that 611(a) concerns are adequately addressed.

E. Project Milestones

Action	Date
EIA Project approved/authorized	Month 1
Missions informed by cable that EIA Project operational	Month 1
Contractor proposals solicited	Month 1
EIA Subproject guidelines issued	Month 2
FY 82/early FY 83 subproject SPARCs and national energy assessment proposals cabled to AFR/RA	Month 2/3
IQC contractors fielded for early subproject design and national energy assessments	Month 4
Contract signed	Month 5
Contractor Nairobi office opens	Month 7
First two Africa-wide technology assessments approved/teams fielded	Month 7
First training activities launched	Month 8
Contractor Abidjan office opens	Month 13

Cycle continues throughout project.

VI. EVALUATION PLAN

A. Objectives and Approach

The EIA project will assess, demonstrate, and disseminate a range of new technologies and extension approaches in energy and forestry. Choice of technologies and extension approaches meriting aggressive dissemination must be based on thorough evaluation of field experience. It also is important to evaluate the effectiveness of the national energy planning assistance, training grant and technical assistance, and information/experience sharing components of the project.

Monitoring and evaluation will take place at three levels. The EIA contractor will monitor, and will submit detailed semi-annual progress reports covering all project components. Each USAID field office, with EIA contractor assistance wherever requested, will perform annual PES-level evaluation of all subproject grants, including grants to IFIs, administered by that field office. Finally, AID/W will assign an independent three-person EIA evaluation team, composed of AID direct hire and/or consultant personnel, to prepare a project evaluation plan and to conduct mid-term and final project evaluation. These three levels of monitoring and evaluation are discussed below.

B. EIA Contractor Monitoring and Evaluation

The EIA contractor will submit a project monitoring plan to AID/W within three months of receipt of Notice to Proceed. The monitoring plan will describe how the contractor will monitor and report on:

- Progress in providing project inputs and outputs, as defined in the Logical Framework (Annex A);
- Actions taken by host country governments as a direct or indirect result of EIA energy assessment or policy development assistance provided;
- Apparent effectiveness and results of training and information/experience sharing assistance provided; and
- Status and perceived effectiveness of subprojects, including IFI subprojects.

The EIA contractor will submit semi-annual progress reports, covering each project component, to AID/W and the REDSOs. These progress reports will provide a basis for periodic joint AID-contractor progress review meetings.

C. Subproject Evaluation

USAID field offices will perform annual PES-level evaluation of all subproject grants, including grants to IFIs, which they administer. Field offices are encouraged to draw liberally upon the EIA contractor in carrying out such evaluations. The contractor's participation is critical in identifying effective self-sustaining extension/dissemination approaches and

informing other countries of experience with those approaches. The contractor is expected to draw upon field office evaluations to disseminate findings and implications regionally. Aspects of performance to be assessed in PES-level evaluations of subprojects include:

1. Effectiveness of Approach

   - How effective is the basic approach of the subproject in arresting or reversing present regional trends in oil import dependence, deforestation, and inefficient utilization of indigenous resources?
   - Has the approach promoted, or will it promote, self-spreading of the technology or innovation?
   - In particular, does the approach mobilize local private initiative to undertake activities which improve the energy, environmental, and/or economic situation of the geographic area?

2. Technical Aspects

   - How well does the technology do the job for which it was intended (e.g., provide equivalent cooking output with less fuelwood consumption)?
   - What has been the experience with (a) operations and maintenance and, where appropriate, (b) local fabrication/manufacturing of the system?
   - Is the technology appropriate to its user level regarding simplicity of design, scale, and other parameters?

3. Economic Aspects

   - Economic analysis of the system, in terms of:
     - Costs and benefits to participants, national government, and/or other important actors.
     - Economic and resource use efficiency relative to the systems replaced by the particular innovation being promoted.
   - Economic feasibility of expanding the approach to a level necessary to have a significant positive national impact.
   - Economic consequences vis-a-vis income, employment, and ownership or access to resources.

4. Sociocultural Aspects

   - Does the innovation and approach "fit" the local economic and sociocultural setting?
   - Does the innovation meet a locally perceived need, and is the adoption/dissemination approach consistent with local political and social structures, religious beliefs, etc.?
   - Is participant involvement sufficient to assure project acceptance?
   - What changes in political/power structures, if any, have occurred as a result of introducing the subproject?

5. Administrative/Institutional Aspects

- What further external intervention -- financial, technical, extension, etc., -- is necessary if the innovation is to spread?
- How realistic is such intervention in terms of financial, manpower, and other constraints on the participating organizations?
- What institutional obstacles must be overcome for further dissemination to occur?
- What management burdens have been placed on the host country or USAID field offices, and how does this effect project success?

6. Environmental and Resource Management

- What environmental and/or resource management impacts -- or impacts avoided -- have resulted from the subproject?
- What are the projected impacts if the sub-project approach spreads to a nationally significant level?

7. IFI Grants Only

- How effective has the IFI been at identifying/preparing sound projects? at administering the loan portfolio? at identifying the need for, and arranging for, technical assistance?
- What is the IFIs loan repayment experience?
- What changes are suggested for new subprojects?

D. AID Project Evaluation

AID/W will designate a three-person independent project evaluation team, consisting of an energy planning or technology expert, an economist, and a sociologist/anthropologist. The team will prepare a detailed project evaluation plan and will conduct mid-term and final project evaluation. Besides reviewing the contractor's progress reports and supporting information, the evaluation team will evaluate a representative sample of:

- EIA national energy assessments and follow-up assistance activities;
- Subproject grants, including grants to IFIs; and
- Training grants and technical assistance assignments.

In addition, the evaluation team will assess -- particularly at the mid-term point -- the effectiveness of the overall process of (1) using technology assessments and subproject evaluations to identify the most promising technologies and extension/dissemination methods and (2) using the national energy planning/policy assistance, training, and information/experience sharing components as vehicles for disseminating and fostering use of such information.

ANNEX A: PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 82 to FY 86
Total US Funding: $16,000,000

Project Title & Number: Energy Initiatives for Africa, Project No. 698-0424

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
ogram or Sector Goal:	Measures of Goal Achievements:		
sist sub-Saharan African untries to develop and plement national policies d programs which effec-vely address their pres-ng energy problems.	- Oil imports reduced below projected level. - Deforestation rates reduced below projected levels - 10% decrease in energy/GNP ratio.	- Country energy assessments. - UN Series J reports. - Periodic FAO or donor reports plus on-site assessments. - UN Series J, IMF or World Bank financial reports	- African governments have the political will to implement national energy and forestry policies. - Self-sustaining forestry, energy conservation, and indigenous energy development models developed/disseminated.
oject Purpose:	Conditions that will indicate purpose has been achieved: End of project status.		
Strengthen institutional capabilities of African governments to plan and implement sound national energy programs and projects.	- Trained energy staff in place in EIA participating countries: ° Large countries: min. 10 professionals in energy planning, policy, and project preparation and 20 in energy/fuelwood extension. ° Small countries: min. 3 in planning, 10 in extension.	- EIA project records, financial project evaluation review of ministry/agency staffing.	- Persons receiving training return to host country agencies.
	- Energy plans in place, policies/programs adopted in each participating country.	- Final project evaluation in review of status in each country.	- Plans reflected, or help achieve political consensus necessary for implementation.
	- Ongoing information/experience sharing network operating.	- Subjective determination by project evaluation team.	- Africans see sharing as useful and take responsibility for continuing network.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
2) Demonstrate and disseminate self-sustaining public and private sector initiatives to reverse problems of deforestation, oil import dependence, inefficient energy use, and lack of development of indigenous energy resources.	- Models of self-sustaining afforestation, forest management or agroforestry demonstrated and disseminated for each major African ecological zone. Adoption of models on at least five times the acreage of the demonstration sites themselves. - Successful energy conservation or indigenous fuel substitution projects disseminated for each major economic sector. Evidence of adoption of similar measures/ projects, outside demonstration sites, in each sector.	- Subproject grant evaluation reports. - Forest department records, interviews. - Contractor progress reports. - Field surveys. - Subproject grant evaluation reports. - Energy ministry/agency reports, interviews. - Contractor progress reports.	- Grants awarded sufficiently early to permit timely evaluation and dissemination of results. - Energy prices and other incentives sufficiently strong to stimulate adoption of models.
Outputs: 1) Planning, Policy Development, Technology Assessments - Technology assessments	- Assessments of African program/ project experience in 10 energy or forestry areas	- Technology assessment reports.	- Inputs provided on time.
- National energy assessments.	- National energy assessments completed in 10 countries	- Contractor progress reports.	
- Follow-up assistance.	- 20 policy/project development assistance assignments completed	- Host country records.	
2) Subprojects Fund - Grants awarded	- Minimum 30 directly funded subprojects initiated	- AID grant documents.	- Inputs provided on time.
- Evaluations undertaken.	- Minimum 5 grants to IFIs and IFI loans or contracts - Minimum 15 subprojects (including IFI subprojects) completed and evaluated - Evaluation of experience of all IFI grantees undertaken.	- Contractor progress reports, subproject evaluation reports.	- Sufficient host country/ PVO demand exists for subproject assistance

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
) Training and Institutional Strengthening			
- Training sessions, workshops for energy planners, IFIs, and practitioners.	- 5 short-term energy planning training sessions/workshops held, with minimum 20 African attendees each. - 5 IFI training sessions held, with average 12 attendees each. - 20 practitioner workshops held, with average 12 practitioners each.	- Training Memoranda of Understanding. - Contractor progress reports. - Records, of training sessions, workshops.	- Inputs provided on time. - Sufficient host country/ IFI personnel provided for training sessions.
- AfDB cooperation.	- Training sessions, 3 - 5 in conjuction with AfDB.		
) Information/Experience Sharing			
- Dissemination of results of technology assessments and subproject evaluations.	- Results of 10 technology assessments and 5 subproject evaluations disseminated to 50 institutions including USAIDs, host country agencies, IFIs, PVOs.	- Contractor progress reports and records. - Interviews with host country agencies, IFIs, PVOs.	- Inputs provided on time. - Sufficient requests for information services.
- Info/assistance to subproject grantees and others.	- Assistance provided to minimum 25 grantees and 200 other energy/ forestry planners or practitioners		
nputs:) Financial:	(000's) AID / Host Country / Total	AID financial reports.	
- Prime contractor TA	$ 6,050 / / 6,050		
- Other consultants	150 / / 150		
- Subprojects Fund	10,550 / 2,650 / 13,200		
- Training	350 / / 350		
- Info/Experience Sharing	200 / / 200		
- Evaluation	200 / / 200		
	17,500 / 2,650 / 20,150		
) Personnel (Contractor)	- 4 expatriates plus consultants - 4 local hire personnel	- Contractor progress reports, records.	- Timely contract award.

ANNEX C

AFRICAN ENERGY AND ECONOMIC SUMMARY

Tables C-1 through C-5 provide a summary of the economic conditions, commercial energy consumption, ecological conditions, energy resources, energy development activities, and the energy planning institutions of major African countries. Based on this information, some broad generalizations are possible.

First, the great majority of African countries are heavily dependent upon imported oil or petroleum products and, as a result of world oil price increases and other causes (including the very high level of interest rates worldwide and generally depressed commodity prices), are running unsustainably large balance of payment deficits. Not shown, because the dat is so sketchy, is the structure of consumption of imported petroleum products. In general, modern-sector industry and transport account for the bulk of such consumption, either directly or through oil-fired electric power generation, followed by consumption in relatively highincome urban households.

Second, most countries have unexploited commercial energy resources which, in many cases, are very substantial. There appears to be significant potential for oil production and export along much of the coast of West Africa, although it is likely to be predominantly deep-water offshore (and therefore expensive) production. The Sudan has what is considered to be a commercial oil field, and a number of companies are exploring there. Preliminary geophysical results in Somalia appear promising. Besides the very substantial coal reserves in Botswana and other southern African countries, such West African countries as Senegal, Sierra Leone, and Niger have discovered potentially exploitable coal or lignite reserves. Geothermal resources exist throughout the Rift Valley and in other isolated areas. Finally, unexploited hydropower resources -- in many cases large enough to serve a regional electric power grid if such existed -- are found in almost every African country. The constraints to indigenous commercial energy development thus are largely financial and institutional rather than resource-based.

Third, with the exception of coastal West Africa and a few isolated highland areas, most of Africa is in an "acute scarcity", "deficit", or "prospective deficit" situation (as defined by the FAO) with respect to forest/fuelwood resources. The Project Design Team sees this imbalance, because of its implications for longrun deterioration in the soil/agricultural base on which the great majority of Africans depend, as the most compelling energy-related problem facing the majority of African countries. Unfortunately, because the impacts of gradual deforestation are not immediately obvious whereas oil shortages, price increases, electricity blackouts, or other commercial energy problems have immediate and visible impacts on politically powerful groups, this sense of priorities is not necessarily shared by African countries themselves.

Little reliable data exists on fuelwood consumption. Nevertheless, a few generalizations and trends are obvious from existing data. First, domestic cooking/heating accounts for the great bulk of use. However, in many areas, other uses -- small food vendors in urban areas, small-scale and some large

industries (brickmaking, breweries, bakeries, etc.) -- also are significant. Second, in almost every country, the distance rural women and children must walk to collect firewood is increasing. Also, urban and in some areas rural dwellers must pay for firewood they previously could collect themselves for free. Areas around cities and even large market towns in many cases are becoming wastelands, stripped bare of vegetation. The share of total fuelwood consumed not as firewood but as charcol -- which, because of high production losses, requires much more wood per unit of heat delivered -- is increasing in virtually all areas. Charcoal and firewood prices in many cases have escalated much faster than oil prices, though starting from a lower base in terms of cost per unit of energy. Finally, the phenomenon of competition for limited wood supplies between commercial firewood or charcoal distributors and rural wood-gatherers is emerging in some areas.

With respect to solar, wind, and other renewable energy technologies, most but not all African countries have promising solar potential, based on generally limited insolation data. Wind regimes may be fairly good in a few coastal areas, around some highland lakes, and in a few other areas but are poor throughout much of the rest of Africa. Agricultural residues and animal wastes generally are used productively now -- mainly as a soil amendment or fuel -- but often could be more productively used (for example, in gasification units with the residue used as soil amendment). Forest residues in many areas represent underutilized resources.

TABLE C-1: MACRO ECONOMIC AND ENERGY INDICATORS

EAST	GNP per capita Dollars 1979	Index of Food Production per capita (1969-71 = 100) 1977 - 1979	Avg. Annual energy consumption growth rate (%) 1978	Energy Consump. per capita (kg of coal equiv.) 1978	Petroleum imports as a % of total commercial energy consumption 1978	Current A/c. balance inc. interest payments on external public depart. (millions of dollars)1979
Botswana	720	89	...	...	...	...
Burundi	180	94	6.9	17	...	- 37
Ethiopia	130	84	- 5.3	20	91	- 66
Kenya	380	92	3.5	180	95	- 359
Lesotho	340	100	...	...	...	- 21
Madagascar	290	94	3.9	94	89	- 417
Malawi	200	100	5.7	70	59	- 169
Mauritius	1030	100	...	...	...	...
Mozambique	250	75	1.1	139	46	...
Rwanda	200	107	10.4	30	...	45
Somalia	...	85	13.0	78	96	- 204
Sudan	370	105	- 0.9	141	94	- 75
Swaziland	650	109	...	...	...	...
Tanzania	260	94	- 2.9	53	90	- 434
Uganda	290	90	- 8.2	39	...	37
Zaire	260	90	0.4	103	...	- 368
Zambia	506	99	5.2	858	40	357
WEST						
Benin	250	97	- 0.6	68	91	- 84
Cameroon	560	110	7.8	148	76	- 225
Chad	110	91	4.6	24	62	- 68
Congo	630	81	7.0	213	...	- 106
Gabon	3280	94	...	...	...	...
Gambia	250	77	...	...	...	...
Ghana	400	82	2.3	265	66	256
Guinea	280	86	1.6	87	66	...
Guinea-Bissau	170	94	...	...	...	...
Ivory Coast	1040	102	5.5	234	95	- 335
Liberia	500	101	- 0.9	448	92	- 69
Mali	140	88	5.3	30	92	- 61
Mauritania	320	75	5.5	155	92	- 54
Niger	270	89	12.8	48	92	- 89
Nigeria	670	87	1.4	83	...	1634
Senegal	430	88	12.4	266	96	- 351
Sierra Leone	250	87	- 1.1	89	96	- 97
Togo	358	81	11.8	117	91	- 203
Upper Volta	180	93	10.2	29	94	- 64

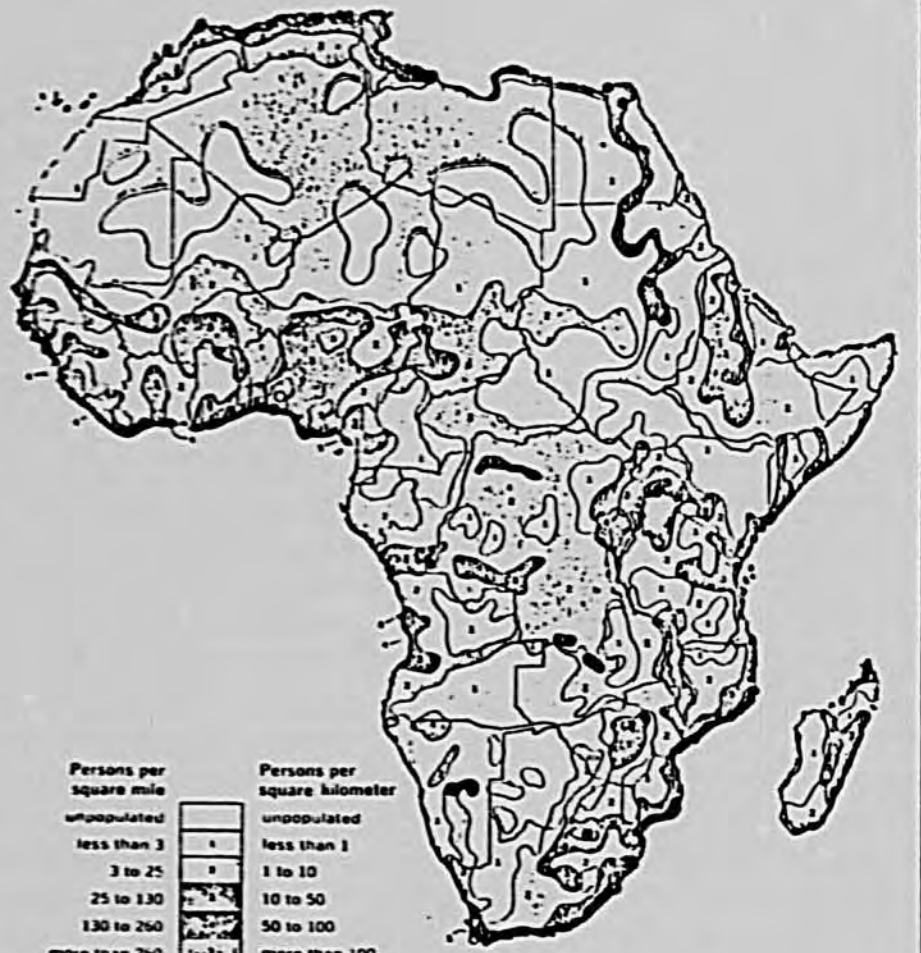
Source: World Bank, "Accelerated Development in Sub-Saharan Africa: An Agenda for Action, Statistical Annex", Washington, D.C., 1981.

LANDFORMS and PHYSICAL REGIONS

AGRICULTURE

TABLE C-2: Cont'd.

POPULATION



Persons per square mile	Persons per square kilometer
unpopulated	unpopulated
less than 3	less than 1
3 to 25	1 to 10
25 to 130	10 to 50
130 to 260	50 to 100
more than 260	more than 100

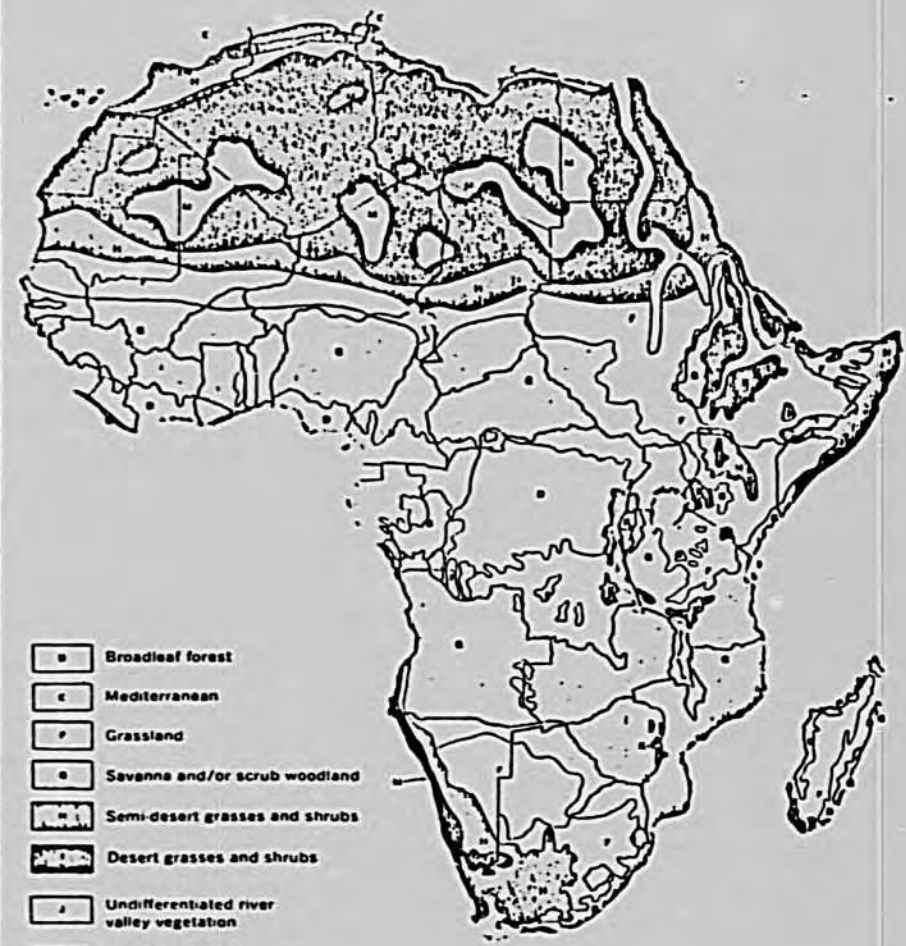
○ Urbanized areas from 500,000 to 1,000,000

● Urbanized areas of more than 1,000,000

1/69,000,000

Azimuthal Equal Area Projection

VEGETATION



- Broadleaf forest
- Mediterranean
- Grassland
- Savanna and/or scrub woodland
- Semi-desert grasses and shrubs
- Desert grasses and shrubs
- Undifferentiated river valley vegetation
- Undifferentiated mountain vegetation
- No vegetation

TABLE C-2: Cont'd.

AVERAGE ANNUAL PRECIPITATION

CLIMATES

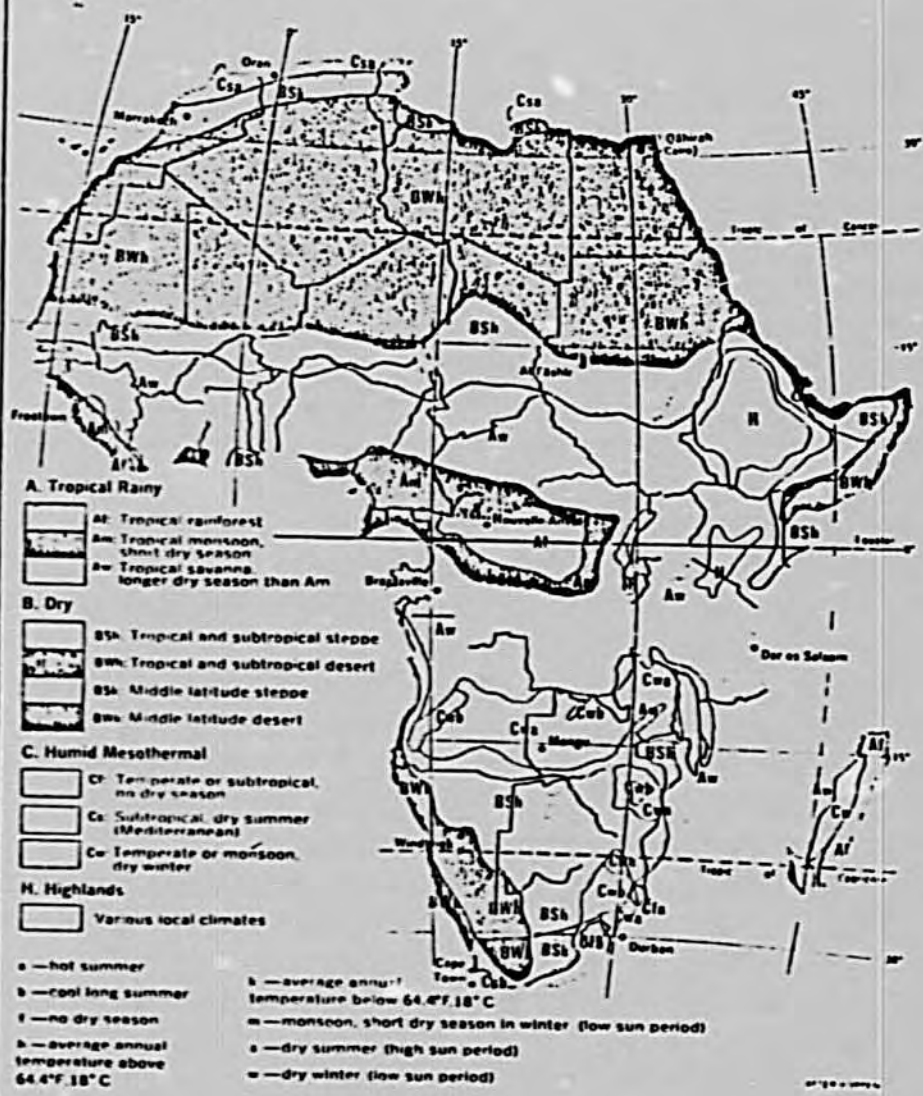
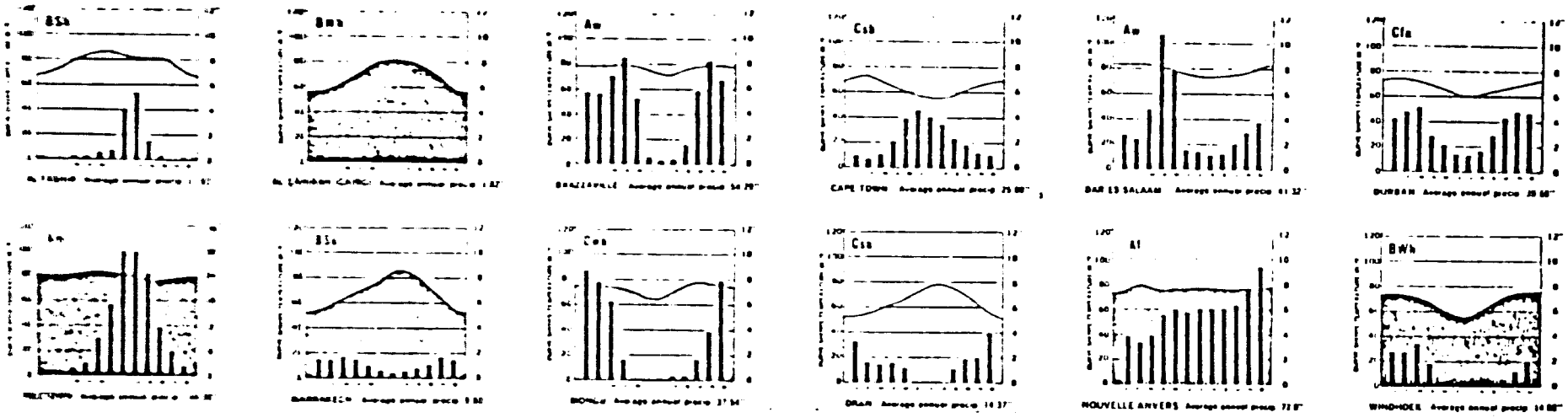
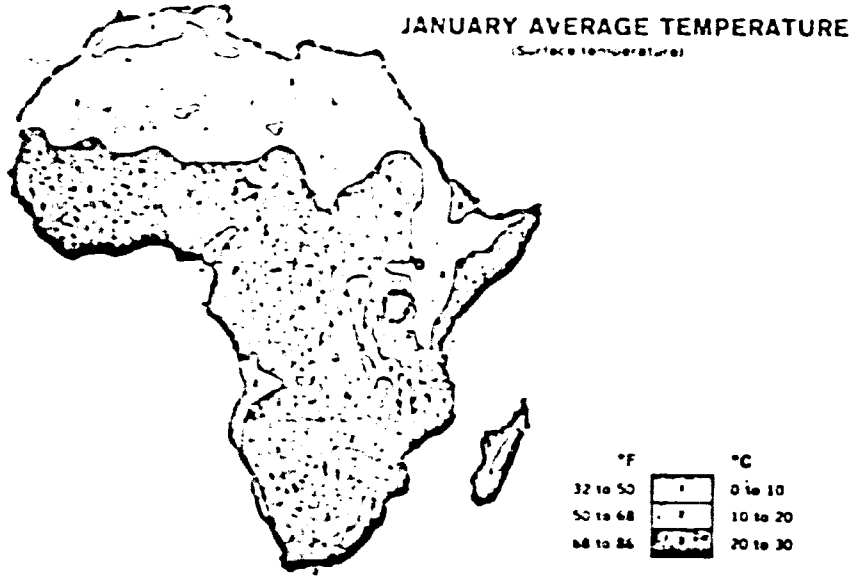


TABLE C-2: Cont'd.





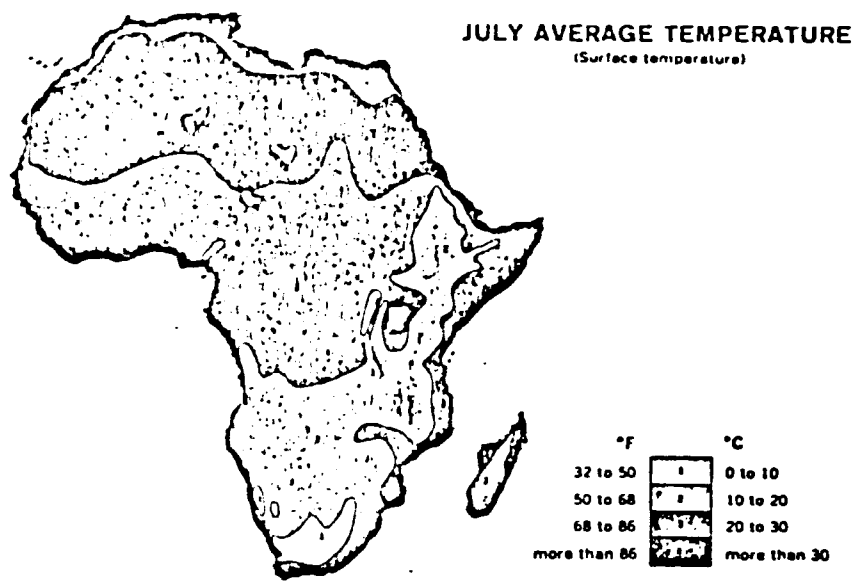


TABLE C-3: MAJOR ENERGY RESOURCES BY COUNTRY

	Hydro* MW-Gross Capacity	Oil/Gas** Est.Proved Oil(1000bbl)	Oil/Gas** Reserves 1/81 Gas ($10^9 ft^3$)	Oil/Gas** 1980 Oil Prod. (1000 b/d)	Coal*** Resource/Reserves	Wood**** Biomass
Angola		1,200,000	1,050	150.0		
Botswana	2,984				100,000/3,500	W: satisfactory +; E: Desert/sub-desert
Burundi	NA					acute scarcity
Benin	1,792	(Note 1)				s/coastal region: deficit; N: prospective deficit
Cameroon	22,960	200,000		58.0	500/NA	S: satisfactory +; N: deficit
Cape Verde	NA					N/A
Chad	3,440					N: desert; S: prospective deficit
Comoros	NA					deficit
Congo	9,040	660,000	2,000	56.0		satisfactory +
Djibouti	NA					desert - sub-desert
Ethiopia	9,214					W: deficit; w/central: acute scarcity; E/N/C: desert
Gabon	17,520	450,000	500	180.0		satisfactory +
Gambia	NA					deficit
Ghana	1,615	6,300		2.0		coastal region: satisfactory; other prospective deficit
Guinea	6,400					SE tip: satisfactory; other: deficit
Guinea-Bissau	120					satisfactory +
Ivory Coast	780	50,000 (Note 2)		3.0		coastal region: satisfactory; other: prospective deficit
Kenya	13,440					prospective deficit; N.E.: desert, sub-desert
Lesotho	490					acute scarcity

TABLE C-3: Cont'd.

Liberia	6,000					satisfactory +
Madagascar	64,000				92/NA	N.E., C: deficit situation; other: satisfactory
Malawi	100				14/NA	deficit situation
Mali	3,520					SW: prospective deficit; other: desert
Mauritania	2,000					desert/sub-desert
Mauritius	80					deficit
Mozambique	11,920				400/NA	S: deficit; N: prospective deficit
Niger	9,600					W: deficit; N: desert; other: prospective desert
Nigeria	1,515	16,700,000	41,000	2,057.0		coastal area: satisfactory; other: deficit
Rwanda	NA					
Senegal	4,400	(Note 3)				S.S: satisfactory + (S); coastal: deficit; NE tip: desert
Sierra Leone	1,100	(Note 4)				prospective deficit
Somalia	240	(Note 5)				desert/sub-desert
Sudan	16,000	(Note 6)				S: satisfactory +; C: prospective deficit; N: desert
Swaziland	700				5000/1820	acute scarcity
Tanzania	20,800				360/NA	prospective deficit; NE tip: deficit
Togo	480					S: coastal deficit; N: prospective deficit
Uganda	NA					prospective deficit
Upper Volta	12,000					acute scarcity
Zaire	132,000	130,000	50	20.0	73/NA	satisfactory + (except S.W.: deficit)
Zambia	3,834				228/5	W: satisfactory +; E: prospective deficit

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TABLE C-3: Cont'd.

* Hydroelectric Potential (Estimated gross theoretical capacity, in megawatts)
Energy in the Developing Countries
World Bank, 1980.

** Oil/gas: Energy in the Developing Countries,
World Bank, 1980
African Business - October 1981 pp. 17,18
Business Week, October 1981
International Petroleum Encyclopedia 1981

*** Coal: Energy in the Developing Countries
World Bank, 1980

**** Wood/FAO Report 1981
- Satisfactory +: resources considerably exceed present and foreseeable needs
- satisfactory: decreasing resources could become adequate, at least locally, in relation to requirements in the foreseeable future
- prospective deficit: present fuelwood resources higher than requirements but evolving toward a crisis situation in 2000
- deficit: present fuelwood resources below requirements, obliging the population to overexploit
- acute scarcity: fuelwood resources have been so reduced that the population is no longer able to ensure a minimum supply
- desert and sub-desert areas in scarcity situation with very few resources and low population

Footnotes to Oil/Gas:

1) Benin: Some offshore production due to commence 1982. No reliable esimate of reserves.

2) Ivory Coast: Conservative estimate of Belier field only (Exxon). Recent Phillips finds reported up to 500 million barrels. Estimated 12/81 production rate 30,000 bbl/day.

3) Estimated potential resources 7 million bbls oil, 700 million bbls heavy oil. Gas production to start 1983.

4) Mobil exploration program underway.

5) Active exploration underway.

6) Reported commercial finds by Chevron, active exploration by Total and others.

TABLE C-4: DONOR-SUPPORTED RESOURCE DEVELOPMENT ACTIVITIES

EAST	Oil/Gas	Peat	Geothermal	Coal/Lignite	Hydro	Solar/Wind
Botswana				x		
Burundi		x			x	x
Djibouti			x			x
Ethiopia			x		x	x
Kenya			x		x	x
Lesotho					x	x
Madagascar			x		x	x
Malawi					x	x
Mauritius						x
Rwanda	x				x	x
Somalia	x					
Sudan					x	x
Tanzania	x		x	x	x	x
Uganda					x	
Zaire	x				x	x
Zambia				x	x	
WEST						
Benin	x		x		x	x
Cameroon					x	x
Cape Verde						x
Chad	x					x
Gabon					x	
Gambia					x	x
Ghana					x	x
Guinea	x				x	x
Guinea-Bissau	x					
Ivory Coast					x	
Liberia	x				x	
Mali					x	x
Mauritania					x	x
Niger	x			x	x	x
Senegal		x		x	x	x
Sierra Leone				x	x	x
Togo						x
Upper Volta						x

TABLE C-5: ENERGY PLANNING INSTITUTIONS AND STRATEGIES IN SELECTED AFRICAN COUNTRIES*

COUNTRY	CURRENT ENERGY SOURCES	ENERGY POLICY/ PLANNING	CURRENT/PLANNED PROJECTS AND STRATEGIES
BENIN	Wood and charcoal for traditional sector (150,000 mt/yr) getting scarcer. Imported petroleum and hydro-electricity from Ghana.	Interministerial committee for study of promotion of new energy sources established in 1980 in Ministère du Plan. Project implementation in Ministère de l'Industrie, des Mines, et de l'Energie.	1. Continue expansion of electrification with thermal (diesel) units. 2. Develop hydro (80 MW) jointly with Togo. 3. Evaluation of solar and wind resources planned. 4. Wood is priority: need for reforestation, improved stoves, etc.
CAPE VERDE	Main fuels are imported petroleum and woodfuels.	Instituto Nacianal de Investigacao Technologia (INIT) created 1980 to evaluate use of natural resources in economy.	1. Exhaustive inventory planned of natural resources, in order to propose concrete actions for funding. 2. Plan to exploit very favorable wind regimes in short term for water pumping, electricity, desalinization. 3. Plan to exploit solar in longer run for fish drying, hot water, distillation, PVC pumps, solar cooking, solar salt (electric) ponds, refrigeration. 4. Seeking financing for pilot (1-10 MW) OTEC plant.
GUINEA	Wood and charcoal main rural and urban energy sources, causing deforestation problems. Estimate 1.1 mmt/yr wood consumed. 190 MW electric installed, mainly thermal.	Ministère del 'Energie et du Konkoure set up 1979 to rationalize use of electrical energy, promote new sources, implement Konkouré hydro project, and propose energy policy to Parti-Etat.	1. Develop hydro, Konkouré (750) MW 1980-86 for aluminium industry, additional 200 MW by 1985 for urban areas and industry. 2. Conduct systematic inventory of renewable energy potential, especially solar and wind. Project proposal submittd to UN Interim Fund. 3. Popularize improved stoves. Plans for socio-economic study, prototype testing, and dissemi-

TABLE C-5: Cont'd.

COUNTRY	CURRENT ENERGY SOURCES	ENERGY POLICY/ PLANNING	CURRENT/PLANNED PROJECTS AND STRATEGIES
GUINEA-BISSAU	Imported petroleum and woodfuels are major energy sources.	Ministère de l'Energie et de l'Industrie, and new UNDP-financed Organisme National d' Electricité et d' Eau.	1. Major electricity sector plan since 1976 to rebuild severely war-damaged (thermal) system. 2. One UNDP-financed hydro study underway (Corubal R.) 3. Tidal energy site under study.
KENYA	Major sources are woodfuels, imported oil, and hydroelectricity (410 MW). Solar drying and water heating widely used. Deforestation problem.	GoK through Ministry of Energy has decided to prepare a comprehensive energy policy, with following objectives: 1. Increase supply to economy. 2. Rationalize petroleum use. 3. Lessen oil dependence thru conservation. 4. Develop indigenous energy sources. Ministry of Energy includes a Policy Planning and Monitoring Division, a Technical Division, and an Energy Development Fund.	1. Funds and programs to encourage farmers to plant trees and establish village woodlots and fuelwood plantations. 2. Exploring hydro potential, which if exploited entirely, could meet electicity needs to 1990. 3. Geothermal energy under development; first 15 MW installed. 4. Two ethanol (from molasses and sugar juice) distilleries planned; one already on stream. Research on liquid fuels from oils. 5. Plan collection of wind data and development of cheap reliable windmills. 6. Biogas under technical and cultural/socio-economic study. 7. Energy Development Fund set up in Ministry of Energy to promote biomass energy. 8. Conservation measures being introduced step by step. 9. Investigating possible substitutions of oil by coal.

TABLE C-5: Cont'd.

COUNTRY	CURRENT ENERGY SOURCES	ENERGY POLICY/ PLANNING	CURRENT/PLANNED PROJECTS AND STRATEGIES
LIBERIA	Hydroelectricity, imported petroleum products, and wood fuels are main sources.	Recently constituted National Energy Committee is mandated to produce a National Energy Plan. Training assistance for staff is needed.	1. Develop more hydroelectricity. 2. Extend existing central grid. 3. Plan research on solar, wind, biogas, wood, and charcoal potential. 4. Replace, where possible, fuelwood and charcoal use. 5. Study of energy use in Liberia underway by Bureau of Hydrocarbons. 6. Pilot mini-hydro project under consideration by USAID.
MALAWI	Most energy (93%) is fuelwood consumed by households, crop and fish drying, brick burning, etc. Rest is hydro-electric and imported petroleum.	In 1978 Energy Subcommittee of National Appropriate Technology Committee established to identify available energy sources and coordinate research. An Energy Unit was established in the Ministry of Agriculture also, focussing on agriculture and forestry. In 1980, a Department of Energy was created under the Office of the President and Cabinet to coordinate energy policy at the national level.	1. Wood energy - IBRD project to set up nurseries and village woodlots - Fuelwood & Poles Project (IDRC) to identify fast-growing species - Eucalyptus research (Swedish) for tobacco industry use - Mudstove program by Ministry of Community Development 2. Expand hydroelectric and rural electrification to all administrative centers. 3. Solar hot water heaters being installed in new hospitals (local commercial production). 4. Ethanol plan under construction (molasses and cassava feed stocks). 5. Under study: biogas and wood gasification for internal combustion engines

TABLE C-5: Cont'd.

COUNTRY	CURRENT ENERGY SOURCES	ENERGY POLICY/ PLANNING	CURRENT/PLANNED PROJECTS AND STRATEGIES
MALI	Wood is main energy source, causing severe desertification problems. Some hydro (6 MW) and imported petroleum products are noncommercial sources.	Recently created Commissariate aux Energies Renouvelable (COMER) is interministerial committee for coordination of new energy development, including conservation. Regional CILSS (based on Upper Volta) and Institute du Sahel (based in Mali) provides some assistance.	1. Develop about 200 MW hydroelectricity by 2000. 2. Socieconomic study in 4 zones to evaluate energy needs and resources now being done. 3. Desire to exploit favorable solar and wind resources, especially PVCs for water pumping and rural clinics, hot water and air dryers, and distillation. 4. Improved stoves are a high priority, also reforestation with community woodlots, gasification and pyrolysis, and biogas.
NIGERIA	Large shortages of electricity and other fuels due to rapid growth create frequent crises in economy. Sources include fuelwood (90%) of total, coal, petroleum, natural gas, and hydro, all locally produced.	No comprehensive energy policy, and no institutional framework to operate a policy. Therefore, there is a lack of data, financing, coordination of isolated R&D, and manpower development. Recent law to establish Energy Commission of Nigeria, Council on Water Resources could remove some constrants to private small hydro development.	1. Expansion of both gas turbine and hydroelectric planned for early 80s. After 1984, will need large (1000 MW) thermal plant since lead time insufficient for hydro. After 1986, plan 1770 MW hydro addition immediately. 2. Small hydro potential large and economical but hitherto private development inhibited by government. 3. Good prospects for solar wind, biogas (local aquatic siam weed), alcohol (from palms or molasses), wood burning stoves, and charcoal kilns. Some studies are underway in these areas. 4. Fuelwood plantations established since 1912, but forests under increasing pressure now from agriculture.

TABLE C-5: Cont'd.

COUNTRY	CURRENT ENERGY SOURCES	ENERGY POLICY/ PLANNING	CURRENT/PLANNED PROJECTS AND STRATEGIES
RWANDA	Hydroelectricity is 95% of all commercial energy use (mostly imported from Zaire). Imported petroleum use is very low (10 kgoe/yr/cap). Woodfuels used in rural and urban areas.	The Ministère des Ressources Naturelles, Division Eau et Energie collects, coordinates, and promotes studies on energy resources in order to develop an energy policy. CEAER, in the University of Rwanda, studies and experiments with renewable energy.	1. Replace imported electricity with 1 large and small hydro development (200 MW potential). 2. Develop peat as boiler fuel to substitute for imported hydrocarbons. 3. Develop methane gas in Lake Kivu. 4. Experiment with biogas and solar electric for rural use. 5. Reforestation program undertaken by Ministry of Agriculture.
SENEGAL	Major sources are wood fuels (60%) and imported petroleum (40%). Oil imports use 43% of foreign exchange.	Responsibility for national renewable energy program rests with secretarial d' Etat a la Recherche Scientifique et Technique, which coordinates and directs all research, study, and prototype/pilot programs. An interministerial national energy committee was set up recently to develop a national R&D program in renewable energy for the next 6 years and to support formulation of a national energy policy.	1. Develop major hydro-potential (690 MW) through sub-regional cooperation (long-term). 2. Set up national energy strategy through interministerial committee. 3. Experiment with solar, wind, and biomass: - solar: study of water heaters, dryers, distillation pumps. - wind: good potential on coast, currently testing. - studying use of biomass for electricity generation and alcohol production. 4. Planned massive improved stove dissemination program 1982. Ongoing stove testing, training, and demonstration.

TABLE C-5: Cont'd.

COUNTRY	CURRENT ENERGY SOURCES	ENERGY POLICY/ PLANNING	CURRENT/PLANNED PROJECTS AND STRATEGIES
SEYCHELLES	Completely dependent on imported oil for energy supplies. Remotely situated with severe communications and supply constraints.	National Research and Development Council works closely with R&D section of Ministry of Planning & Development. Recently inaugurated integrated Energy Project which aspires within 20 yrs. to nearly eliminate dependence on fossil fuels.	1. Investigate solar, wind, biogas, and producer gas (from coconut husk) options for small-scale use on outer islands. 2. Feasibility studies of large scale electricity production for major population centers. OTEC good possibility. 3. Study and eventually fabricate and/or market energy conservation and waste heat recovery technologies. 4. Create workshop and laboratory facilities for sustained R&D, and begin counterpart training.
SIERRA LEONE	Imported petroleum products use 30% of foreign exchange in 1980. Fuelwood and charcoal are main household fuels.	National energy commission formed to define national policy and to create a controlling body for implementing policy.	1. Develop hydro (60 MW by 1986) for electric needs. 2. Forestry project underway including reforestation, village woodlots, wood and charcoal production, efficient stoves, training forestry workers. 3. Use of agricultural wastes, alcohol from sugar cane, biogas, solar, wind, and lignite are under investigation.
SUDAN	Major energy sources are fuelwood and charcoal (used in rural and urban households respectively). Some imported petroleum and hydroelectric power. Estimated 11 mmt/yr wood use. Desertification is a problem.	In 1980, National Energy Administration created USAID energy assessment to begin Sept. 1982. NEA coordinates energy policy and research in renewable energy, mainly through the Institute for Energy Research, National Council for Research	1. Energy assessment to be completed in 1982 then will formulate strategies and plans. 2. Hydro potential large (3370 MW), but electric demand low and lack of capital, so no immediate plans. 3. Afforestation programs in N. Sudan, but relatively small. 4. Under study: wind (av. 10 mph), ethanol from molasses, geothermal, improved charcoal kilns and improved stoves. 5. Solar stills, water heaters, cooling & drying

TABLE C-5: Cont'd.

COUNTRY	CURRENT ENERGY SOURCES	ENERGY POLICY/ PLANNING	CURRENT/PLANNED PROJECTS AND STRATEGIES
ZAIRE	Main commerical energy sources are hydro-electricity (of which only 1% of the resource has been exploited) and imported petroleum (some products are refined locally by PETROZAIRE). Railroads are electrified. Wood and charcoal major noncommercial sources.	Department de l'Energie includes PETROZAIRE, SNEL (electricity), and the Centre Nucleaire Regional pour l 'Afrique Centrale. All energy planning to date focussed on hydro development.	1. Develop large and small hydropower resource for urban and rural electrification and export to other African countries. Use hydro to develop industries that are large consumers of electricity, and to replace current thermal plants. Fabricate hydro equipment locally. 2. Limited interest in developing large coal resource (700 mmt) and gas in Lake Kivu, due to plentiful hydro. 3. Some interest in improvement of charcoal kilns.
ZAMBIA	Hydroelectricity (1658 MW, 80% of which used in mining industry), petroleum, coal (proven reserves of 146 mmt), wood and charcoal are major sources.	In 1980, National Energy Council established to finance and give guidelines for research, development, and demonstration activities.	1. Plan assessment of small/medium hydro for rural use, and aim for national manufacture of hydro-related equipment. 2. Good prospects for solar drying and water heating but not yet commercialized. 3. Water pumping windmills widely used; local production under consideration. 4. Feasibility study underway on ethanol from molasses. 5. Research on improved charcoal stoves and kilns.

*Based on country papers submitted by national Governments to the UN Conference on New and Renewable Sources of Energy in Nairobi, Kenya, August 1981

ANNEX D

DONOR ASSISTANCE PROJECTS BY COUNTRY

Table D-1 summarizes donor energy assistance by country for eastern and southern Africa ("East Africa") and West Africa, respectively. The list should be taken only as illustrative, since the pace of donor assistance decisions makes any such list obsolete before it is published. Because of lags in publication of donor reports on their assistance activities, the table particularly understates forestry activities. With these caveats, it still is clear that most countries already have a wide variety of donor energy assistance projects. These may or may not be coordinated.

Table D-2 lists a few of the AID and IBRD/FAO energy and forestry assistance resources available to countries generally, including African countries. These are oriented heavily to energy planning and training activities. Many European countries -- notably Great Britain, France, Germany, Holland, and Sweden -- have similar programs.

TABLE D-1

International Energy Aid by Recipient Country and Region

EAST AFRICA

	Donor	Year	Project	Amount $USmil
BOTSWANA				
Rural electrification	SIDA	1977	Rural electrification	1.12
Fossil fuel-exploration and recovery	UK	1974	Coal deposit study	0.039
National energy planning/Technical Assistance (TA)	WB		Loan for Francistown development	3.0
	Neth.	1975-79	National resources study	0.092
	USAID	1982	Resource planning & mgmt.	.600
Renewable energy	USAID	1979-80	Small scale R & D	1.08
	Canada	1978-80	Wind/water project	0.035
	USAID	1980-83	Technology	2.304
Forestry/fuelwood	USAID	1980-82	Rural sector grant	3.780
				12.05
BURUNDI				
Power generation, transmission & distribution	EDF	Pre-75	Energy Infra/Production	0.574
	EDF	1978	Ruzizi Dam study (w/Rwanda & Zaire, t = $1.62)	0.540
	Belgium	1978	Hydro project	0.79
	Belgium	1979	Hydro project	0.592
	UNDP	1974-77	Hydro potential studies	0.42
	Germany		Distribution-Mramuya	1.7
	Germany		Distribution-Ngozi/Kaganza	7.2
	Germany		Distribution-Bujumbura	2.2
	Germany		Distribution-Gitega	2.6
	Germany		Distribution-Nugyenga	2.5
Rural electrification	EDF	1978	Rural electrification	1.4175
	Germany		General Plan for Rural Elec.	0.78
	Germany		T.A.-- advisor to REGIDESO	2.7
	Germany		T.A.-- electric provision-Bujumbura	0.1
	Germany		T.A.-- rural electrification	0.44
Renewable energy	UN	1979	Solar advisory missions	-
	France	1977	Solar dryer	0.024

Forestry/fuelwood	Ireland	1978-79	Peat	0.008
	USAID	1978-80	Peat	2.995
	WB	1979	Village afforestation	4.4
	USAID	1980-83	Peat	8.000
	USAID	1980-82	Bururi forest	1.366
				41.35
COMOROS				
Power generation	France	1977	Vardjou thermal	1.07
Renewable energy	EDF	1979	Energy for microwave relay	0.270
				1.34
DJIBOUTI				
Power generation	France	1976	Distribution	2.85
Geothermal	Italy		Geothermal	-
	UN/UNDP	1978-79	Geothermal fluid test	0.471
Renewable energy	UN		Short term solar advisory	-
	France	1978	Solar pump	0.12
Energy planning	USA.)	1981-82	Energy Initiatives	4.000
				7.44
ETHIOPIA				
Power generation, transmission, distribution	Germany		Transmission consortia	10.7
Geothermal	EDF	1978	Geothermal	5.535
	Italy		Geothermal	-
	UN/UNDP	1979	Geothermal investigation	0.52
	UNDP	1976	Geothermal exploration	0.206
	UNDP	1977	Geothermal exploration	0.08
	IDRC	1972	Awash valley geothermal studies	1.9
Power Section	CIDA	1978-80	Power training	0.043
Renewable energy	France	1979	Solar equipment	0.049
	IDRC	1976-79	Windmill studies	0.13
	Canada	1978-80	Wind/water	0.087

Forestry/fuelwood	WFP	1974-83	Terracing and reforestation	3.20
	Sweden	1976-79	Forestry	11.50
				33.95

KENYA

Power generation, transmission & distribution	WB	1976	Gitaru hydroelectric	63.0
	EDF	1978	Upper Tana Dam	35.555
	EIB	1978	Upper Tana Dam	16.2
	Denmark		Hydro	0.05
	UK	1978-80	Tana Hydro	14.87
	SIDA	1975-	Kambura hydro	0.02
	SIDA	1974	Kambura hydro	6.0
	UK		Tana River Kyow	11.6
	CIDA	1979-82	LOC electrification	3.48
	FGR	1978	Upper Tana Dam	49.6
	WB	1981-	Geothermal	40.000
Rural electrification	SIDA	1973	Study for rural electrification	0.700
	CIDA	1979-82	Rural electrification	0.565
	SIDA	1977	Rural electrification	0.312
Fossil fuels	WB	1975	Oil products pipeline	20.0
Geothermal	UN/UNDP	1979	Geothermal exploration	0.073
	WB	1978	Dev.of geothermal resources	35.0
	UNDP	1976	Geothermal expl. and study	0.090
	UNDP	1970-75	Geothermal expl. and dev.	1.151
	AFDB	1979	Geo. dev. at Olkaria	9.71
	WB	1979	Olkaria geothermal	9.00
Energy planning/TA	UNDP	1979	Energy planning	0.413
	CIDA	1979-82	Planning engineers	2.48
Renewable energy	Germany		Solar pump	0.73
	UNIDO		Dev. of solar salt prod.	0.013
	Germany		Baking and cooling apparatus	0.28
	Germany		Subsidation of renewable research project	0.08
	USAID	1981-83	TA	4.800
	Germany	1981	Rural renewable	-
	France	1977	Solar pump	0.49
	UK	1973-77	Geothermal research	0.59
	UK		Micro hydro feasibility	0.126
	Neth.	1977	Wind research	0.012
Forestry/fuelwood	WB	1975	Second forestry plantation	20.0
	Canada	1975-79	Forestry/fuelwood	0.148
	USAID	1979-83	Arid & semi-arid lands dev.	13.000

KENYA - Cont'd.				
Miscellaneous	CIDA	1979-80	Acres mobilization	0.043
	WB	1978	Bura irrigation	5.4
				365.59
LESOTHO				
Power generation	Canada (CIDA)		Hydro	0.73
Energy planning/TA	UNDP	1976	Oxbow Complex feas. study	1.864
	CIDA	1978-79	Thaba Tseka Mt. (TA)	0.26
	Neth.	1975-79	National research survey	0.092
Renewable energy	Holland		Solar	-
	CIDA	1978-82	Renewable dev. project	4.0
	USAID	1979	Small scale hydro R & D	0.574
	USAID	1979-	Technology	1.600
				9.12
MADAGASCAR				
Fossil fuels	UNDP	1978-79	Petrol & mineral resource study	0.238
Geothermal	UN/UNDP	1979	Geothermal development	0.069
Renewable energy	France	1976-79	Technical assistance	1.02
	France	1979	Solar pumps	0.49
	Switz.	1978-79	Solar	0.03
	France	1979	Microhydro	0.6
				2.45
MALAWI				
Power Generation	WB	1973	2nd power: hydro	7.5
	WB	1977	3rd power: hydro	8.0
	EF	1978	Nkula Falls Dam II	11.475
	Canada	1979	Hydro	5.348
	UK	1979	Tadzani Falls	8.61
	WB	1977	Hydropower House	17.0
	AFDB	1975	Nkula Lilongire powerline	6.25
	EEC	1977	Hydro power production	9.7
	FGR	1978	Nkula Falls Hydro	6.66
	UK	-	Nkula Falls Hydro	20.79
Renewable energy	EDF	1978	Solar water heating--Mangocho	0.135
Forestry/fuelwood	AFDB	1979	Kasungu fuelwood plant	7.28
	WB	1981-	Wood energy	13.8

MAURITIUS				
Power generation	WB	1978	Power transmission	15.0
	EIB	1978	Thermal power station	2.7
	France	1976	Thermal	5.37
	UNDP	1976-79	Cascade Diamamoure, Hydro	0.250
	UNDP	1973	Quatre Soeurs Hydro	0.354
	AFDB	1975	Baptiste Dam	5.0
	France	1977	Transmission	7.32
Renewable energy	UK	1978-79	Seawave energy	0.084
	France	1979	Heliostats	0.024
Forestry/fuelwood	WB	1973	Rural dev. of fuelwood	2.7
				161.34
MOZAMBIQUE				
Power generation/transmission/distribution	UNDP	1976	Elec. generation plant	0.122
	UK	1978	Quelnine oil thermal	4.2
	Neth.	1978-79	City diesel generator	8.25
	Neth.	1977	Diesel generator repair	0.25
	Neth.	1978	Elec.Material-Electricidad do Macambigou	1.0
	UN	1979	Technical assistance to Elec. Commission	0.178
				1.4
RWANDA				
Power generation	EDF	pre-1975	Energy Infra/Production	20.7
	EDF	1978	Ruzizi Dam study (w/Burundi, Zaire, $t = 1.62)	0.54
	EDF	1978	Mukungwa Dam	27.0
	EDF	1978	Kigoma Mururu power line	5.26
	OPEC		Mukungwa hydro	2.35
	EDF	1962	Electric distribution (national grid)	20.79
	Germany		Giserieje Hydro	1.2
	"		Kigali Oil Thermal	2.1
	"		Study-Thermal Power	0.28
	"		Study-Ruhengeri/Gisenye Thermal	0.19
	"		Electric distribution	6.4
	"		Transmission materials-Kigali	0.67
	"		H.V. Distribution Line-Rulindo-Molendi	0.42
	"		Gisenye Electrical materials	1.2

RWANDA - Cont'd.				
Rural electrification	Switz.	1979	Electrification	7.94
Fossil fuels	UNIDO	1978	Rehabilitation of Lake Kivu gas	0.06
	UNIDO	1979	Rehabilitation equipment inspection	0.046
	UNDP/UNIDO	1971-77	Exploration of Lake Kivu gas	0.184
Renewable energy	France	1977	Solar dryer	0.024
	Belgium	1978-79	Solar	0.251
	France	1979	Biomass	0.049
	Belgium	1978-79	Biogas	0.269
	USAID	1979	TA	.488
Energy planning	USAID	1982	Rural works	.250
Forestry/fuelwood	WB	1979	Village afforestation	3.0
	WB	1981	Forestry development	4.000
				105.66
SOMALIA				
Power generation	Kuwait Fund	1975	Expand Mogadiscio	21.7
Renewable energy	EDF	1978	Utilization of molasses	0.155
Forestry/fuelwood	UNIDO	1979	Dev. of charcoal plant	0.026
Energy planning	WB	1981-	TA	5.000
				26.88
SUDAN				
Power generation	WB	1975	Transmission and generation	23.0
	OPEC		Hydropower II	9.5
	Germany		Roseires Dam	40.8
Energy planning/TA	Germany		T.A.-Hydro Engineering	0.075
	Germany		T.A.-Central Electric & Water	0.56
Rural electrification	WB	1973	Irrigation and rural elec.	42.0
	WFP	1973	Commodities for above	2.3
Renewable energy	Denmark	1979	Solar	0.04
	France	1976-78	Solar pumps	0.459
	France	1979	Experts	0.105
	Germany	1979	Water hyacinth biomass	1.890
	EDF	1978	Utilization of molasses	0.155
	Germany		Um Safari Oases-solar proj.	0.56

SUDAN - Cont'd.				
Renewable energy	Germany		Exploration of renewable energy	0.83
	USAID	1981-82	Rural	4.588
	Germany	1981	Rural renewable	-
Forestry/fuelwood	Canada	1975-80		0.122
Energy planning	USAID	1980-91	Training	.200
	USAID	1981-82	TA	-
				127.18
SWAZILAND				
Renewable energy	US	1979	Alternate energy resources	0.45
Energy planning/TA	Neth.	1975-79	National resources survey	0.092
				0.54
TANZANIA				
Power generation	WB	1974	Kidatu supplementary	5.0
	WB	1976	Kidatu 2nd stage	30.0
	Belgium	1977-79	Hydro	0.725
	Canada	1979	Hydro	8.18
	Norway	1979	Hydro	6.0
	UNDP	1979	Strengthening electric distr.	0.[illegible]
	CIDA	1976	Hale Moshi transmission line	6.[illegible]
	CIDA	1975	Great Ruaha power project	15.0
	SIDA	1974	Kidatu hydro	4.0
	CIDA	1971-75	Hale-Moshi line	0.031
	CIDA	1971-75	Hale-Moshi transline	7.26
	CIDA	1978-80	Great Ruaha	0.165
	CIDA	1979-82	Mwanza-Musoma	8.873
	SIDA	1977	Hydro	14.99
	Germany		Kidatu hydro	38.8
	Neth	1979	Mbeya R.P.	4.75
Fossil fuels	UNDP	1978	Dev.of coal production	0.52
	Norway	1977	Gas/oil field feasibility study	0.075
	Neth.	1976	Mineral exploration	1.225
Geothermal	SIDA	1976	Geothermal potential study	0.02
Energy planning/TA	CIDA	1975	Study for primary elec. resources	0.600
	CIDA	1971-75	Tanesco-for dev.of resources	2.550
	CIDA	1979-80	Tanesco-equipment	0.039
	CIDA	1978-80	Power study	0.215

TANZANIA - Cont'd.				
Renewable energy	Denmark		Solar	0.035
	Switz.	1978	Solar/wind	0.020
	UNIDO/UNDP	1979-80	Dev.of solar salt prod.	0.140
	Neth.	1972	Wind research	0.01
	Ireland	1979	Peat	0.001
	Neth.		Gasification (SIDO/77U)	0.937
	Neth.	1977	Wind mill research	0.91
	UNIDO/UNIDF	1979	Biogas technology demonstration	
	Germany	1981	Rural dev.	-
Rural electrification	Germany		Rural elec. transmission and Distribution	11.1
Forestry	WB	1976	Sao Hill Forestry	7.0
	Sweden	1979-80	Forestry	21.08
	WB	1978	Mwanza-Shinyanga	2.0
Energy planning	USAID	1981-82	TA	1.500
	WB	1981	TA	1.000
				201.41
UGANDA				
Energy planning/TA	UNDP	1978-79	Energy dev. overall assessment	0.121
	Kuwait Fund	1975	Hydro feasibility study, increased sugar production	0.800
				.92
ZAIRE				
Power generation	EDF	pre-75	Energy Infra/Production	26.19
	EDF	1978	Ruzizi Dam study (w. Rwanda, Burundi $t = 1.62)	0.540
	EDF	1978	Butuhe power station	2.235
	EDF	1975	400 Km network feeding power	26.19
	USAID	1983	Rural Hydro	2.000
Fossil fuel	WB	1979	Enhanced oil recovery	4.100
Energy planning/TA	EDF	HEP	Tea processing study	0.209
Renewable energy	Belgium		Solar power	-
	Belgium		Biogas	-
	France	1978	Telecommunications by solar	0.049

ZAMBIA				
Power generation	WB	1973	Rafue Hydro	115.00
	WB	1974	Kariba Hydro	42.10
	Sweden	1977	Kydro dam	1.14
	Neth.	1977	Mongu Kalabu line	2.05
Fossil fuels	AFDB		MAMBA Colleries-coal mining	6.07
	Neth.	1974	Mine technology	0.218
Energy planning/TA	UNDP	1969-76	Senior electr. engineer	0.181
	France	1979	Experts	0.002
Forestry	WB	1977	Industrial forestry	16.8
				245.17
				1,356.39
USAID				47.49

WEST AFRICA

BENIN				
Power generation	UNDP	1979	Hydro feasibility study	0.310
	CIDA	1974-75	Ghana-Togo-Benin line	0.400
	CIDA	1978-82	Ghana-Togo-Benin line	1.320
Energy planning/TA	UNDP	1964-77	Energy supply and demand forecast	0.100
Renewable energy	UNIDO	1979	Solar/salt production	0.270
Forestry	USAID	1978	Charcoal production	0.350
	USAID	1979	Charcoal production	0.560
	USAID	1979	Wood charcoal	0.060
				3.37
CAMEROON				
Power generation	EDF	pre-75	Energy Infrastructure/Prod.	0.977
	EIB	1978	Songloulou dam	18.225
	EDF/EIB		Dam schemes	10.125
	Kuwait Fund	1979	Songloulou power	16.020
	Germany		Distribution/transmission Electric Network Southwest	1.700
	France	1976-79	Songloulou Hydro	45.030
	France	1978	Songloulou Transmission	4.880
Nuclear	UNDP/UN	1971-76	Nuclear materials pros.	0.165
Energy planning/TA	CIDA	1977	Energy study	0.020
	Germany		Power CAM Advisor	1.700
	Germany		West Cameroon Energy Plan (Study)	0.940
Renewable energy	EDF	1978	5KW solar pump	0.259
	France	1976	Solar pump	0.170
	France	1976-79	Technical assistance	0.268
	France	1976-78	Scholarships	0.070
	France	1979	Solar refrigeration	0.049
	France	1979	Solar pumps	0.146
	EDF	1979	5KW solar irrigation pumps	0.419
	WB	1977	Rice husk biomass	16.020
	Germany		Biogas	0.360
				117.54
CAPE VERDE				
Power generation	EDF	1978	Distribution network	0.473
	Holland	1978	Electric supply-Porto Novo	0.510
	USAID	1978-81	Solar desalination	3.595

CAPE VERDE - Cont'd.				
Renewable energy	USAID	1978-79	Renewable	2.85
	Switz.	1975	Solar	0.05
	France	1978	Air generators	0.159
	France	1979	Wind generators & dryers	0.12
	France	1979	Solar pumps	0.073
	France	1979	Electricity production	0.29
	Switz.	1975	Wind	0.05
	France	1978	Heliostat and wind generators	0.16
	Neth.	1975	Wind research	0.013
	USAID	1980	TA, training	.500
Fossil fuels-exploration and development	Germany		Butane bottling plant	2.3
Geothermal	Switz.	1975	Geothermal	0.070
				11.21
CHAD				
Power generation	Kuwait Fund	1975	N'Djamena power expansion	0.805
	France	1978	N'Djamena/Sack generator and study	2.684
Fossil fuel	UN/UNDP	1979	Petrol exploration	0.312
	UN	1979	Petrol advisory mission	-
	OPEC	1979	Oil refinery project	4.500
Renewable energy	France	1976	Solar pumps	0.24
	France	1976	Heliostat pumps	0.024
	France	1977-78	Solar station	0.46
	France	1976-78	Technical assistance	0.195
	France	1976-78	Scholarships	0.07
Forestry/fuelwood	WB	1978	Savannah woodlands management	0.400
	WB	1977	Sahelian reforestation	0.400
	Germany		Reed and charcoal study	0.06
				10.15
CONGO				
Renewable energy	France	1976-79	Technical assistance	0.7
	France	1979	Methane fermentation	0.024

GABON				
Power generation, transmission & distribution	Germany		Study of water & electric provision	0.31
	France	1976	Ichembele hydro	24.39
	France	1978	Assegue transmission	4.88
Energy planning/TA	France	1977	Quining Center Orlando	2.44
				32.74
GAMBIA				
Power generation	UNDP	1978-79	Assistance to power generation	0.645
	AFDB	1975	Banjul diesel plant	2.5
	CIDA	1978-80	Hydro	0.33
	Germany		Banjul power plant	1.5
Energy planning/TA	Germany		T.A.-Gambia utilities	1.11
Renewable energy	UNIDO	1979	Solar salt works	0.027
	WB	1976	Biomass	–
Forestry/fuelwood	US	1979	Fuelwood	0.15
	USAID	1980	Fuelwood	1.188
	USAID	1979		7.45
GHANA				
Power generation	WB	1977	Third power distr.	18.0
	WB	1977	Kpong hydro	39.0
	EDF	1978	Kpong dam	12.01
	EIB	1978	Kpong dam	13.5
	EIB	1978	Interconnection of networks w/Ivory Coast (t = 14.85)	7.425
	CIDA		Hydro	29.9
	CIDA	1978-82	Kpong hydro	23.65
	CIDA	1979-81	Ghana/Togo/Benin transmission line	0.065
	OPEC	1979	Bui hydro	1.63
	OPEC	1979	Kpong hydro	3.7
	Kuwait	1979	Pong power station	31.93
	CIDA	1977	Hydro study	0.131
	CIDA	1977	Hydro	28.62
	Austrl.	1977	Hydro	2.22
	Germany		Distribution-electric Network, Accra	15.2
	Germany		Distribution-transmission Volta Reju	15.6

GHANA - Cont'd.				
Energy planning/TA	Germany		T.A.-ECG advisor	0.72
	Germany		T.A.-Electrification plan	1.0
	USAID	1978		0.2
Renewable energy	Germany		Solar house cooling	0.54
	USAID	1978	Pyrolitic converter	0.083
	USAID	1979	Pyrolitic converter	0.83
	*USAID		TA	3.500
Forestry	Canada	1977-80	Forestry/firewood	0.13
	UNIDO/UNDP	1979	Charcoal production	0.019
	WFP	1975-83	Forestry, wood and charcoal	1.35
				250.12
GUINEA				
Power generation	UNDP/UN	1969-77	Electric power	0.216
	France	1978	Study-Grandes Chutes hydro	0.316
Fossil fuels	UNDP	1979	Petrol production, distr.	-
Renewable energy	France	1978-79	Solar program	0.212
Forestry/fuel	*USAID	1091-82	Nursery	.500
				1.24
GUINEA-BISSAU				
Energy planning/TA	UN/UNDP	1979-81	Dev. of electrical energy	0.248
	UN/UNDP	1975-78	Management electric supply	0.113
	Sweden	1977	Energy project	0.736
	Germany		T.A.-Electric provision (Bissau)	0.89
Forestry/fuelwood	USAID	1980	Forestry management	0.05
	*USAID	1982	Management	1.000
				3.04
IVORY COAST				
Power generation	EIB	1978	Distribution network	14.85
	EIB	1978	Interconnection of network	7.425
	CIDA	1978-80	Credit Bidi powerline	1.567
	CIDA	1978-82	Kassou Daloa line	3.03
	CIDA	1977	Electr. distribution	2.86
	France	1977	Hydro Buyo	51.22
	France	1978	Korbugo Feinkessdogou	3.9

IVORY COAST - Cont'd.				
Rural electrification	CIDA	1978-80	Rural electrification	0.022
Forestry	WB	1979	Dev. of forest resources	18.0
				102.87
LIBERIA				
Power generation	WB	1973	Power supplementary	2.9
	WB	1975	3rd Power	1.8
	WB	1978	4th Power	10.0
	EDF	1978	Mano river dam study	3.2
	EIB	1978	Bushrod power station	6.615
	Germany		Electric Dist.-Monrovia	11.0
	USAID	1978-81	Mini Hydro	.070
Fossil fuels	UN	1979	Petrol legislative advice	-
				35.59
MALI				
Power generation	EDF	pre-1975	Energy infrastructure and production	0.032
	EDF	1978	Selingue dam	25.86
	Belgium	1978	Hydro	-
	CIDA		Selingue dam line	8.399
	France	1978	Basundo trans/distr.	6.15
	France	1976	Selingue hydro	8.54
	CIDA	1978-82	Selingue trans. line	8.545
	CIDA	1978-80	Plan director for transmission project	0.053
	Kuwait Fund		Selingue dam	17.8
	Germany	1977	Hydro-Selingue dam	19.4
	CIDA	1977	Transmission line	7.52
Energy planning/TA	US	1978-79	General	0.03
Renewable energy	EDF	1978	Solar irrigation pumps	0.077
	EDF	1978	Yangasso solar	0.11
	EDF	1978	Tombouctou solar pump	0.09
	France		Mali/Senegal solar	2.9
	UNIDO/UNESCO	1978-79	Solar lab assistance	0.068
	CEAO	1979	Regional solar center	0.180
	France	1976-78	Technical assistance	0.16
	France		Scholarships	0.07
	France	1979	Tech. asst. & scholarships	0.24
	USAID	1978-80	Renewable R & D	2.7
	USAID	1978-82		4.100
	USAID	1978	Photovoltaic	.220
	Germany	1981	Rural renewable	-

MALI - Cont'd.				
Forestry/fuelwood	Canada	1974-79	Forestry/firewood	0.139
	WB	1975	Fuelwood	0.10
	WB	1979	Forestry	2.60
	USAID	1980	Village Reforest	.495
				116.58
MAURITANIA				
Power generation	UNDP	1979	Champagne hydro	0.19
	FGR		Nouakschott Diesel Power	0.9
Renewable energy	EDF	1978	Solar pump (10 KW)	0.041
	France	1977	Heliostat generators	0.049
	France	1978	Solar generator	0.37
	France	1977	Solar village pump	0.049
	France	1978	Solar distillery	0.146
	France	1978	Solar irrigation pump	0.12
	France	1976-78	Technical assistance	0.07
	France	1976	Missions	0.07
	USAID	1980		0.480
	France	1979	Solar pump	0.24
	France	1976-78	Solar center	2.07
	France	1976-77	Solar pump	0.15
	USAID	1981-83		1.070
Forestry/fuelwood	US	1978	Fuelwood	0.25
	USAID	1980	Village fuelwoodlots	0.209
	USAID	1978-83	Renewable resource mgmt.	2.000
				8.47
NIGER				
Power generation	EDF	pre-1975	Energy Infrastructure and prodcution	0.537
	EDF	1978	Kandadji dam study	2.6
	Canada		Hydro	0.84
	CIDA	1974-75	Kainji-Niamey line	1.4
	France		Coal generation	17.07
	CIDA	1978-80	Poste Dosso	0.298
	CIDA	1980-82	Barrage West hydro study	0.852
	CIDA	1978-80	Kainji-Niamey Line	0.54
	Germany		Dev.of freon 113 steam engine	0.159
	CIDA	1977	Elec. distribution	0.029
	AFDB	1977	Sonichar thermal	6.340
	Germany		Transmission-Niamey-Tillabery	4.3
Fossil fuels	UNDP	1979	Petrol. expert	0.03
	UN	1979	Petrol. legislative advice	-
	AFDB	1979	Sonichar coal mine	12.4

NIGER - Cont'd.				
Nuclear	Japan	1977	Uranium prospecting	12.74
Energy planning/TA	Germany	1979	R & D	0.138
	USAID	1979-80		0.149
Renewable energy	EDF	1978	2 Solar pumps	0.743
	EDF	1978	Solar water heater	0.006
	Germany	1978-79	ONERSOL	0.33
	US	1978	Solar	0.5
	France	1976	Solar pumps	0.012
	France	1977	Heliostat generators	0.037
	France	1978	Central electric-solar	0.488
	France	1976-78	Solar power/education TV	0.12
	France	1976-79	Renewable tech. assistance	0.19
	France	1976-78	Mission	0.16
	France	1979	ONERSOL	0.12
	France	1979	Solar pump	0.488
	France	1979	Solaire television	0.73
	Germany	1981	Rural renewable	-
Forestry/fuelwood	WB	1978	Forestry	4.50
	WB	1978-79	Forestry	3.40
	Canada	1974-79	Forestry	0.104
	WB	1975	Maradi fuelwood component	0.20
	WB	1978	Forestry	1.00
	USAID	1980-82	TA	1.151
				74.70
NIGERIA				
Power generation	CIDA	1978-80	Kainji-Niamey line	0.104
	Germany		Transmission-enlarge network	17.3
	Germany		Transmission	11.1
	Germany		Near East electricity study	0.09
Forestry	Canada	1975-79	Forestry	0.20
	Canada	1977-80	Forestry	0.20
	WB	1977	Ayangha rural dev.-firewood	1.20
	WB	1977	Lafia rural dev.-firewood	0.90
				31.09
SENEGAL				
Power generation	Germany		Mantali dam	92.2
	CIDA		30KW line	-
	France	1976	Deshi	2.68

SENEGAL - Cont'd.				
Energy planning/TA	USAID	1979	General	0.500
	UN/UNEP	1978-80	Experimental energy center	0.268
	CIDA	1978-81	Electrical sector study	0.396
	France		Electrical training center	2.44
	WB	1981	TA	3.3
Renewable energy	EDF	1978	Kanel solar pump	0.098
	EDF	1978	Theis solar pump	0.33
	Germany		Solar	3.4
	France	1976	5 solar pumps	0.34
	France	1977	Pastureland irrigation pumps	0.37
	France	1977	Thermodynaic solar irrig.	0.73
	"	1976-78	Technical assistance	1.34
	"	1976-78	Scholarships	0.22
	"	1976-78	Missions	0.049
	"	1978	Solar electric station	0.24
	"	1978	Heliosolar station	0.12
	"	1978	Heliosolar pumps	0.098
	"	1978	Aerogenerators	0.17
	"	1979	Aerogenerators	0.73
	"	1977	Dakhar solar generator	3.66
	USAID	1979	Solar demonstration	0.5
	USAID	1979	Bakel solar pump	0.5
	USAID	1980		.300
	Germany	1981	Rural Renewable	-
Forestry/fuelwood	Canada	1974-78	Forestry/firewood	0.14
	USAID	1979-80	Village woodlots	1.0
	USAID	1979-81	Fuelwood production	3.133
	USAID	1980	Africare reforestation	.126
	WB	1980	Village woodlots	.211
	WB	1981		9.3
				128.89
SIERRA LEONE				
Energy planning/TA	Germany		T.A.-Electrical experts.	0.06
Renewable Energy	U.K.	1975-80	Solar water heater research	0.0072
				.07
TOGO				
Power generation	CIDA	1974-75	Ghana-Togo-Benin line	2.00
	CIDA	1975-76	Lome powerline and substation	5.28
	CIDA	1978-80	CIAMO poer	11.30
	Germany		Free lines electric study	0.016
Energy planning/TA	UNDP	1964-77	w/Benin-supply forecast and demand	0.1

TOGO - Cont'd.				
Renewable energy	EDF	1978	2 Solar pumps	0.108
	USAID	1980	Rural solar	.050
				18.85
UPPER VOLTA				
Power generation	EDF	pre-75	Energy Infra/Production	1.85
	EDF	1978	Electr. of secondary centers	1.418
	France	1977	Distribution	4.55
	France	1976	Noumbiel study	1.162
Renewable energy	Austria	1978	Solar	0.054
	Austria	1978	Solar	0.02
	US	1978	Solar	0.08
	EDF	1979	Solar station at Dori	1.35
	UN	1979	Solar advisory mission	-
	France	1976	17 solar pumps	1.83
	France	1979	Solar pumps	0.24
	USAID	1979	PV pump demonstration	0.150
	EDF	1978	Utilization of molasses	0.135
	UNIDO/UNIDF	1979	Biogas technology demonstr.	.56
	France	1977-79	Biomass	0.195
	France		Scholarships	0.07
	France		Missions	0.049
	France	1976-79	Technical assistance	0.54
	Neth.		Rural Telephone-solar power	0.55
	Germany	1981	Rural Renewable	-
Forestry/fuelwood	Switz.	1977-80	Forestry	0.790
	USAID	1979-80	Village woodlots	0.700
	WB	1979	Forestry	1.90
	France	1976	Reforestation	3.41
	USAID	1979-82	For. Educ. & Dev.	4.468
	USAID	1980	Agri. forestry	.056
	WB	1980	TA	14.5
				40.63
				994.60

AFRICA REGIONAL

Rural electrification	ECA	1979	Small scale electr. production for rural use	.022
	ECA	1979	Symposia on dev. of rural electric	.012
	ECA	1979	Study of factors affecting rural energy development	.012
Nuclear energy	ECA	1979	Est. of African Inst. of Nuclear Physics	-
	ECA	1979	Study on est. of African Petrol. Ins.	-
	ETA, UN ATCD		Forecasting demand in Africa	.022
	ECA, UN	1979	Training inst. for elec. engineer	.022
	ECA, UN	1979	Feasibility studies	.068
	ECA, UN	1979	Assistance in connecting African elec. system	.044
	UNEP	1979	Workshops on energy options in Affica	.015
	ECA, UN	1979	Dev. of energy resources	.150
Fuelwood	USAID	1979	Firewood	1.607
Renewable energy	ECA	1979	Small scale elec. prod.	.022
	ECA	1979	Seminar on small scale elec. generators	.012
	ECA/ France	1979	Dev. of non-conventional energy	.042
	ECA	1979	Dev. of non-conventional sources	.035
	France	1976-78	Renewable Exports	.73
	UNEP	1979	Solar energy workshops	.015
	UNESCO	1979	Coord. of regional solar research	.024
	Germany		Club du Sahel solar baking and cooking	.19
Energy planning/TA	Germany		Club du Sahel - T A	.056
	Germany		Club du Sahel - Energy experts	.176
	USAID	1978-80	General	4.452
				7.73
TOTAL ANNEX B				2.358.72

Proposed, not yet funded

TABLE D-2: INVENTORY OF SELECTED INTERNATIONAL AND REGIONAL ORGANIZATIONS SUPPORTING ENERGY INITIATIVES IN AFRICA*

I. INTERNATIONAL ORGANIZATIONS

I.A: INTERNATIONAL NON-GOVERNMENTAL ORGANIZATIONS

Organization	Purpose	Membership	Location	Comments
Appropriate Technology International (ATI)	Private nonprofit corporation created in response to a Congressional mandate to AID for a "coordinated private effort to promote the development and dissemination of technologies appropriate for developing countries." ATI works with the private sector to the greatest extent possible, and builds on the experience that already exists within the development assistance community, especially private and voluntary organizations.		Washington, D.C.	Has formed advisory panels made up of experts. Organized around areas of concern to ATI. These panels will make recommendations for and assist the development of project activities.
Intermediate Technology Development Group (ITDG)	Operates with volunteers who make up advisory panels in various fields. These panels then work with groups in industry and academic institutions. ITDG develops small scale technologies in direct response to developing world needs. Communicates results through manuals and leaflets as well as journal entitled Appropriate Technology Quarterly.		London, England	Founded in 1965.
International Council for Research in Agroforestry (ICRAF)			Nairobi, Kenya	

*International agencies which are discussed in Table B-1 (Annex B) are not treated here. Such agencies include the: International Development Cooperation Agency (both AID and TDP); International Bank for Reconstruction and Development (World Bank); International Development Association (IDA); International Finance Corporation (IFC); Concerted Action for Development in Africa (CADA); European Economic Community (EEC); and a number of organizations within the United Nations (i.e., UNESCO, UNICEF, WHO, WMO).

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International Institute of Tropical Agriculture (IITA)	Founded in 1968. Concerned with the development of improved farming systems in the lowland humid tropics, esp. in Africa. One of chief concerns to dev. more intensive cropping systems to replace shifting cultivation typical of much of tropical Africa. The Center is carrying on crop improvement programs for root and tuber crops and grain legumes and is cooperating with other CGIAR Centers on the local adaptation of maize and rice.		Ibadan, Nigeria	Center is part of the Consultative Group on International Agricultural Research (CGIAR). CGIAR is sponsored by FAO, World Bank & UNDP.
Volunteers in Technical Assistance, Inc. (VITA)	VITA is a nonprofit organization that helps people and groups working on technical problems in developing countries. It works with inventors, entrepreneurs, governments and development organizations to develop and adapt needed technologies. VITA answers more than 2,500 by-mail technical inquiries yearly, on business development, technical training, small-scale industry, renewable energy, agriculture, and construction.		Mt. Rainier, Maryland	VITA also works on long-range development projects with local organizations, provides technical consultancies and consultant name referrals, and publishes more than 100 how-to manuals and bulletins.

I.B: INTERNATIONAL GOVERNMENTAL ORGANIZATIONS

Agence de Cooperation Culturelle et Technique (Agency for Cultural & Technical Cooperation)	To develop new forms of multilateral cooperation in fields of education, culture, science and technology between partly or wholly French-speaking countries.	14 African countries 4 European countries Canada, Haiti and Lebonon 2 Assoc. members in Africa Participant: Quebec	Paris, France	Established in 1970.

UN Environment Program (UNEP)	Supports RD&D in those areas which are considered best suited to a particular environment. In 1977 established an Energy Task Force to plan and implement UNEP's strategy and activities in the area of energy. These activities are divided into two sub-programs: energy/ environment and renewable sources of energy. Also organizes and disseminates information pertaining to these two areas through its Environmental Liaison Center (ELC) and its international referral system -- Infoterra. These resources attempt to link requestors in Africa (and other requestors worldwide) with "focal points" in other countries having the needed information.	Members of UN	Nairobi, Kenya	See Table B-2 (Annex B) for more information.
UN Institute for Training and Research (UNITAR)	UNITAR's involvement in energy area oriented towards monitoring and evaluating R&D, and disseminating research breakthroughs or technological developments which offer promise of helping energy needs of dev. countries.	Members of UN		Disseminates information and ideas through sponsorship of public lectures, and publication of studies. Organizes and sponsors seminars and conferences.

II. REGIONAL ORGANIZATIONS

II.A: REGIONAL NON-GOVERNMENTAL ORGANIZATIONS

African Center for Administrative Training and Research for Development (CAFRAD)	To undertake research into administrative problems in Africa, to document results, to provide consultative service for governments and organizations, to hold seminars.	26 African countries	Tangier, Morocco	Aided by a special UNDP fund. Has a large resource library. Established in 1964 by agreement between Morocco and UNESCO.
Associations of African Universities	To encourage exchanges and cooperation between African University institutions to study and make known educational needs in Africa and coordinate arrangements to meet these needs.	49 African universities	Accra North, Ghana	Established in 1967.

Association pour la Promotion des Initiatives Africaines (APICA)	Provides technical support of local development initiatives. Private organization.	Cameroon, Central African Republic, Congo, Gabon, Zaire, Burundi, Rwanda, Chad.	Douala-Bassa, Cameroon	Provides an information center, inquiry service, prints a newsletter. Created May 1980.
ENDA	Provides an information and consulting service for government and private rural development programs, mainly in Western African countries. Privately-run.		Dakar, Senegal	
Environmental and Development Agency	Private institution. Undertakes RD&D in renewable energy area -- water power, wind, methane, solar.		Marshalltown, South Africa	Disseminates information through various publications.
Institut Africaim pour le Developpment Economique et Social (INADES)	Acts as an information and consulting service for government and private rural dev. programs. Mainly in West Africa. Privately-run, non-profit.	Affiliates in Burundi, Cameroon, Ethiopia, Kenya, Rwanda, Togo, Upper Volta & Zaire.	Abidjan, Ivory Coast	Provides an information center, library and inquiry service (technical), and rural extension.
Pan-African Institute for Development (PAID)	Oriented towards training and education programs.		Douala, Cameroon	
Regional Appropriate Technology Committee	Regional meetings of rural technology information sponsored by Commonwealth Secretariat and country governments -- one in Arusha in 1977 and one in Lusaka im 1979. Several bi-lateral exchanges of technologies have been initiated. No formal regional institution or network has been established.	Zambia, Malawi, Tanzania, Botswana, Kenya, Lesotho, Mauritius, Swaziland, Nigeria & Ethiopia.	No regional headquarters established	National Appropriate Technology Committees have been set up in most member countries.

II.B: REGIONAL INTER-GOVERNMENTAL ORGANIZATIONS AND INSTITUTIONS

African Development Bank (AfDB)	To contribute to the economic and social development of members either independently or jointly. Aims to promote investment of public and private capital in Africa, to use its normal capital resources to make or guarantee loans and investments, and to provide technical assistance in the preparation, financing and implementation of development projects. The Bank may grant direct or indirect credits; it may operate alone or in concert with other financial institutions. Established 1964. Began operations 1966. AfDB maintains close relations with other African regional and subregional organizations. Signed formal agreements with OAU, and following UN agencies: UNDP, UNESCO, FAO, ILO and WHO. AfDB formed with OAU and ECA a coordination committee whose purpose is to harmonize programs of the institutions.	Countries must be independent, members of UN and within geographical scope of African continent and islands bordering it.	Abidjan, Ivory Coast	Bank promoted est. of two financial institutions: the African Development Fund (assists Bank by making loans on concessionary terms) and SIFIDA (multinational private investment company of over 120 banks and industries). See Annex B (Table B-1) for a list of donor activities in Africa.
Club des Amis du Sahel (Club of Friends of the Sahel)	An informal forum for coordination of long-term policies and strategies between AID donors and the eight members of the CILSS (see below). Set up by the CILSS in association with OECD. The Club aims to help mobilize resources for the development of the Sahel, and will promote programs to develop water resources, transport and communications, improve livestock and agricultural productivity, combat ecological deterioration and train local personnel to plan and manage development programs.	AID donors & 8 CILSS members		Established March 1976.

Comité Permanent Interétats de Lutte Contre la Sécheresse Dans le Sahel (CILSS) -- Permanent Interstate Committee on Drought Control in the Sahel	Coordinates and assists member government programs of reforestation, wood conservation, erosion control, etc. in the Sahel region.	Cape Verde Islands, Chad, Gambia, Mali, Mauritania, Niger, Senegal, Upper Volta	Ouagadougou, Upper Volta	Established 1973. See Table B-1 (Annex B) for listing of donor activities in Africa.
Comite Interafricain D'Etudes Hydrauliques	To undertake RD&D in alternative energy areas (i.e., windmill installation, water resources, methane, pumps). Also involved in dissemination of information from research studies and projects.	12 African countries: Benin, Cameroon, Chad, Congo, Gabon, Ivory Coast, Mali, Mauritania, Niger, Senegal, Togo, Upper Volta. 4 observer states: C.A.E., Ghana, Nigeria, Liberia	Ouagadougou, Upper Volta	
Communauté Économique de L'Afrique de l'Ouest (CEAO) - West African Economic Community	Replaced the West African Customs Union (UDEAO). Function to coordinate not only customs and trade measures but also to develop policies with regard to transport and communication, cattle, industry, external trade, tourism, energy, research, etc. Non-manufactured, crude products many be imported and exported within the Community without internal taxes. Industrial products of member states, when exported to other member states, may benefit from the special preferential system based on a Regional Cooperation Tax, which replaces the import taxes of the separate states.	Ivory Coast, Mali, Mauritania, Niger, Senegal, Upper Volta Observers: Togo and Benin	Abidjan, Ivory Coast	CEAO began 1974. CEAO has proposed a Centre Regional d'Energie Solaire (CRES) to be based in Bamako, Mali. Expected to be funded by an international donor consortium.

Conseil de L'Entente	To promote economic development in region; to assist in preparing specific projects and to mobilize funds from other sources; to act as a guarantee fund to encourage investments in the region; to encourage trade and investment between the member states. Since 1974 empowered to finance the reduction of interest rates and extension of maturity periods of foreign loans to member countries.	Benin, Ivory Coast, Niger, Togo, Upper Volta	Abidjan, Ivory Coast	A political and economic association of 4 states which were formerly part of French West Africa, and Togo, which joined in 1966. Organization founded in May 1959. Priority to provide economic coordination for member states Financing consists of annual contributions from members' subsidies and grants, and investment returns and commissions from its guarantee operations.
Economic Community of West African States (ECOWAS)	Promote cooperation and develop economic activity, particularly in fields for which specialized commissions are appointed, to raise the standard of living of people of member countries, increase and maintain economic stability, improve relations among member countries and contribute to progress and development of Africa.	Benin, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo, Upper Volta		Treaty came into force June 1975. Treaty focused on following: - Elimination of tariffs and other obstructions to trade among member states - Elimination of internal taxes for the protection of domestic goods plus abolishing all revenue duties - Providing compensation for states whose import duties are reduced through trade liberalization. - Established fund for development projects. Donor activities listed Table B-1 (Annex B).

Institut du Sahel	Operates under the CILSS umbrella to provide research and training -- including its information service -- RESADOC (Sahelian scientific and technical information and documentation network).	CILSS members (See above)	Bamako, Mali	Serves primarily its members' large research institutions.
International Center for African Economic and Social Documentation (CIDESA)	To establish international coordination of economic and social documentation concerning Africa and to facilitate research.	74 member institutions	Brussels, Belgium	
Organization of African Unity (OAU)	To promote unity and solidarity among African states. To coordinate and intensify their efforts to improve living standards in Africa. To defend their sovereignty, territorial integrity, and independence. To eradicate all forms of colonialism from Africa. To promote international cooperation, having due regard to the Charter of the UN and the Universal Declaration of Human Rights. Member states contribute in accordance with their UN assessment. No member state shall be assessed for amount exceeding 20% of yearly budget of Organization.	47 African States.	Addis Ababa, Ethiopia	Established in 1963. Supports a number of specialized commissions within the OAU -- including the Scientific, Technical and Research Commission (STRC) For a listing of donor activities see Table B-1 (Annex B).
Southern African Development Coordination Conference (SADCC)	To plan rehabilitation of the transport system and to take measures to ensure food security, manpower development, and animal health programs. Also play major role in regional political developments. Coordinate major programs of member countries.	8 Southern African Countries (Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Zambia, Zimbabwe) plus Tanzania		Member countries have diverse political and economic systems but common interest in development of Southern Africa.

UN Economic Commission for Africa (ECA)	Commission has responsibility to promote and facilitate concerted action for the economic and social development of Africa; to maintain and strengthen economic relations of African countries, both among themselves and with other countries of world; to undertake or sponsor investigations, research and studies of economic and technological matters; to encourage coordinated policies for development of Africa.	Members of UN, must be independent and within geographical scope of African continent and bordering islands.	Addis Ababa, Ethiopia	Founded 1958 by a resolution of ECOSOC as the 4th UN regional economic commission. Involved in areas of: - education and training, - science & technology, - regional & subregional planning, and - development of energy resources (both conventional and nonconventional).
	The African Institute for Economic Development and Planning -- an autonomous organ of the ECA -- was founded in 1963. This group has a special fund to assist in the training of senior African officials. Emphasis on developing techniques for planning and management. Also serves as a clearing house and documentation center.		Dakar, Senegal	
	The African Training and Research Center for Women of the ECA promotes the full use of human resources for development by integrating African women more effectively into development efforts of their countries. Itinerant workshops, assistance to governments in project identification and implementation, study tours, pilot projects, socioeconomic surveys, studies and scholarships are offered.		Addis Ababa, Ethiopia	Energy needs of rural women are an important aspect, including projects or studies on improving village water supplies, hand-operated grinding mills, and oil presses, food production and storage.
UN Center for Natural Resources, Energy and Transport (CNRET)	Undertakes numerous studies in fossil fuel area. Also supports technical cooperation projects in energy executed by the UN. Include energy surveys, evaluation of alternative sources of electricity supply, and geothermal exploration. Also provides assistance in formulation of energy policies, and the organizing and strengthening of energy institutions. Work mainly in conventional energy area but was involved in preparing for International Conference on New and Renewable Sources of Energy.	Member of UN		See Table B-2 (Annex B) for a listing of donor activities.

III. NATIONAL ORGANIZATIONS

III. A- NATIONAL NON-GOVERNMENTAL ORGANIZATIONS

Organization	Location	Areas of Concentration and General Comments
Pelegano Village Industries	Gaborone, Botswana	Works on the development and demonstration of renewable energy technologies -- solar pumps and ovens, windmills, oxtrikes, solar hot water systems. Privately-run institution.
Federation des Eglises et Missions Evangeliques au Cameroun	Yaounde, Cameroon	Provides assistance in the areas of water resources, small scale industries, medical science industries, and technical training and assistance. Extension work.
Technology Consultancy Centre, University of Science and Technology (UST)	Kumasi, Ghana	Undertakes R&D in renewable energy technologies (e.g. pedal-powered rice thresher, pyrolytic converter using sawdust to produce charcoal, and technologies utilizing solar power, wind, and biogas). Publishes a newsletter to spread results of their work and others. A regional resource.
Department of Mechanical Engineering, University of Nairobi	Nairobi, Kenya	Dissemination of information on technology and training, and technical assistance to other governmental agencies. Provides technical assistance, a library and information/documentation center. Provides education and training in area of renewable energy. A potential regional resource.
University of Malawi, Bunda College	Lilongwe, Malawi	Education and training in renewable energy area. Undertakes R&D in such areas as water pumping windmills for irrigation. If findings are successful could be commercially produced.

Laboratoire d'Energie Solaire du Mali	Bamako, Mali	Parastatal agency. RD&D in solar energy. Work underway in solar water heaters; solar meat, fish, and fruit driers; solar cookers and large distillers; collectors; photovoltaic pumps; solar power plants for irrigation, water supply, and electricity; refrigeration and air conditioning. Also working in area of biogas installation. A potential resource.
School of Industrial Technology, University of Mauritius	Reduit, Mauritius	Provides inquiry service, consulting, technical assistance, and resource library. Involved in RD&D in areas of solar and wave energy; wind data; windmill prototypes; methane from cow dung and bagasse; hydraulic ram pumps; solar energy; water power; wind energy; solar stills, heaters; cookers; refrigerators; and driers.
Office d'Energie Solaire	Niamey, Niger	Government of Niger's office of solar energy. Undertakes research on rural energy technologies. Provides Nigeriens with access to technologies, especially improved stoves. A potential regional resource.
Faculty of Technology, University of Ibadan	Ibadan, Oyo State, Nigeria	Emphasis on research, consulting services, training and project planning and evaluation. Much work in solar energy area. A potential regional resource.
Centre d'Etudes et d'Applications d'Energie au Rwanda (CEAER)	Butare, Rwanda	Involved in the study and application of energy technologies (e.g. biogas plants; rural production and utilization; solar captors; peat; and small-scale hydro). A potential regional resource.
Centre d'Etudes et de Recherches sur les Energies Renouvelables (CERER), University of Dakar	Dakar, Senegal	Undertakes research in renewable energy area (e.g., rotor water pumps and low-cost woodstoves). A potential regional resource.

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Center for Advisory Services in Technology Research and Development (ASTRAD), Department of Mechanical Engineering, Fourah Bay College, University of Sierra Leone	Freetown, Sierra Leone	Provides consultancy services, and RD&D in renewable energy field (e.g. solar water heater, solar power). The Department works closely with Ministry of Social Welfare and Rural Development and other government ministries in developing low-cost technologies for use by rural communities and rural women (i.e., hand-operated oil-presses, solar water heaters and solar dryers).
Department of Agricultural Engineering Njala University College	Freetown, Sierra Leone	Education and training in agricultural engineering. Research and instruction in such energy technologies as Samao crop drier, hydraulic pumping, and water-mill principles.
Sudan National Research Council, Institute of Energy Research	Khartoum, Sudan	Established 1976. Sponsors program on Desert Encroachment Control and Rehabilitation. Emphasis on improving traditional energy technologies. RD&D underway in renewable energy field -- solar, wind, small-scale hydro, and biomass. Considered a regional resource
Arusha Appropriate Technology Project (AATP)	Arusha, Tanzania	Been involved in RD&D since 1977. Emphasis on demonstration, extension work and training in renewable energy field -- applying appropriate energy technologies to rural villages. A potential regional resource.
Department of Agricultural Engineering, Makerere University	Kampala, Uganda	Education and training in agricultural engineering. RD&D in such areas as animal-drawn equipment and the utilization of solar energy for agricultural productivity, etc.
Societé Africaine d'Etudes et de Developpement (SAED)	Ouagadougou, Upper Volta	Private status. Undertakes feasibility studies in energy field. RD&D involving use of muscle energy, pumps, and water resources. A potential regional resource.

University of Ouagadougou	Ouagadougou, Upper Volta	The University in conjunction with the Agricultural Board of the Republic of Upper Volta, and the Inter-African Committee for Hydraulic Studies, have undertaken a program of applied research aimed at developing reliable equipment suited for rural needs and conditions.
Zambia Institute of Technology	Kitwe, Zambia	RD&D in renewable energy technology -- emphasis on rural energy needs. Much work in areas of solar energy and firewood.
Technology Development and Advisory Unit, University of Zambia	Lusaka, Zambia	Provides information collection and dissemination, training and technical assistance. Coordinates Zambia's wind activities. Also plans and manufactures windmills. RD&D underway in all renewable energy areas.
Association for Appropriate Technology (ATA)	Salisbury, Zimbabwe	Loose-knit organization of groups and persons working in area of appropriate technology. Publishes a monthly Digest. A potential regional resource.

III. B: NATIONAL GOVERNMENT ORGANIZATIONS

Botswana Technology Centre	Gaborone, Botswana	Undertakes RD&D projects in renewable energy area (e.g., methane, solar, water resources, wind). Potential regional resource. A parastatal agency.
Rural Industries Innovation Centre (RIIC)	Kanye, Botswana	RIIC is the field/research/dissemination unit of Rural Industrial Promotions (RIC), a parastatal. Undertakes R&D projects such as small-scale diesel sorghum huller, pedal-powered sorghum huller, windmills, meat-smoking mud oven, baking ovens, biogas, solar stills, roofing tiles, and water resources. Potential regional resource.

Bureau of Conservation and Natural Resources, Ministry of Rural Development	Praia, Cape Verde Islands	General renewable energy and natural resource conservation and management. Involved in testing efficiency of windmills, air-generators, and solar pumps (SOFRETES MS 3 type).
Ethiopian National Energy Commission	Addis Ababa, Ethiopia	A government policy group for the Ethiopian government. Involved in both conventional and non-conventional energy development, conservation and management.
Intermediate Technology Centre	Addis Ababa, Ethiopia	Government agency. Concerned with the introduction of simple energy technologies to rural areas (e.g., windmills, mud stoves).
Service of Documentation and Communication for Development of Ethiopia (SEDOC)	Addis Ababa, Ethiopia	Maintains library and responds to technical inquiries Works in renewable energy area (e.g., food processing/preservation, and solar).
Centre National de Productivité, Ministry of Information	Conakry, Guinea	
Karen Village Technology Unit, Government of Kenya	Nairobi, Kenya	Oriented towards training. Emphasis on teaching rural villagers how to build, implement and maintain simple energy technologies -- evaporation charcoal cooler, solar food drier, hydraulic ram pump, hand water pump, pedal pump and windpumps. A potential regional resource.
Kenya Ministry of Power and Communication	Nairobi, Kenya	A government energy policy group.
Basotho Enterprises Development Corporation (BEDCO), Appropriate Technologies Unit	Maseru, Lesotho	Undertakes RD&D in regards to appropriate energy technologies.
Ministry of Rural Development, Government of Lesotho	Maseru, Lesotho	Provides training, technical assistance -- both financial and material, and extension work. Assistance mainly in areas of agriculture, water resources ,small-scale industry, solar energy, wind energy, & methane gas. Been involved in installing about 50 windmills.

Thaba Tseka Rural Development Programme	Maseru, Lesotho	Considered a regional training center in renewable energy technologies -- use of, etc. Involved in wind data measurement and windmill testing.
Centre d'Information Technique et Economique (CITE)	Tananarive, Madagascar	Provides technical inquiry service, training, and extension work in renewable energy field. Maintains resource library. Worked in areas of water resources ,solar energy, water power, wind energy and methane gas.
Etablissement d'Enseignement Superieur Polytechnique, Universite de Madagascar	Antananarivo, Madagascar	Education and training in renewable energy area. Has undertaken research and development in such areas as wind energy for water pumping and electricity.
Energy Unit, Ministry of Agriculture	Lilongwe, Malawi	Begun late 1980, to carry out energy surveys in urban and rural areas; design, test and promote appropriate energy systems; and conduct studies of energy issues.
Centro Nacional de Documentacao E Informacao de Mocambique (CEDIMO)	Maputo, Mozambique	
Ministry of Agriculture and Land Use, Agricultural Extension & Training Division	Victoria, Mahe, Republic of Seychelles	Provides technical assistance, training, extension work and an information and documentation service in regards to agriculture and land use. Also maintains a resource library. Worked in areas of food processing/preservation, small-scale industries, and methane gas.
Sudan National Energy Administration	Khartoum, Sudan	Government agency for coordination of all energy activities.
Small Industries Development Organization (SIDO)	Dar-es-Salaam, Tanzania	Agency under Tanzania's Ministry of Industry. Worked in developing small-scale technologies utilizing solar energy, water and wind power, small-scale hydro, and biogas.

Tanzanian National Scientific Research Council	Dar-es-Salaam, Tanzania	Primary technical research and information agency in Tanzania. Research investigations and studies undertaken for utilizing solar, wind and biogas energy.
Centre National de Promotion des Petites et Moyennes Enterprises (CNPPME)	Lome, Togo	Center for the promotion of small enterprises and industries (businesses). Involved in small-scale rural industries, marketing of developed products and technologies, and vocational training. Also research component of center.
Centre d'Applications des Technologies Rurales et Urbaine (CATRU). Centre National pour le Perfectionnement des Artisans Ruraux (CNPAR)	Ouagadougou, Upper Volta	CATRU is the appropriate technology unit within CNPAR. Considered the center for woodstove demonstration and prototype development. A potential regional resource.
Department of Energy Resources, Ministry of Mines and Energy Resources	Salisbury, Zimbabwe	Government agency for management of energy resources in Zimbabwe. Work and activities include renewable energy technology. Provides assistance for small-scale projects.

ANNEX E

SUBPROJECTS FUND AWARD CRITERIA

The Subprojects Fund, administered by AID, is intended to promote the development and dissemination of promising energy technologies and extension approaches in Africa. Three types of assistance may be provided: direct implementation grants of up to $500,000 per subproject ($1 million in the case of CDA fuelwood subprojects); grants up to $500,000 to intermediate financial institutions (IFIs) which in turn will make loans of up to $100,000 each for energy subactivities; and grants or contracts of up to $50,000 for feasibility studies or project design. These award criteria will be expanded upon in guidelines for subproject design and approval to be issued by AFR/RA shortly following EIA project authorization.

I. SUBPROJECT GRANTS

A. General Requirements

- Eligible Countries: All African countries with USAID field offices, including Sahelian offices, and either REDSO may sponsor EIA subprojects.
- Proposing Organizations: Eligible proposing organizations include African regional organizations, host country government agencies, parastatals, local government cooperatives or other community-based organizations, and host country or U.S. private voluntary organizations (PVO's). Host country PVOs must be registered with the USAID field office. U.S. PVOs must have ongoing operations in the country or countries covered by the proposal. No subproject grants will be made to home offices of U.S. PVOs. Individuals and private for-profit organizations are not eligible for direct subproject grants but may apply for loans from an IFI (see II below). Peace Corps Volunteers may be used by a grantee, but the Peace Corps itself is not an eligible proposing organization.
- Level of Funding: Grants may be approved up to a level of $500,000 per subproject, or $1 million in the case of Cooperation for Development in Africa (CDA) fuelwood initiatives. For grants to a host country, the normal host country contribution requirement applies unless waived by AID/W for a specific grant to a Relatively Less Developed Country (RLDC). For grants to other eligible organizations, U.S. or foreign, there must be a 25 percent non-AID contribution.
- Length of Subproject: Subproject activities normally are expected to be completed within three years. In exceptional cases, such as long-term forestry activities, subprojects with Project Assistance Completion Dates of up to five years after project startup may be approved.
- Eligible Activities: Grants may be provided for implementation of innovative energy development, conversion, or utilization technologies or extension/dissemination approaches. "Energy" specifically

includes fossil fuels (oil, gas, coal, lignite), peat, fuelwood (including forestry or agroforestry projects producing fuelwood as a major output), other biomass, hydropower, solar/wind power, energy conservation, and such other energy sources as AID may deem appropriate.

- Consistency with National Priorities: The proposed subproject must be consistent with national energy and development priorities, as reflected in the mission CDSS, national energy plans, and similar documents.
- Use of Subproject Funds: EIA subproject grant funds may be used for the purchase of materials and equipment, including related freight and transport costs, and costs of short-term consultants (up to six months per person). Funds may be used for costs of long-term technical assistance only with prior AID/W approval. Local labor costs normally will be paid from the host country or non-AID contribution. However, use of grant funds for local labor cost may be authorized by the USAID field office director in exceptional circumstances.
- Procurement Source and Nationality Rules are discussed under "Procurement Arrangements" in the EIA Implementation Plan.

B. Evaluation Criteria

In addition to assuring that the above general requirements are met, AID/W will base subproject grant award decisions on the evaluation criteria set forth below:

1) Priority of Area of Activity: Priority will be given to projects which offer the prospect of having a significant beneficial impact on national or subregional fuelwood imbalance and deforestation. Such projects may include afforestation/reforestation, species selection, provision of seed or seedlings, agroforestry projects, projects to improve efficiency of energy use in cooking or other important wood-consuming areas, more efficient charcoal production, or substitution of identified agricultural residues, "energy crops", or other indigenous energy resources for wood energy. Second priority will be given to projects which offer significant economic or other benefits to the urban and rural poor. Examples could include biogasification or pyrolysis systems for rural industry; use of wind or water power for community water supply, irrigation, or small-scale industry; or solar drying of cash crops or foodstuffs raised by smallholders. This category also includes projects to develop or process indigenous energy resources -- coal, peat, lignite, mini-hydro, etc., -- or to conserve commercial energy where the proposer can demonstrate significant benefits to the urban or rural poor.

2) Priority Organizations and Implementation Approaches: Within the above areas of activity, priority will be given to organizations and implementation approaches which appear most able to lead to the self-spreading of the innovation being financed. Particular emphasis will be placed on projects which rely upon and/or support the private sector -- including farmers' organizations, cooperatives, small artisans and entrepreneurs, established traditional or modern sector trading/market networks, and for-profit corporations, partnerships, or sole proprietor-

ships -- as the vehicle for such self-spreading. This criterion will be interpreted flexibly. Provenance trials leading to selection and production/distribution of high-yielding multipurpose trees of value to rural smallholders, efforts to develop low-cost decentralized alternatives to government nurseries for seedling production, assistance to a government forest plantation to contract with a private company to produce and sell charcoal from plantation residues, a cookstove development and testing project involving existing makers of jikos or fourneaux malagasy, or establishment of a cash market for seeds/pods from leguminous trees are but a few examples of the range of such possible initiatives.

Proposals also will be evaluated in terms of the proven capability of the organization(s) and key individuals involved to carry out the proposed activities and accomplish the subprojects. Regardless of how a proposal rates in other terms, funding will be provided only where AID has a high degree of confidence that such organizations and individuals have the capabilities, experience, initiative, and integrity to make the subproject a success.

3) Technical, Economic, Sociocultural, Administrative Feasibility and Environmental Acceptability: Proposers must be able to demonstrate that their proposed subprojects:

- Are technically sound and involve a relatively low level of technical risk based on analysis of such factors as systems reliability, ease of maintenance and operation, the degree to which the performance of the system as a whole and individual components is proven, and feasibility of in-country manufacturing or assembly where relevant.
- Will provide the intended technologies, products, or services within a cost range likely to be economically attractive to potential users, based on simple payback or discounted cash flow analyses or a cost-benefit comparison versus whatever technologies, products, or services are being displaced.
- Are appropriate to the sociocultural needs and characteristics of the interested participants and, to the extent they are different, beneficiary groups; where appropriate, have been developed with the active participation of such groups; and will involve such groups in appropriate ways throughout the project.
- Use implementation mechanisms and organizations which both are adminstratively, institutionally, and politically feasible within the immediate project scope and appear capable of spreading on their own or with a level of government, donor, or other outside financial, extension or other support which is feasible given national/regional resource constraints.
- Entail acceptable environmental and natural resource management impacts both within the scope and duration of the project itself and where relevant, at the expanded level of activity projected necessary to achieve national/regional impact.

Obviously, the above analysis far exceeds the information presented in the Subproject Activity Request Cable (SPARC). AID/W will make an initial assessment in terms of the above criteria based on the SPARC and if necessary will send a contractor staff person to conduct a more detailed on-site evaluation. In order to avoid excessive contractor costs, where possible AID/W will combine such contractor on-site evaluation with preparation of the Subproject Paper.

II. GRANTS TO IFIs*

Grants from the Subproject Fund to intermediate financial institutions (IFIs), which the IFIs in turn will lend for specific energy subactivities, generally are the same as those under I (above) for direct subproject grants. Exceptions or additions are noted below.

A. General Requirements

- Eligible Countries: Same as IA.
- Proposing Organizations: Same as IA above but including national and subregional development banks or other lending institutions which are wholly or partially owned by one or more host country governments. In addition, organizations which qualify for subproject grants are eligible for IFI grants only if they already have ongoing, well-established lending operations.
- Level of Funding: Grants may be approved up to a level of $500,000 per IFI. Following the EIA mid-term evaluation, AID/W may elect to increase this ceiling for selected IFIs which have demonstrated successful management of their initial EIA grants.
- Project Assistance Completion Date: Grant funds to IFIs are to be lent for in-country energy subactivities and subsequently re-lent to additional subactivities after initial borrowers' repayment. A grant to an IFI normally will run for five years. Individual loans by the IFI are expected to be for three years or less but may, with prior USAID field office approval, be for up to five years.
- Eligible Activities: Same as IA.
- Use of Subproject Funds: Same as IA.
- Procurement Source and Nationality Rules are discussed under "Procurement Arrangements" in the EIA Implementation Plan.

B. IFI Activity Approvals

IFI SPARCs and subproject papers will specify initial loans, totaling at least 50% of the grant amount, which the IFI proposes to make. Any loan over $100,000 not specified in the initial grant agreement must be approved by the USAID field office. All sub-loans will be evaluated in terms of the criteria in Section IB above.

*Per change made at ECPR Meeting, IFI financing will be on a loan basis, unless grant financing is clearly justified.

In addition, the contractor will conduct an intensive evaluation of the IFI itself, including:

- Process by which the IFI identifies/selects projects, including requirements for proposals and pre-feasibility studies.
- Load/administrative capability and prior lending and loan repayment experience.
- Qualifications of staff committed to proposed lending program.
- Need for and IFI ability to provide technical assistance to borrowers.
- Consonance of proposed interest rate with established IFI and host country lending practices.

In addition, the contractor will ask the IFI to furnish a model sub-loan contract, including interest rate and repayment terms and other conditions (e.g. collateral or other security).

Establishment by the IFI of a separate account and books for this lending program will be made a Condition Precedent of the grant agreement with AID.

C. Monitoring of Sub-Loans

The AID/IFI loan or grant agreement will establish a schedule of IFI reporting requirements. In addition, the contractor will employ a short-term expert in financial management (M.B.A. or advanced economics degree) to assist the IFI in tracking loan repayment and other performance indicators. At least annually, but more often if necessary, the short-term expert will visit the IFI, examine progress reports, and prepare an assessment for AID on:

- disbursement of sub-loans, including quality of proposals and pre-feasibility studies.
- aggregate actual vs. target loan repayments.
- general health of the IFI lending program.

D. Re-lending

The separate account established by the IFI will also house the revolving loan fund, which will be used for on-lending for other activities in the energy/forestry field. The USAID mission will be asked to concur in new sub-loans over $100,000; smaller loans will not require AID approval.

At the time of initial loan or grant negotiation, AID and the IFI will agree on the spread between the sub-loan interest rate and the interest rate at which the IFI will reimburse the revolving loan fund. Also as part of the loan or grant agreement, the IFI will agree to maintain the revolving loan fund for a specified number of years and to report to AID yearly on use of the funds, following termination of the grant LOP.

III. STUDIES AND CONFERENCES

AID/W may elect to use a limited amount of Subprojects Fund monies to undertake feasibility studies or project design activities, studies of major African energy or forestry problems, and specialized meetings or conferences to discuss and disseminate results of such studies. Grants or contracts may be awarded by AFR/RA. In evaluating requests for such funding from a REDSO or another AFR office, AFR/RA will apply the following criteria:

Implementation Probability: For feasibility studies or project design efforts, there must be a high probability that the project or projects expected to follow from the proposed pre-project effort in fact will be implemented. Broader studies or conferences must be expected to lead to concrete improvements in subsequent project design and implementation.

Priority of Area of Activity: Priority will be given to studies or conferences leading to projects which support the overall strategy and objectives of the EIA project.

Pre-project studies or design efforts normally will be undertaken by an AID contractor, as an IQC contractor task assignment, as an add-on to the EIA contract, or as a separate contract. Alternatively, AID/W may at its option use RSSA, PSC, PASA, or other vehicles or award a grant to an eligible institution in Africa or other U.S. organization. Grants can be awarded only to those Proposing Organizations declared eligible in Section IA above.

ANNEX F

ILLUSTRATIVE POTENTIAL ON-LENDING INSTITUTIONS

BOTSWANA

Botswana Enterprises Development Unit (BEDU)

CAMEROON

Fonds National de Développement Rural (FONADER)

KENYA

Agricultural Finance Corporation

Kenya Industrial Estates

LESOTHO

Lesotho National Development Corporation

SENEGAL

Office National de Cooperation et d'Assistance pour le Développement (ONCAD)

Société Financière Sénégalaise pour le Développement de e' Industrie et du Torisme

SUDAN

Sudan Development Corporation

ZAMBIA

Development Bank of Zambia

MULTI-COUNTRY

Partnership for Productivity

Various Christian missionary/assistance organizations (e.g., National Christian Council of Kenya)

ANNEX G

COMPARATIVE COSTS AND PROSPECTS OF NEW ENERY TECHNOLOGIES FOR AFRICA

Annex G-1 briefly summaries 17 areas of new/renewable energy technology most likely to have near-term potential for application in Africa. Conventional fossil fuel and electric power production systems are not included in the definition of "new and renewable energy technologies." Annex G-2 characterizes a much larger range of over 50 energy technologies, including 17 summarized in Annex G-1.

The primary areas of technology application which emerge are:

- Energy conservation (both commercial fuels and fuelwood/biomass);
- Charcoal production, gasification, and other wood/biomass conversion and utilization systems;
- Small- and medium-scale hydropower;
- Water-lifting; and
- A variety of small-scale rural technologies.

In addition, although not covered in this annex, there is considerable potential for development of indigenous fossil fuel resources -- such as natural gas, coal, or peat -- where such resources exist.

ANNEX G-1

PROMISING ENERGY TECHNOLOGIES FOR AFRICA

1. Biomass Fuels*

Charcoal making. Traditional charcoal pit kilns are variously estimated to be 8-21% efficient (charcoal weight/dry wood weight). Designs for improved portable metal kilns rated at 28-30% efficiency are available but their high cost ($2,000) make them unattractive to small producers. Stationary brick kilns and improved traditional earth or pit kilns also are available. For example, an improved earth kiln, the "Casamance Kiln", has achieved a 30% efficiency rating in field tests in Senegal and has significant potential for wider use.

*A significant factor in considering conversion of agricultural residues or animal wastes into energy is the potential conflict between energy needs and food production. The amount of organic materials available for recycling back into the soil may be decreased, resulting in reduced soil fertility and erosion. Gasification and pyrolysis, however, are especially attractive where large amounts of otherwise unproductive biomass residues exist, e.g. sawmills, or timber cutting operations.

Gasification. Reliable small-scale wood or crop waste gasifiers (1-10 kW) are available for coupling with gasoline or diesel engines and generators, to produce electricity or to provide mechanical energy for water pumping, threshing and other agricultural uses. Local fabrication is feasible in the more industrialized countries of Africa. Large-scale gasifier systems for electricity generation or industrial steam and process heat will probably be limited in application for the next several years to a few developing countries with the necessary capital ($2.5 million for a 80-million BTU/hr plant) and biomass (6.5 tons wood waste/hour). Complete systems are available from industrialized countries.

Pyrolysis. Small-scale pyrolysis (6 tons/day) has been shown to be technically feasible but expensive, e.g. in Ghana. Estimated equipment capital cost for the Ghanian pyrolysis unit is $75,000-$85,000. Pyrolysis products potentially can be used to supply rural and urban energy needs: char can be briquetted for use in cooking, the oil (Bunker C grade) used in boilers/furnaces, and the low-BTU gas for drying or process heat. In the more industrialized African countries equipment could be manufactured locally.

Biomethanation. Although small-scale anaerobic fermentation has received much attention, economies of scale make digestors feasible mainly on larger farms (corresponding to digesters of over $20m^3$ capacity) where animals are penned, facilitating manure collection.

2. Power Generation

Hydropower. Micro and mini hydropower (1-1000 kW) systems with an installed cost of $1000-2000 per kW are now available. These require less than 5% of invested capital per year for operation and maintenance. Local fabrication fabrication of system components, with the possible exception of some of the larger and more sophisticated generators and turbines and electronic controls, might permit small-scale hydropower to have widespread impact for rural electrification or supply to the central grid. Large-scale hydroelectric (greater than 1 MW) generation is a conventional power source used widely throughout Africa. Costs range from $0.02-$0.13/kW, depending on the availability of equipment (turbines, electronic controls are generally imported) and site preparation costs.

Wind electric. Two to four kW wind machines are commercially available from industrialized countries for $3000-$8000 ($0.10-$0.20/kWh). Local manufacture is feasible in the most developed African countries. Windelectric units, given adequate wind speed (greater than 5m/sec), have good potential for remote applications. Large wind-electric systems (greater than 10 kW) are available from industrialized countries for $0.05-0.06/kWh and may represent a viable alternative for central grid electric power in some countries. Maintenance is an important concern for both large and small windelectric machines.

Direct combustion. A range of sizes of wood and other biomass burning furnaces/boiler systems are available from industrialized countries. Since large amounts of biomass are required for steam-electricity generation (1.8 t/day for a 50 kW plant), this technology is of limited value for widespread impact in Africa.

3. Water Lifting and Agricultural Processing

Water lifting. Simple, proven technologies are available for smallscale applications. Hand, pedal and animal powered pumps and hydraulic rams have potential for dissemination through the marketplace by small entrepreneurs. Photovoltaic cell (PVC) water pumps are at this time promising only for remote high priority uses such as rural clinics, schools and hospitals. Solar thermal pumps have thus far proven to be unreliable and uneconomical.

In regions with good wind power availability -- especially the Senegal/Mauritania coasts and nearby islands, the northern Sahelian region, and the Rift Valley/Lakes and coastal regions of East Africa -- wind pumps have potential for use on large farms, institutions, and communities, and could could be manufactured locally in the more industrialized African countries. However, maintenance has proven to be a major problem to date and will require attention.

Water and grain storage/catchment. Cement and ferrocement tanks and bins and locally constructed alternatives, e.g. corrugated iron tanks and cisterns, are easily constructed and, in most situations, are cheaper than metal or concrete bins of the same capacity. For grain, traditional thatch or timber bins are cheaper but storage losses tend to be significantly higher.

Grain threshing, winnowing, and grinding. Hand, pedal, and animal powered machinery is readily available for home and small-scale community use. PVC grain grinders have proven to be unreliable thus far (e.g. in Upper Volta) but may merit further testing. Water wheels have high potential for communities, institutions and small-scale entrepreneurs.

4. Housing, Cooking, and Food Processing

Cooking Systems. As the Beijer Institute has documented in Kenya, traditional cooking systems -- the three-stone stove or simple metal brazier for charcoal -- fulfills many functions. Users may want stoves simultaneously to be able to boil rapidly, simmer slowly, provide light and heat, keep down insects, cure their thatch roofs, and dry and flavor foods, in addition to serving as a focal point for social intercourse. Efforts to design "improved" stoves typically focus only on the first and/or second functions (and even these tend to be mutually exclusive) and usually involve giving up or severely cutting back many of the other functions. It therefore may not be so surprising that efforts to develop and disseminate improved stoves -- particularly ownerbuilt high-mass Lorena-type stoves -- in Africa have had generally disappointing results.

Because of their potential for short-term reduction in fuelwood demand, efforts to develop, test and disseminate improved cookstoves must be continued. Where possible, efforts to involve local stove-makers and sellers (as the National Christian Council of Kenya is doing) or related manufacturers (as the Beijer Institute is doing with Clayworks in Kenya) should be encouraged, alongside current efforts such as the VITA/CILSS cookstove program in Upper Volta. In addition, however, the broader cooking system should be addressed. For example, tests with Indian Chulas indicate that aluminum pots

-- which are being disseminated widely with no donor or government involvement whatsoever -- are roughly 50% more energy efficient than the pottery they replace. Initial examinations indicate that grinding, bean soaking, or other simple pre-processing can result in important energy savings. For meals requiring long hours of simmering, the simple and inexpensive "haybox" cooker -- a brightly painted version of which already is being sold in Southern Africa as the "Wonder Box" -- can achieve major energy savings.

Food drying. Solar cabinets and passive/forced air convection dryers have been used throughout Africa and have proven to be economical, given adequate insolation. Costs range from $2-3 per square foot of dryer area. Dryers can be easily manufactured locally.

Refrigeration. PVC and adsorptive solar refrigerators, while commercially available from industrialized countries, are currently too expensive (adsorptive: $400-$500; PVC: $500 for a 4 cubic foot model) for widespread use. They are, however, an option for remote hospitals and clinics lacking other cheaper alternatives. Simple, very low-cost designs are available for evaporative coolers. Especially useful in areas with low humidity and adequate ventilation, they are capable of cooling small amounts of perishable items about 15 °F below ambient temperature.

Water heating. Considerable research and development has been done on solar water heaters throughout Africa and, where incident solar radiation is sufficient, they represent a viable option for middle and upper income families in rural and urban areas. Capital costs are about $1-$2 per liter water capacity. Thus a typical family-sized unit of 50-100 liter capacity would cost about $50-$100.

5. Other Industrial and Commercial Sources

Conservation. Significant amounts of energy could be conserved in the industrial sector through energy audits of existing buildings, retrofitting of small and large businesses, co-generation of heat and electricity, encouraging governmental regulations on conservation practices and building, and codes requiring energy efficient new building construction. Oil or gasfueled boilers can be retrofitted with airblown biomass gasifiers using currently available technology from industrialized countries. Economies of scale exist however: a 1.5 million BTU/hr gasifier costs $22,000 per million BTU/hr, while a 14-85 million BTU/hr gasifier costs $4000-$9000 per million BTU/hr.

Solar hot water heating. Large scale solar hot water or air heating is readily available for industrial processes and commercial use (hotels, schools). Costs vary widely, depending on system configuration, choice of materials, and place of manufacture.

Kilns and ovens. A variety of low-cost brick, pottery, lime and bakery ovens and kilns have been developed which merit attention including: a small wood fueled Ghanian domed bakery oven costing about $200; waste oil fueled ovens and kilns from Tanzania; improved pottery kilns in Kenya; and a labor intensive clay brick production system in Malawi. These technologies, which are critical to many energy-intensive small industries, have for some reason been largely neglected in foreign assistance programs. Yet their potential for small-scale industries is great.

ANNEX G-2: COMPARATIVE COSTS AND PROSPECTS OF NEW ENERGY TECHNOLOGIES FOR AFRICA

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
			A. Decentralized Biomass Fuels			
Wood & agro-waste densification (pelleting, cubing, briquetting, extrusion, and rolling-compressing)	Large-scale: well developed. Small-scale: experimental work being done by VITA in Upper Volta.	$15-25/ton production costs. $35,000 to millions of dollars for a large-scale plant.	Possible decrease of soil fertility, desertification, and accelerated soil erosion.	Imported.	Industrial sector and possibly households for cooking/heating.	Large-scale: uncertain. Raw material often not where electric supply for densification is. Small-scale: more development needed for hand or pedal-powered unit suitable for rural areas.
Pyrolysis	Pilot plant demonstrations in a number of countries. In Ghana, USAID project proved pyrolysis economically attractive for commercial and governmental use.	$75,000-85,000 for 6 tons input (forestry and agriculture residues) per day producing a 25% char yield and 17.4% oil yield by weight. (USAID project figures).	Possible conflict, if agriculture residues are used, with soil fertility and erosion. Skilled technical support required. Careful planning for reliable raw material supplies is necessary.	Industrial sector.	Small and large industry.	Very good prospects where waste from forestry operations or agricultural residues are abundant.
Peat (direct combustion)	Well developed.	Competitive with fuelwood and charcoal in favourable cases.	--	Imported and local fabrication.	Industrial boilers and small industry.	Well established but few known deposits in Africa.

ANNEX G-2: Cont'd.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
Producer gas coupled with internal combustion engine (ICE).	Commercially available, based on gasification of biomass, charcoal or peat. Can be easily coupled with diesel and gasoline engines for mechanical power or to operate a generator. A producer gas powered grain grinder being developed in Tanzania.	$2-5/GJ (UN Panel estimate). A gasifier-diesel set is likely to produce cheaper power than baseline source wherever low-cost combustible biomass is available.	Maintenance and operation of gasifier-diesel set require moderate technical expertise. The initial capital investment is comparatively high.	Engines and gasifier primarily imported, although in some countries gasifier could be constructed locally in the industrial sector.	Industrial and small rural industry.	Excellent potential for gasifier diesel sets in many developing countries, especially where biomass is abundant, i.e. near forestry operations, sawmills. Excellent short-term prospects for reducing fossil fuel consumption.
Anaerobic fermentation: biogas (55-65% methane)	Large-scale units available in industrial countries. Massive dissemination of small to large scale units undertaken in LDCs, such as in China and India, linked with environmental health improvement, fertilizer production and production of fuel for cooking and lighting. Can be coupled with ICE's e.g., diesel water pumps in Botswana	$2-12/GJ (UN Panel estimate). Average capital investment for a family-sized unit (3-5m^3) is between $400-800.	In many cases, biogas systems have collateral benefits in improved sanitation and in fertilizer values. Nevertheless, small systems present technical and social obstacles. Without subsidies, biogas technology remains a technology for owners of a large number of animals. Purchase of dung for digestion can increase its market price and thus increase the gap between rich and poor.	Rural households and industries.	Rural households and farms.	Developing country prospects favorable in certain cases, but applicability limited. Large-scale biomethanation has good prospects--immediate for residues and in the medium term for energy crops, e.g. aquatic biomass. Technical feasibility demonstrated, operating feasibility often more difficult.

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ANNEX G-2: Cont'd.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
			B. Decentralized power sources			
Diesel or gasoline engine with new and renewable sources (liquid and gaseous fuels).	Liquid or gaseous fuels from new and renewable sources can be partially or wholly substituted for diesel oil (or in gasoline engines).	In particular cases, costs will be lower than those for engines using conventional liquid or gaseous fuels.	Possible conflict with food production and reforestation.	Imported or industrial.	Households, farms, industry.	Good prospects for developing countries if problems discussed in section E below can be resolved. Excellent short-term prospects for gaseous fuels (producer gas, methane) for reducing fossil fuel consumption.
Micro- & mini-hydro power: (1-1000 kW).	Well developed. System design, civil works, plant installation and operational techniques are comparatively simple. Plant efficiencies are between 70% and 90%. USAID 25-30 kW pilot plant being constructed in Liberia and R&D work starting in Lesotho and Rwanda.	Costs vary widely from site to site. The average cost is in the range of $.05-.10/kWh, or $1000-2000/kW installed, requiring less than 5% of invested capital per year for operation and maintenance.	Maintenance and operation of plant requires moderate technical expertise.	Imported, or manufactured in rural/urban industrial sector, depending on technical level of country.	Central grid or decentralized electricity.	Good prospects since life span of the plants are between 30-40 years. Small plants can be installed by unskilled labor within a short time period while larger systems require sophisticated technical expertise. Can be operated automatically from remote locations. Many unexploited favourable sites in Africa.

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ANNEX G-2: Cont'd.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
Very small wind power for pumping and grinding.	Well developed for application where variable output can be accepted. Significant work being done in Botswana, Cape Verde, Tanzania, Kenya, Ethiopia and Mali. Commercial models available from Kenya, South Africa, and Cape Verde.	$2000-4000 per unit.	Availability of continuous wind for a considerable period of time. Maintenance, requiring moderate technical skills, important for long term viability.	Imported or small or large industry.	Rural.	Very good prospects, given adequate wind speeds.
Wind electric power with diesel back-up	Rapid progress in development of low-cost wind electric machines. R&D work being done in Tanzania and Cape Verde.	$0.10-0.20/kWh (UN Panel estimate, based on $1000-2000/kW investment cost and mean annual wind speed of 6m/s).	Discontinity of wind electricity generation requiring use of diesel back-up. Requires technical support infrastructure for long-term maintenance.	Imported or large industry.	Rural households and institutions.	Very good prospects, particularly in islands and coastal regions.
Stirling engine (external combustion)	Under development. Not yet commercially available but production appears imminent for 1) free-cylinder water pumps; 2) specialized hot-air engines for water pumping; 3) simple hot-air engines up to a few kilowatts in shaft power; 4) heat-driven cooking machines; & 5) free-piston electric generators up to 10 kW in output.	-- /	Possible conflict with food production and soil fertility if biomass fuels used.	Imported or large industrial.	Small and large industry and farms.	Very good prospects for mid 1980s.

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ANNEX G-2: Cont'd.

Photovoltaic with battery storage	Commercially available. Under intensive development to reduce cost and improve efficiency.	$10-30/Wp at 2.80/Wp by 1982, $0.70/Wp by 1986, and $0.15-0.50/Wp by 1990 (in constant 1980 dollars for quantities of tens of kilowatts) goal, of DOE.	—	Imported.	Rural community industry and households.	Competitive for some small-scale, high-priority, remote applications in rural areas (e.g. operating educational televisions, transmitters/receivers, water pumps, electric fences, lights, etc.).
Draught animal power	Traditional source with new developments such as rubber-tired wheels for carts.	$0.4-0.6/kWh, based on 1-3 kWh/day from a pair of bullocks costing $0.6-1.2/day to feed (UN Panel estimate).	—	Rural or industrial sector.	Rural.	Will continue to be of major importance in developing countries.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
			C. Water lifting, irrigation, and agricultural processing			
Water wheels: overshort, undershort and breast	Well developed over centuries. Used for small mechanical energy applications in grain grinding, hulling, oil pressing, threshing, etc. Efficiency ranges between 20-60%.	Average cost between $100-30[illegible].	Restricted to powering low-speed and high torque machinery.	Small rural and urban industry.	Rural households and small industry.	Excellent for small-scale applications. They are mechanically efficient, operating with varying water heads (from 6 to 30 ft.) and flow rates (from 1 to 30 cubic ft. per second).
Hydraulic ram	Well developed. Extensive research and manufacturing in Tanzania.	Average of $100 per complete unit, constructed locally in LDCs. $300-400 per unit in industrial countries.	—	Small rural and urban industry, or industrial sector.	Rural households and farms.	Excellent because of low initial capital cost, local fabrication, little or no maintenance costs, and a life span of 20 years.
Pumps: hand, pedal, and animal powered	Well developed.	Costs vary widely, depending on construction materials, type of pump, and place of manufacture.	Frequent maintenance problems of the past have been reduced considerably. Low skill level necessary for repair.	Small rural or urban industry.	Households and farms.	Excellent for widespread use.
PV solar water pumps	Commercially available. Significant project in Mali.	Little economy of scale. Dependent essentially on solar conditions, depth (head) and amount of water required. $2000-4000/1/sec at 5m head and 925w/m^2 irradiance. Economically competitive on life cycle cost basis in many rural areas with conventional diesel and electric units.	Frequent maintenance, requiring skilled technical support.	Imported.	Large farms or cooperatives for water supply and irrigation.	Good if made more reliable and if costs of PVCs decrease as projected by DOE. Uses water tank rather than battery electric storage.

ANNEX G-2: Cont'd.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
Solar thermal water pumps	Although commercially available, still essentially in prototype stage. Most pumps installed in field (Mali, Upper Volta, & Niger) have failed to work without almost constant skilled maintenance. USAID pilot in Senegal started; will be operational by late 1981.	Related to economies of scale.	Continuous skilled maintenance required for operation is often lacking in rural areas. Economies of scale would require farm consolidation for efficient use.	Partly imported, partly manufactured locally (flat plate collectors).	Very large commercial or government plantations.	Unlikely to be economically feasible in forseeable future. Although they received much attention in Mali, Upper Volta, and Sudan and limited early success over cost and simple reliable operation is required before units would be practical enough for significant usage. Because of economies of scale, small scale pumps (less than 10 Kw) not economically attractive.
Grain grinders, winnowers, threshers: hand and pedal powered	Well established.	Dependent on size and type. Very small grinders (from 25 kg grain per hour) available from $18. Pedal powered units from $40-100.	Women may not be able to use pedal power due to social constraints.	Small rural or urban industry.	Households and farms.	Excellent for widespread use.
PV grain grinders	Prototype in Tangaye, Upper Volta.	Major cost component is photovoltaic array.	Frequent maintenance requiring moderately skilled technical support.	Imported.	Rural cooperatives and small industry.	If the price of photovoltaic cells drops sufficiently, good for mid to late 1980s.
Grain and water storage; water catchment	Well established. Small cement and large ferrocement storage tanks available.	Dependent on local prices of cement and steel reinforcing. In general, $5-20/$m^3$ for ½ to 100 m^3 storage tanks.	Requires training of local masons in proper construction techniques. Water catchment will require technical assistance to design appropriate catchment systems.	Small rural and urban industry.	Households and cooperatives.	Excellent.

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Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
			D. Housing, Cooking and Food Processing			
Solar space heating & cooling (passive systems) for habitat & agriculture	Developed.	Slightly higher than normal construction costs.	Need for local architects & engineers to be aware of contribution of passive systems for heating and cooling. Possibility of non-acceptance by local people if architectural design different from traditional.	Local construction.	Households, institutions, and industry.	Excellent proven potential. But systems are site-specific, and local architects and engineers must be aware of passive deisgns and adopt systems best suited to each particular site.
Batch solar water heaters	Well developed	$1 and up.	May not meet recognized needs in hot climate.	Local	Rural households, industry.	Excellent. Simplest batch water heater is a 4 liter can painted black sitting in sun.
Solar water heaters (30-50°C) using flat plate collectors	Well developed throughout Africa.	$5 to 2,500 capital costs; $5-20/GJ (UN Panel estimate based on mean insolation of 5.4/GJ/m^2/yr).	Unfamiliarity with operation may lead to system failure.	Rural or urban artisan, industrial, or imported.	Households, institutions, and industry.	Excellent.
Solar cookers	Developed.	$25-250, depending on size and design.	Have never been found socially acceptable on a large scale. Require cooking outside under sun.	Rural or urban artisan, industrial, or imported.	Rural households.	Poor prospects of large-scale dissemination until heat storage capability developed.

ANNEX G-2: Cont'd.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
Solar ovens	Developed, e.g. by Thaba Tseka and small entrepreneurs in Lesotho. Very low-cost designs for rural areas under investigation by Solveira House in Zimbabwe.	$30-70, depending on size and design	Although simpler and easier to operate than solar cookers, social acceptability has still not been demonstrated widely.	Rural or urban artisans.	Rural or urban households.	Could be very promising in short term if current field tests demonstrate social acceptability.
Solar distillation	Well developed.	Capital costs of large stills having areas greater than 1000 ft^2 of basin area can be low as $1/$ft^2$ with water costs between $3-4/1000 gals. The cost for small family-size units is near $4/$ft^2$ of basin area, given water costs from $15-30/1000 gals.	Water borne diseases from comtamination.	Constructed locally of essentially imported components.	Rural clinics and households.	Not economical in many cases. Intermediate size (less than 50,000 gals/day production) may be more economical than conventional desalting plant.
Wood-, charcoal-, and peat-conserving cookstoves	Under intensive development, especially in West and Central Africa. Most significant project in Upper Volta where VITA rep coordinating stove testing and demonstration program. Other well established programs in Senegal, Niger, Mali, Zimbabwe, Tanzania, Botswana, and Lesotho. USAID	Costs vary widely depending on stove type. High mass mudstoves cost $15-20.	Socio-cultural considerations important in stove design and dissemination. Prestige attached to ownership of "modern" stove has sped adoption in some cases.	Artisan or owner-built.	Households and institutions.	Excellent if adapted and tested for local conditions.

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ANNEX G-2: Cont'd.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
	project in Burundi will develop low-cost peat stoves.					
Insulated box cookers (hayboxes)	Established. Boxes can be made from any available material. Agricultural residues, especially fibrous waste, make excellent insulators.	Costs vary; can be constructed by individual at no cost using available materials.	Socio-cultural considerations important for widespread use and adoption.	Households or small industry.	Households.	Excellent.
Solar food dryers	Well developed throughout Africa.	$5 and up, depending on construction materials. In general, $2-3/square foot.	Possible disposal problem of plastic if used as a glazing material.	Small or large industry.	Rural households and farms.	Excellent.
Solar PV refrigerators	Compressor models commercially available. Peltier-type (PVC) limited production beginning summer of 1981; mass production scheduled for January, 1982.	Compressor type: $4000-5800 for 3-4 cubic foot refrigerator-freezer. Peltier type: $5000 for complete 1 cubic foot refrigerator-freezer system.	Compressor type requires moderate level of technical expertise to maintain. Peltier type, because it has few (in one model, only one) moving parts, requires little maintenance.	Imported.	Institutional use only, in remote areas.	Very good for isolated clinics to preserve vaccines. If PV panels come down in price, PVC refrigerators could be promising by mid-80s. Highly durable.
Solar thermal refrigerators	Absorption type is experimental. Adsorption-desorption type is commercially available as a zeolite-water unit.	$400-500 for 4 cu. ft. capacity.	Maintenance of collector and refrigeration unit required.	Imported.	Institutions and middle income households.	Ice-making option available. Flat plate collector easy to install at any angle.
Evaporative coolers.	Well established. Capable of cooling small amounts of food products about 15°F below ambiant temperature.	Costs vary widely, depending on size and type of design.	Most suitable in areas with low humidity and adequate ventilation.	Rural and urban households.	Rural and urban households.	Excellent for short term storage of perishables.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
			E. Liquid fuels			
Synthetic crude oil from tar sands	Commercial production in Canada: 10 million tonne/yr.	Approximately $175/toe for existing syn-crude operation. New plant would be higher.	Current technology involves large-scale strip-mining, risk of air pollution and major unresolved liquid waste-disposal problem.	Imported.	Transportation, industrial, diesel and gasoline engines, and cooking.	Requires large scale of production with heavy capital requirements and long lead times. Very few developing countries known to possess tar sands.
Shale oil (can be upgraded to synthetic crude oil)	Pilot-plant or small-scale production in a number of countries.	$175-245/toe (World Bank estimate).	Air and water pollution and solid-waste disposal problem.	Imported.	"	Although new technologies for large-scale production of shale oil are still under development, many developing countries are known to possess oil shale, and there is promise for small-scale retorting in some developing countries.
Ethanol from biomass (primarily gasoline substitute). 150-200 proof alcohol	Commercial production from sugar crops in Brazil and Zimbabwe and from maize in the United States of America. Mixtures of 10%, 190+ proof ethanol with 90% gasoline are used in spark ignition-type engines or 150+ proof ethanol can be used alone. Mixture of 85%, 150 proof ethanol with 15% diesel can be used	$640-1,320/toe (UN Panel estimate). World Bank estimates that, based on sugarcane at $15/tonne or molasses at $60/tonne, ethanol can compete with gasoline from reference crude oil. ($34/barrel). Minimum average capital cost for	Potential conflict with food and fodder crops.	Liquification & saccharification enzymes, anhydrous ammonia, yeast and caustic soda are primarily imported initially, but local capabilities for production of these materials can be developed in LDCs. Small-scale stills can be fabricated locally. Large, commercial stills	"	Currently viable in a few countries having low-cost sugarcane or surplus molasses. Small-scale stills at rural cooperatives, or large-scale stills at the national level could both be feasible. Potential conflict with food production could be mitigated if economic conversion of fibrous material (i.e., non-food biomass) becomes feasible. The overall energy balance in ethanol production can be improved by using low

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
	in diesel engines.	production is over $1.25/ annual gallon of capacity.		are primarily imported.		grade energy for most cooking and distillation processes. Stillage can be used as animal feed.
Methanol from biomass (primarily gasoline substitute)	Gasification of wood and methanol synthesis are both established technologies, but no methanol-from-wood plant has yet been built, except for traditional wood distillation (pyrolysis) units, which may still be competitive in special cases.	$520-960/toe (UN Panel estimate). Various studies based on type of gasifier technology, scale of production and price of wood indicate that methanol could be competitive with gasoline in short term.	Indiscriminate gasification of biomass could lead to soil erosion and desertification.	Imported.	Transportation, industrial, diesel and gasoline engines, and cooking.	May have important application in developing countries after 1985 if current research is successful.
Vegetable oils, including hydrocarbons (primarily diesel-oil substitute or chemical feedstock)	Limited use in some countries, including South Africa.	$1000-2400/toe (UN Panel estimate).	Potential conflict with food crops.	Imported.		Development of high yielding species could improve prospects, especially on marginal arid and semi-arid lands such as in the Sahel where competition with food crops would be minimized.

ANNEX G-2: Cont'd.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
			F. Central electric power			
Wind electric. (greater than 10 kW)	Almost fully developed. Wind power plants now being built in the United States. Providing wind power capacity not more than 10-30 per cent of grid, no storage is necessary.	$0.05-0.16/kWh (UN Panel estimate based on mass production of existing multi-MW systems.)	Initial capital investment is comparatively high.	Imported.	Central grid.	Very good, especially for islands and coastal areas favorable sites. Expected to be fully competitive at favourable on-shore sites by mid 1980s. Off-shore arrays may be competitive at favourable sites in late 1990s.
Hydropower (greater than 1 MW)	Fully developed, conventional power source. Extensively used throughout Africa.	$0.02-0.13/kWh (World Bank estimate; UN Panel preferred not to give estimate). Costs vary widely because of variations in dams and structures and in collateral benefits such as irrigation according to site.	Flooding of agricultural and other land to create reservoir. Possible spread of water-borne diseases and other downstream problems with large projects.	Imported machinery.	Central grid.	Excellent. Favorable sites are widespread. There are also prospects for retrofitting some existing irrigation and other dams with hydropower turbines in the range 1-10 MW.
Geothermal	Fully developed for dry-steam and wet-steam fields. Magna, hot dry rock and geopressured sources remain long-term goal. Lower temperature (30-150°C) sources well developed in Iceland for process heat.	$0.03-0.06/kWh (World Bank estimate based on investment cost of $1400/kW for dry-steam field and $2800/kW for wet steam. UN Panel estimate almost identical.) More competitive if combined with a demand for process heat.	Air and water pollution problems in some cases.	Imported.	Central grid or industrial process heat.	Very good, but there are very few favorable sites close to demand centers. Suitable low-temperature sources are more widespread than higher-temperature sources, required for power.

ANNEX G-2: Cont'd.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
Oil shale (direct combustion)	Fully developed in USSR, and plants are being installed in some other countries.	Appears to be competitive where there is high-quality oil-shale resource close to demand centers.	Air pollution and solid-waste disposal problems.	Imported.	Central grid.	Very good, but there are very few favorable sites close to demand centers.
Peat (direct combustion)	Fully developed in USSR, Ireland and Finland. USAID pilot project in Burundi under-way.	$0.03/kWh (Finnish data based on investment cost 5-10% greater than for coal fuel plant and milled peat fuel cost corresponding to $1/GJ).	Soil erosion.	Imported.	Central grid or large factories.	Very good, but there are very few favorable sites close to demand centers.
Biomass (direct combusiton)	Wood-burning steam-turbine generators being built in a few countries. Development of high-yielding tree species could improve prospects.	$0.05-0.10/kWh (UN Panel estimate).	Indiscriminate burning of biomass could lead to deforestation, soil erosion and desertification.	Imported.	Central grid or large factories.	Could become important in favorable areas, especially when coupled with aggressive reforestation.
Tidal	240 MW plant in France. Pilot plants or feasibility studies in some other countries.	$0.08/kWh at La-Rance (French data). May be competitive in highly favourable sites.	Possible coastal degradation problems.	Imported.	Central grid.	Extremely few favorable sites.

ANNEX G-2: Cont'd.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
Wave power	Development work in early stages.	Not seen to be competitive before 2000.	Environmental effects not yet evaluated.	-	Central grid.	Long-range prospects depend upon significant advance in research.
Photovoltaic electricity generation	Commercially available. Under intensive development to reduce cost and improve efficiency.	$10-30/Wp (peak watt). $2.80/Wp by 1982, $0.70/Wp by 1986, and $0.15-0.50/Wp by 1990 (in constant 1980 dollars for quantities of tens of kilowatts) goals of USDOE. The probability of achieving these goals is questioned by some experts.	Requires large land area, adequate insolation.	Imported.	Central grid.	Large-scale photovoltaic electricity generation, such as for powering towns and cities, not projected to be economical until capital costs decrease drastically.
Solar thermal (central tower or distributed receiver systems)	Under development, with some pilot plants being built.	Could become competitive by mid-2000.	Requires large land area.	Imported.	Central grid.	Long-range prospects are dependent on significant technological advance. May never be feasible.
Solar pond with organic Rankine cycle engine	Under development, with some pilot plants being built.	$0.08-0.14/kWh, estimate for 5 MW pond with investment cost of $3000-4100/kW. Based on pilot-plant experience in Israel.	Requires large land area. Coastal or island regions best suited.	Imported.	Central grid and factories.	Prospects good for late 1980s, especially for islands and coastal regions with favorable sites.
Ocean thermal energy conversion (OTEC)	Pilot plants being built.	$0.06-0.12/kWh, based on capital costs of $2500-4000/kW for 100-400 MW plant (UN Panel estimate). Potable water may be produced as an economically significant by-product.	Possible environmental effects not yet fully evaluated but not expected to be serious for individual plants.	Imported.	Central grid.	Some tropical islands and coastal areas adjacent to deep water could have good prospects for late 1980s.

ANNEX G-2: Cont'd.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
Improved energy efficiency: housekeeping practices, retrofitting, fuel switching, energy management, new capital equipment, regulations (automobile and applicance efficiency standards, building codes), taxation and pricing policies.	Well developed for modern sector in industrial countries.	In U.S. estimates suggest 20% energy savings overall would have been economical over last 10-15 years at then, current prices, with efficiency improvements. Economic savings potential for industrial sector today much higher.	Higher pricess, major tool for conservation, may be politically unacceptable. Many techniques developed for temperate or cold climates and capital-rich factor ratios of industrial countries.	Local materials in most cases.	Modern sector.	Excellent for modern sector. Obstacle is lack of information and technical advice on possible improvements, as well as political and bureaucratic vested interests.
			G. Other Industrial/commercial source			
Evacuate tube collector (50-150°C)	Commercially available.	Costs in the range $5-20/GJ	--	Imported or industrial.	Urban, rural, industrial.	Fills special ture range just above that of flat-plate collectors.
Line and point focusing thermal concentrators and central tower systems (over 150°C)	Many prototypes in operation. Some focusing systems require tracking of sun, which limits geographical range and introduces reliability problems.	Costs in the range $5-20.GJ ahticipated.	- -	Imported, industrial	Industrial	Good prospects for late 1980s in favorable locations, especially for those systems incorporating low-cost tracking systems.

ANNEX G-2: Cont'd.

Source	Stage of Development	Estimated Cost	Social & Environmental Constraints	Place of Equipment Manufacture	Proposed Sector for Utilization	Prospects
Charcoal kilns and improved wood harvest methods.	Well developed. Research on improved pit kilns being done by UNDP/USAID in Senegal (Casamance kiln).	Varies depending on kiln size.	Cost to change from no-cost pit kiln to portable metal kiln or stationery masonry kiln major obstacle to dissemination. New skills must be acquired to operate.	Imported industrial, or rural.	Small rural industry.	Good if obstacles of training many small producers and high cost of kilns can be overcome.
Improved small-scale brick, lime, pottery, bakery kilns fueled by wood, charcoal, fuel oil, waste oil or gas.	Numerous designs available for different applications and fuels.	Varies according to size and design.	Skill in operation required.	Local materials.	Small industry.	Excellent. One of most neglected yet promising energy technologies. Waste oil-fueled ovens and kilns have especailly good potential in urban areas where large quantities of waste oil are readily available. Most small-scale kiln experts are in developing countries.
Solar crop and timber dryers.	Developed and under development.	--	Requires management skills.	Local fabrication with imported materials.	Small and large industry	Good prospects where speed and quantity of production are a concern. Excellent potential for appropriate crops and locations, especially where rainy seasons follow closely on harvest

KEY: Reference Costs:
- crude oil at $250/tonne ($34/barrel), equivalent to $6.2/GJ
- large coal-fired power station generating electrical energy at $0.07/kWH.Based on investment cost of $1000/Kwh and steam coal costing $4.3/GJ ($130/tonne).
- small, light oil fuel diesel engine at inland location, $0.20-0.50/Kwh
- fuel oil at $6.2/GJ ($250/tonne or $34/barrel).

Source: Synthesis of Technical Panel Reports, preparatory committee for the United Nations Conference on New and Renewable Sources of Energy, Third Session, March - April, 1980; and Volunteers in Technical Assistance (VITA), 3706 Rhode Island Ave., Mt. Rainier, MD 20712 (USA).

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ANNEX H

TRAINING GRANT AWARD CRITERIA

Individual training subactivities will be authorized by means of a memorandum of understanding between the EIA contractor, the participating government(s), and the sponsoring host country institution. The memorandum of understanding will be subject to approval of the respective USAID mission director and AFR/RA. The individual memorandum of understanding will provide the following information:

1. Substance - brief description of activity;

2. Participants - description of types of invitees by specialty and position; minimum/maxium number of participants;

3. Sponsor - name of host institution(s); responsible individual; site of training;

4. Timetable - schedule for preparation of training materials; designation of who will be responsible for which materials; date(s) of training; length of activity; preparation of reports;

5. Evaluation - what evaluation of the training session, if any, and by whom;

6. Logistical Details - responsibility for invitations, hotels, transportation, field trips, clerical support, rosters, audio-visual equipment, etc.

7. Follow-up - responsibility for next stages including follow up seminar or course, long-term training, regional activities, incorporation of course into regular curriculum, discrete environmental activities, etc.;

8. Contribution of Local Institution(s) - description of staff time, facilities, transport, and other arrangements which will come from local institutions;

9. Financial Arrangements - agreement on who will provide payment and in what manner, including who will prepare accounting and reports for particular disbursements.

10. Expected Benefits - both of the immediate training subactivity and of planned follow-up work.

Training grant proposals may be submitted at any time through the USAID field office to the contractor's Abidjan or Nairobi office, as appropriate. In evaluating training grant proposals, the contractor will use the general requirements and evaluation criteria below.

I. GENERAL REQUIREMENTS

- Eligible Countries: All African countries, including Sahelian countries, with USAID field offices, including Sahelian offices or REDSO may sponsor EIA training subactivities.
- Proposing Organizations: Eligible proposing organizations include African regional organizations, host country government agencies, parastatals, local governments cooperatives or other community-based organizations, and host country or U.S. private voluntary organizations (PVO's). U.S. PVOs must have ongoing operations in the country or countries covered by the proposal.
- Level of Funding: Grants may be approved up to a level of $50,000. On an exceptional basis, grants in excess of $50,000 may be approved with AFR/RA approval.
- Length of Subactivity: Training grant activities normally are expected to be completed within six months.
- Training Location: Training must be provided in Africa. In exceptional circumstances, AFR/RA can approve training and study tours in other locations.
- No Duplication: The contractor must determine that the proposed training activity does not duplicate training already provided by others.
- Use of Grant Funds: Training grant funds may be used for the purchase of materials and equipment, including related freight and transport costs, and costs of short-term consultations; and local labor costs.
- Procurement Source and National Rules are discussed under "Procurement Arrangements" in the EIA Implementation Plan.

II. EVALUATION CRITERIA

In addition to assuming that the above general requirements are met, the contractor and AID/W will base training grant award decision on the following evaluation criteria:

- Priority of Area of Activity: The training must address an area of energy or forestry activity which is of high priority to the country or countries involved, as reflected in national energy plans, CDSSs, or other documents.
- Purpose and Expected Benefits of Training: Priority will be given to training which is expected to lead to practical improvements in energy or forestry project design or implementation. Proposed training recipients -- whether national energy planners, financial institutions, entrepreneurs, artisans, etc. -- must be in a position to put the results of such training into actual practice.
- Relation to Other EIA Subactivities: Priority will be given to well conceived training activities which complement other EIA subactivities. Examples include energy planner or practitioner workshops to discuss and disseminate EIA technology assessment results and workshops for a number of EIA subproject practitioners working in a similar area.
- Proposed Training Institutions: The contractor will assess the capabilities and experience of the proposed training institution.

ANNEX I

METHODOLOGY FOR COST BENEFIT ANALYSIS OF ENERGY PROJECT INITIATIVES

The three areas of feasibility analysis, and their most important subcomponents, are as follows:

- The private investor/consumer perspective --
  - ° financial analysis,
  - ° demand analysis;
- The society's economic perspective; and
- The dissemination efficiency perspective.

The area of analysis which is the most important in evaluating a particular technology will depend, to a large extent, on who the actual purchaser (investor) is, and on the nature of that purchaser's motivation. Some technologies may be acquired by individual households as a "consumer durable" (mud stoves). Others may be purchased by households or entrepreneurs for income generation (solar mud ovens). Still others may be purchased by the central, district or local government in order to create a new social service (solar electrified rural clinics) or as a more economical means of providing existing services (windmills instead of diesel to pump village water supplies). Many other examples could be cited. The central point is that purchaser motivation has a great deal to do with what areas of analysis will be stressed, discounted or ignored altogether in the actual decision-making process. The following ordering principles are suggested:

- ° If a technology is unattractive from the purchaser's standpoint, it should be considered impractical, short of some overriding social concern coupled with an explicit readiness to impose the technology, directly or indirectly.
- ° A technology to be acquired privately should be analyzed at both the consumer and societal levels.
- ° Within the area of private purchase, either financial or demand analysis, or both, can be used. Some technologies are clearly acquired more for investment than for consumption purposes, and vice versa. However, it would be exeptional if the choice of a village level, small-scale, private technology is purely an investment or purely a consumption decision.
- ° A technology acquired by a government need not be analyzed from the private investor's standpoint. This does not mean that a government is not interested by some of the same factors as private investors (such as, for example, cash-flow analysis). These factors can, however, be addressed within the framework of the social level analysis.
- ° All technologies should be evaluated from the dissemination efficiency perspective.

a) Investor/Consumer Perspective

Undertaking a given investment or adoption of a given technology requires that the purchaser give up a portion of their resources. The

likelihood that they will do so is a basic criterion of "economic feasibility." Two major issues are involved:

- Is the expenditure economically advantageous to the purchaser?
- On what basis will the investor or buyer decide?

(1) Financial analysis, which relies on the traditional financial tools: projections of revenue, costs, project life, and discount rates. Where appropriate, labor saved can be quantified using an estimate of opportunity cost as perceived by the individual.

(2) Sensitivity analysis, which determine how sensitive the results of the financial analysis are to key assumptions. For example, an expenditure which saves villagers two hours a day in wood gathering time may be judged very profitable if the time saved is valued highly, or quite unprofitable if it is not.

(3) Scarce resource analysis, which examines the likelihood that specific resource limitations may prevent the adoption of a technology, regardless of its overall attractiveness. For example, are villagers likely to have enough discretionary cash for the purchase? If not, is credit available? At what terms? Does the investment yield net benefits in cash (which is scarce), rather than just in time or resources (which may be more abundant)?

(4) Demand analysis, which does no more than identify and categorize the principal factors which appear to influence the non-financial elements of the desire to make a given expenditure. It draws heavily on the sociological understanding on which the project is based. Attempts to artificially quantify demand factors are counterproductive here, since they reduce rather than enhance the informational content of the output.

The outputs of this level of analysis can then be summarized and presented as follows (using a hypothetical example):

ECONOMIC EVALUATION
INVESTOR/CONSUMER PERSPECTIVE

Technology	Financial Analysis	Sensitivity Analysis	Scarce Resource Analysis	Demand Analysis
Mud Stoves	Highly attractive financial return if labor time valued at 15¢ per hr.	Very sensitive to how time is valued	° Cash cost/ benefit analysis highly negative ° Cash often unavailable for this purpose	° Limited perception of benefits ° Mud stoves lack status ° Stoves not portable

b) Society's Economic Perspective

The steps in the economic evaluation at the social level are as follows:

(1) Economic analysis, using the same techniques as the financial analysis at the investor level, but with several input substitutions:

-- Labor time is valued at shadow wages, which equal the social opportunity cost of time.
-- Shadow discount rates are used to reflect social, rather than individual, preferences as to the future growth vs. immediate benefits.
-- The analysis incorporates social costs, which take account of cost or benefits which may accrue to society, but which are not realized by the individual investor. These include such things as environmental benefits, costs of extension and so forth. A method of addressing non-quantifiable benefits - developed in the Lesotho RET project paper* - is extremely useful here. It consists of including a non-quantifiable cost or benefit in the financial analysis, but entering "X" for its value. The system can then be solved for the value of "X" which makes the investment economically worthwhile. From here we can make a crude judgement as to whether the non-quantifiable benefits (costs) in question will approach the level "X".**

(2) Sensitivity analysis, which, as in the investor level analysis above, determines how stable the results of the social cost-benefit analysis are in response to changes in key assumptions.

(3) Scarce resource analysis, which, at the social level, becomes a measure of how practical a technology is within the specific constraints of LDC rural areas. For example, windmills require trained mechanics for maintenance and repair. Are those human resources available? At what cost? Similarly, biogas systems need regular supervision to function satisfactorily. Even if the technical skills are were available, the principal capability required is good management***. Thish is one of the most precious and scarce development resources.

*Annex I of Lesotho Renewable Energy Technology Project Paper: "The Economics of Renewable Energy Systems for Lesotho." (USAID, 8/79).

**Clearly, only one non-quantifiable item can be addressed at a time, or the system cannot be solved for"X". Where there is more than one non-quantifiable item to be considered, "X" may be interpreted as the sum of benefits from all such items.

***The term is not used in a corporate sense here; it merely suggests a capacity for close supervision and monitoring, good planning, and timely intervention (maintenance, repair).

(4) Evaluation of national policy objectives, which may affect a technology's economic value to society.

Outputs of the social/economic analysis can be summarized and presented as follows (using windmills for water pumping as an example):

ECONOMIC EVALUATION
SOCIETY'S ECONOMIC PERSPECTIVE

Technology	Economic Analysis	Sensitivity Analysis	Scarce Resource Analysis	Policy Objectives Analysis
Wind powered water pumping systems	Attractive rate of return relative to diesel systems	° not economic for deep wells not economic for over 6000-8000 liters per day	Relies heavily on already taxed maintenance capabilities	Major contributions to national economic independence

c) Dissemination Efficiency

From the standpoint of a project's effectiveness in achieving its objectives (such as, for example, reaching the rural poor), it is not sufficient that a given technology be cost effective from the investor and social perspectives. It should also be a more efficient vehicle for achieving project goals than alternatives which are equally feasible at social/investor levels. Even where no clear-cut alternative technology exists, project design requires some judgment of whether it makes economic sense to attempt to introduce and disseminate a technology.

In many development projects, investments are judged in isolation rather than in terms of the possible alternatives. That is, if a project is judged economically sound*, it is considered worth doing. This tendency is especially pronounced in projects funded by foreign donor agencies, where the very availability of donor funds cannot be separated from the existence of the specific projects being evaluated. Yet the

*By whatever criterion is being used, such as, for example, some minimum rate of return.

urgent need of economic development is to use scarce resources efficiently, not just adequately.

It is obvious that the actual judgment as to whether a given expenditure on a technological project is preferable to some other expenditure lies largely beyond the jurisdiction of the project/technology evaluator. For example, the decision that an incremental dollar spent on water pumping for villages is more useful than one spent on new school books must be made at some other policy level. Nevertheless, the choice of how best to achieve the objectives of pumping water (through windpowered pumps, diesel engines, or solar photovoltaic systems) may be an economic one. Economic analysis can contribute to the more efficient use of scarce resources by devising means to compare the efficiency of alternative technology expenditures.

To some extent, the economic/financial analyses carried out from the investor and the social perspectives create the framework for the comparative evaluation of technologies. But project effectiveness can depend on other factors which go beyond the scope of those analyses. These factors need to be considered separately. The most important is an area which is largely ignored in the economic analysis of public sector projects: the process by which technology is disseminated. Whatever the other criteria of economic benefit deriving from a technology, the underlying premise must be that it reaches its potential beneficiaries. Yet this is precisely where many LDC technologies have failed. The rural landscape of the Third World is littered with "pilot" schemes that have never reached a larger audience.

The commercial analog to "dissemination" is "sales". It would be absurd for an entrepreneur to introduce a new good without some indication that it will sell. Similarly, it makes little sense to introduce a technology intended to improve the living conditions for a population without some indication that it is capable of reaching a significant portion of that population.

There are several dissemination mechanisms through which this can occur. These include, among others:

-- extension/training,
-- informal social process,
-- commercialization, and
-- direct government implementation.

Generally, two or more mechanisms operate at once. There is often a time pattern to how different mechanisms come into play, with training/extension ideally giving way over time to dissemination processes generated within the socio-economic system.

For purposes of judging project effectiveness, two aspects of dissemination are of particular interest:

-- What is the likelihood that a technology will spread and actually reach those it is intended to help?

-- What are the costs of dissemination, both absolutely and in comparison to the alternatives?

Each dissemination mechanism brought into play introduces a new set of actors and incentives, and thereby influences both of the above questions. Neither question can be answered with precision, particularly when speaking over a medium- to long-run time frame. However, useful information can be derived from analyzing the characteristics of the technology in question and of the economic environment of rural areas. A threefold approach is proposed:

d) Dissemination Cost Ratio

A measure of the cost effectiveness of dissemination can be defined by the following ratio*:

$$\frac{\text{incremental budgetary cost of transferring a technology to one new user}}{\text{incremental benefit to society of transferring a technology to one new user}}$$

In practice, the denominator can be measured by the Net Present Value of the technology when evaluated from the social perspective. While this is a crude measure, it does address the key criterion for a pilot implementation project: is it economically practical to spread the technology to a much larger audience should the pilot succeed? Moreover, when this ratio is used to compare technologies, it becomes a more refined measure of the relative merits of two or more program alternatives.

e) Changes in Dissemination Costs Over Time

Changes in the dissemination cost effectiveness ratio should be examined over time. That is, some technologies may have dissemination costs which are high at the outset, but which decrease after an introductory period. This may occur because of demonstration effects, greater public familiarity, field-proven effectiveness or, simply, because new dissemination mechanisms have come into play. An appropriate time frame within which to project these changes would be on order of 15 to 20 years.

f) Overall Dissemination Effort

The above indicators of dissemination costs should not be applied mechanically. Together, they only provide inputs into a judgment of how likely it is that a technology will actually take hold and have a meaningful impact on some target population. For example, if the

*There could be more theoretically elegant measures. This one was devised because it is relatively easy to obtain rough magnitudes for both numerator and denominator. Numerous other formulations could be used to represent dissemination cost-benefit.

dissemination cost effectiveness ratio is fairly high and remains high over time, reaching fifty percent of rural households over fifteen years may require a major national commitment of resources. In this case, such costs should be estimated and explicitly accepted as being both worthwhile and likely before project resources are committed to the initial effort. It should be emphasized that the dissemination cost effectiveness ratio alone merely indicates whether spreading a technology generates net benefits (i.e., that dissemination costs are less than benefits). Only by combining this with information on changes in dissemination costs over time and by evaluating the overall dissemination effort to reach a target population can a judgment be made as to whether a given technology merits priority consideration. This latter judgement, in turn, depends on the social opportunity cost of the financial and other resources involved.

The outputs of this level of analysis can be summarized and presented as follows:

Technology	Dissemination Cost Ratio	Changes in Dessimination Costs Over Time	Overall Dissemination Effort
Thatch insulation	Favorable, but high	Good prospects for commercialization	Acceptable, limited mainly to introductory phase

g) Conclusion

The main focus of this methodology is to capture and effectively use a wider range of information on economic costs, benefits and motivation than is encompassed by the conventional tools of financial analysis. It is based on the premise that mere numerical analysis often hides more useful information than it reveals. The methodology also draws on sociological information because social factors can heavily influence whether or not a technology is both desirable and acceptable.

Finally, the output of this approach to economic feasibility evaluation should not be a simple positive or negative judgement. It should instead be one criterion as to a technology's feasibility. The evaluation also should provide information on specific characteristics or constraints which influence the feasibility. Furthermore, the evaluation should feedback into the process of technology development. A technology is not simply a fixed entity, but rather a bundle of characteristics, many of which can and must be adapted in response to local needs. Hence, the development and dissemination of appropriate technologies for rural areas should be viewed as an iterative process.

ANNEX J

DRAFT CONTRACTOR SCOPE OF WORK

I. Introduction

As part of its energy assistance program, AID is undertaking an Energy Initiatives for Africa (EIA) project which focuses upon African national efforts in fuelwood, energy conservation, and expansion of use of renewable energy technologies. An important, although not exclusive, emphasis is upon those actions which will stimulate expansion of effective private sector efforts.

Specifically, the contractor will conduct work over a five-year period on four interrelated components:

-- Provide technical services in planning, policy development and technology -- including detailed assessment of project experience in high-potential energy and forestry areas and provision of planning, policy development, and project preparation assistance to host country governments;
-- Help AID operate a Subproject Fund -- providing grants for energy and forestry/ fuelwood projects, directly or through intermediate financial institution (IFIs);
-- Help AID operate a training grants program -- providing grants for training, workshops, and related activities for energy planners, national development finance institutions, and energy/forestry practitioners; and
-- Facilitate informal information/experience sharing in energy and forestry/fuelwood, primarily by acting as referral agent to existing information centers or networks.

The contractor also will monitor both the EIA project itself and the individual subprojects supported through the Subprojects Fund.

The EIA project will operate in all sub-Saharan countries, including Sahelian countries, in which AID has field offices.

II. Scope of Services

Within three months of receipt of formal Notice to Proceed, the contractor will establish a project office in Nairobi and, no more than six months later, will establish a second field office in Abidjan. These two offices, with project management from a contractor office located in the U.S. and with contractor U.S. administrative and backup support, will provide project staff and support services to implement the following four project components.

A. Planning, Policy Development and Technology Assessment

- Inventory the status of national energy assessments, planning, and policy development in each AID recipient country in Africa for which such an inventory has not already been completed.

- Where directed by AID, provide short-term technical assistance to selected African governments to assess their national energy situation and identify major government decisionmaking and implementation issues. A typical national energy assessment will require approximately 16 person-weeks of contractor professional staff time.

- Provide and manage three-person interdisciplinary teams, including where feasible qualified African individuals or institutions, to conduct assessments of African project experience in at least ten high-potential energy and forestry project areas identified by AID. Such "technology assessments" address technical, economic, sociocultural and institutional/extension aspects. A typical assessment will include on-site evaluations of 6-9 African projects designated by AID -- and including not only AID but other donor-supported or private sector projects -- and require approximately 24 person-weeks of professional effort. (Table 1 lists possible technology assessment areas.)

- Cooperate with the energy unit of the African Development Bank, supported by AID under another project, to undertake selected joint energy planning or project preparation activities.

B. Sub-Projects Fund

- Assist AID(AFR/RA) in the establishment of a Subprojects Fund from which loans or grants of up to $500,000 (or $1 million for selected CDA initiatives) will be provided to projects appearing to have the best potential for reducing deforestation or oil imports. Grants may be made to recipients within the following categories:

  - National industrial, or agricultural development/finance institutions or PVO's to establish revolving funds for on-lending to promising projects.
  - Governmental or not-for-profit non-governmental organizations for projects which meet priority energy needs and appear likely to spread on their own without continued dependence upon donor support.

The Fund has the following purposes:

  - test a variety of energy and forestry technologies and dissemination approaches,
  - provide startup funding to initiate multi-donor fuelwood initiatives, and
  - support development of requisite afforestation and agro-forestry infrastructure, including production within Africa of seeds of the best selections of appropriate species.

The EIA Project Paper describes the Fund process and general award criteria. Within this framework, the contractor will:

  - Draft detailed processing procedures and award criteria for AID(AFR/RA) approval;

- Assist missions in preparing, and AFR/RA in reviewing, Subproject Activity Request Cables (SPARC's);
- Assist missions in preparing and approving Subproject Papers; and
- Provide such other Fund-related assistance as may be requested by a mission, REDSO, or AFR/RA.

Provide monitoring and evaluation, on a recurring basis, of on-lending institutions and subprojects funded.

C. Training and Institutional Strengthening

- Provide contractor services to help AID (AFR/RA) establish and operate a program for the provision of grant financing, up to $50,000 each, for the following:

- Short-term informal training sessions and workshops, emphasizing exchange of information, experience, and insights among the participants, and coordinating with AID ST/EY-funded training programs.
- Training/workshops for and among on-lending institutions, coordinating with, and where appropriate cosponsored by, the AfDB.
- Practitioner-oriented training and technical assistance such as "hands on" workshops or for subprojects personnel for participating on-lending institutions.

- The contractor will administer training grant funds on behalf of AID. The contractor will help identify priority training activities and, if the initial training proposal is approved by AFR/RA, prepare a memorandum of understanding -- to be signed by the grant recipient, contractor, and appropriate Mission or REDSO -- which will constitute the formal grant approval and administration document.

- Monitor training activities funded.

D. Information/Experience Sharing

- Provide the following information and experience sharing services from the contractor's Nairobi and Abidjan offices:

- Access to prescreened information on technology choices, costs, and African project experience for national/subregional energy planners.
- Access to prescreened information on detailed technical, economic, dissemination, and other aspects of African energy and forestry projects of particular interest to Subproject Fund grantees or other African project practitioners.
- Referral of requests to other information and technical centers in Africa or elsewhere.
- Widespread dissemination -- primarily through other organizations' information centers, newsletters, etc. -- of results of EIA technology assessments and subproject evaluations.

- The contractor also will establish a small library of evaluation reports, state-of-the-art reports, etc in Nairobi and Abidjan and also reproduce and distribute evaluation reports and periodic state-of-the-art reports.

III. Evaluation

The contractor will provide ongoing monitoring and evaluation of technical, administrative/institutional, and resource management aspects of the project itself and of EIA subprojects. The contractor will provide quarterly project progress reports to AFR/RA. The contractor and AFR/RA will meet at least semi-annually during the first two years, and at least annually thereafter, to review project progress and results.

The contractor also will provide information, interviews, and other support to AID's independent evaluation team for mid-term and final project evaluations.

IV. Project Management

The contractor will designate an officer or senior manager as Project Manager. The Project Manager will have responsibility for liaison with AID, project staffing and scheduling, quality assurance of all tasks undertaken by contractor U.S. or overseas staff, and supervision of U.S. administrative and other support.

Within three months following receipt of Notice to Proceed, the contractor will develop a detailed work plan and make commitments for office facilities in Nairobi. Within six months following opening of the Nairobi office, the contractor will open its Abidjan office.

V. Other Contract Information

A. Estimated Term of Contract

The contract term is estimated to be five years.

B. Estimated Level of Effort

	Person-months
Project Manager (Washington, D.C.)	18
Project Field Director (Nairobi)	50
Associate Field Director (Nairobi)	50
Project Field Director (Abidjan)	44
Associate Field Director (Abidjan)	44
Extension Staff (1 each, Nairobi and Abidjan)	96
Secretaries/Admin. Assts. (1 each Nairobi and Abidjan)	102
U.S. administrative/backup support	36
Short-term consultants/subcontractors	36

C. Language Requirement

The Abidjan staff must be fluent in English and French. The Nairobi staff must be fluent in English. At least one of the two Nairobi senior staff members must be fluent in French. Nairobi staff fluency in Swahili is desirable but not mandatory.

VI. Duties and Qualifications of Staff

A. Project Manager, Washington, D.C.

The Project Manager will provide overall project direction and supervision. As such, he/she will be responsible for project task definition, staff scheduling, quality assurance, and cost control on all assignments undertaken by the contractor, its subcontractors, and consultants. He/she will report to and work closely with the AID (AFR/RA) Technical Project Officer. He/she will be expected to maintain close contact with the project field staff, involving them in staffing and scheduling decisions as appropriate, receiving regular communications from them on the status of task assignments, and visiting each field office at least semi-annually.

Specific Project Manager duties include, but are not limited to:

1. Hiring and oversight of long and short-erm contractor personnel.
2. Primary authority and responsibility for initial work planning (in concert with AID/W) and subsequent periodic plan revision.
3. Management of contractor effort on all aspects of the project, including technology assessments, national energy assessments and planning/policy studies, the Subprojects Fund, training grants, information/experience sharing, and associated contractor monitoring and evaluation.
4. Daily/weekly interaction with the AFR/RA Technical Project Officer to define tasks, schedule staff, review task status, and plan or carry out other aspects of the project.
5. Liaison with other AID/W offices and, at least semi-annually, with the REDSO.
6. Project financia. management.

The Project Manager must be an officer or senior manager of the contractor or major subcontractor. He/she must have at least five years' working experience in energy planning and/or energy project management; have extensive energy planning or energy project experience in Africa (preferably in both East/Southern and West Africa); and be familiar with political, economic, and sociocultural aspects of African life. He/she must have managed other multi-million dollar projects in energy or forestry and must have a working knowledge of AID planning, programming, and project management experience, preferably including experience with the Africa Bureau and one or both REDSOs. He/she must be an effective communicator.

The Project Manager must have a Master's degree or equivalent in business, economics, or engineering. Experience in private sector project finance, venture capital, or international finance is highly desirable but not mandatory. Fluency in French is desirable but not mandatory.

B. Project Field Directors, Nairobi and Abidjan

The Nairobi and Abidjan Project Field Directors, under the overall direction of the Project Manager, have authority and responsibility for planning/programming and implementation of all contractor project tasks within the regions of REDSO/E and REDSO/W, respectively. Specific duties include, but are not limited to:

1. Task identification, definition, and proposed staff scheduling, working in concert with the host country government, USAID mission, REDSO, or others as appropriate.
2. Supervision of all contractor long-term personnel subcontractor personnel, and consultants working within the region served by the contractor field office.
3. Review of proposed energy assessment/policy assistance assignments, Subprojects Fund grant proposals, training grant proposals, and training grant memorandum of understanding prior to being forwarded to Washington.
4. Frequent meetings with the REDSO, host country governments, and others (e.g., AfDB) as appropriate to identify/stimulate priority project tasks, coordinate project activities, and review project status. (Note: AID/W expects either the Project Field Director or the Associate Field Director to visit each participating country at least semi-annually, with more frequent visits to particularly active participating countries).
5. Directly carry out country-level project-related tasks such as subproject design and monitoring, provision of national energy planning assistance, and negotiation of training grants.
6. Field office financial management and periodic financial reporting to the contractor's U.S. office.

Each Project Field Director must have at least two years' working experience in Africa, have managed energy or forestry projects and prepared and assessed proposals, have at least five years' experience in energy planning and/or in energy or forestry projects, and be familiar with relevant African economic and cultural aspects. Prior private business experience (other than consulting to government agencies), preferably including private sector project preparation or project finance is desirable but not mandatory. Each Director must be knowledgeable of AID programming and operating systems, be an effective manager, and be able to communicate effectively with individuals and groups in the region such as African governmental, business, PVO and village persons and AID and donor representatives. Each Director should have an advanced university degree in energy engineering, forestry, or economics.

The Project Field Director - Abidjan must demonstrate working fluency in French (FSI Level 3) including ability to carry out discussions of complex energy and forestry issues. Also, because he/she will be expected to work closely with the AfDB, prior private sector project preparation or project finance experience is particularly desirable.

C. Associate Field Directors, Nairobi and Abidjan

The Associate Project Director in each field office will support the Director in managing and carrying out the project and will directly manage the training and information/experience sharing aspects of the project.

Each Associate Field Director must have at least two years' working experience in Africa and have at least three years' experience in energy planning and/or energy or forestry projects. Each should be able to communicate effectively with individuals and groups in the region. Each should have either an advanced university degree in energy engineering, forestry, economics degree in energy engineering, forestry, economics, or rural development or a bacholor's degree and at least five years' experience. The Abidjan Associate Field Director must be fluent in French (FSI Level 3).

The Associate Field Director must have similar capability and familiarity, but may have less experience than the Project Field Director. He/she must be acceptable to, and work effectively with, the Project Field Director. AID expects the contractor to select each office's Project Field Director and Associate Field Director to have complementary skills. For example:

- At least one of the two in each office should have forestry, agroforestry, or forest economics experience.
- At least one should be an energy planning expert or expert in energy technologies relevant to African needs.
- In Nairobi, at least one of the two should be fluent in French. (In Abidjan, both must be fluent in French -- FSI Level 3).
- At least one in each office should have prior experience in African rural or small enterprise development projects.
- Together, the two should be prepared to spend an average of 35% of their collective time in travel within the region.

Specific duties include, but are not limited to:

1. Responsibility for developing, and operating the information/experience sharing network and training grants program.
2. Coordination of program activities with selected missions and national energy programs, assisted by the Project Field Director.
3. Direct participation in project subproject tasks assigned by the Project Field Director (at least 70% of his/her time).

D. Project Staff (Local Hires)

Each Project Field Director will recruit and employ a locally hired project information/extension officer to assist in carrying out the information sharing, training, and extension aspects of the project. These persons should have at least five years' experience in rural or small enterprise development. At least two years' experience in energy or forestry training or extension is desirable but not mandatory. In the Abidjan office, both of these staff members must be fluent in French (FSI Level 3).

Each Project Field Director also will hire a full-time secretary/administrative assistant.

ANNEX K

STATUTORY CHECKLIST

Listed below are statutory criteria applicable generally to projects with FAA funds and project criteria applicable to individual funding sources: Development Assistance (with a sp category for criteria applicable only to loans); and Economic Support Fund.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE?
HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT

1. Continuing Resolution Unnumbered; FAA Sec. 634A; Sec. 653(b).

(a) Describe how authorizing and appropriations Committees of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that figure)?

2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,000, will there be (a) engineering, financial other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

4. FAA Sec. 611(b); Continuing Resolution Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973?

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?

6. FAA Sec. 209. Is project susceptible of execution as part of regional or multilateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.

7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

9. FAA Sec. 612(b), 636(h); Continuing Resolution Sec. 508. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?

11. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?

12. Continuing Resolution Sec. 522. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: (include only applicable paragraph which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.)

(1) [103] for agriculture, rural development or nutrition; if so (a) extent to which activity is specifically designed to increase productivity and income of rural poor; 103A if for agricultural research, full account shall be taken of the needs of small farmers, and extensive use of field testing to adapt basic research to local conditions shall be made; (b) extent to which assistance is used in coordination with programs carried out under Sec. 104 to help improve nutrition of the

people of developing countries through encouragement of increased production of crops with greater nutritional value, improvement of planning, research, and education with respect to nutrition, particularly with reference to improvement and expanded use of indigenously produced foodstuffs; and the undertaking of pilot or demonstration of programs explicitly addressing the problem of malnutrition of poor and vulnerable people; and (c) extent to which activity increases national food security by improving food policies and management and by strengthening national food reserves, with particular concern for the needs of the poor, through measures encouraging domestic production, building national food reserves, expanding available storage facilities, reducing post harvest food losses, and improving food distribution.

(2) [104] for population planning under sec. 104(b) or health under sec. 104(c); if so, (i) extent to which activity emphasizes low-cost, integrated delivery systems for health, nutrition and family planning for the poorest people, with particular attention to the needs of mothers and young children, using paramedical and auxiliary medical personnel, clinics and health posts, commercial distribution systems and other modes of community research

(4) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development; and (ii) extent to which assistance provides advanced education and training of people in developing countries in such disciplines as are required for planning and implementation of public and private development activities.

(5) [106; ISDCA of 1980, Sec. 304] for energy, private voluntary organizations, and selected development activities; if so, extent to which activity is: (i) (a) concerned with data collection and analysis, the training of skilled personnel, research on and development of suitable energy sources, and pilot projects to test new methods of energy production; (b) facilitative of

geological and geophysical survey work to locate potential oil, natural gas, and coal reserves and to encourage exploration for potential oil, natural gas, and coal reserves; and (c) a cooperative program in energy production and conservation through research and development and use of small scale, decentralized, renewable energy sources for rural areas;

(ii) technical cooperation and development, especially with U.S. private and voluntary or regional and international development, organizations;

(iii) research into, and evaluation of, economic development process and techniques;

(iv) reconstruction after natural or manmade disaster;

(v) for special development problems, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;

(vi) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

c. [107] is appropriate effort placed on use of appropriate technology? (relatively smaller, cost-saving, labor using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor.)

d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least developed" country)?

e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"?

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government.

g. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?

2. Development Assistance Project Criteria (Loans Only)

a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, at a reasonable rate of interest.

b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

3. Project Criteria Solely for Economic Support Fund

a. FAA Sec. 531(a). Will this assistance promote economic or political stability? To the extent possible, does it reflect the policy directions of FAA Section 102?

b. FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities?

5C(3) - STANDARD ITEM CHECKLIST

Listed below are the statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by imposing limits on certain uses of funds.

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed?

2. FAA Sec. 604(a). Will all procurement be from the U.S. except as otherwise determined by the President or under delegation from him?

3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will commodities be insured in the United States against marine risk with a company or companies authorized to do a marine insurance business in the U.S.?

4. FAA Sec. 604(e); ISDCA of 1980 Sec. 705(a). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably procured in U.S.)

5. FAA Sec. 603. Is the shipping excluded from compliance with requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates?

7. FAA Sec. 621. If technical assistance is financed, to the fullest extent practicable will such assistance, goods and professional and other services be furnished from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized, are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?

8. International Air Transport. Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will provision be made that U.S. carriers will be utilized to the extent such service is available?

9. Continuing Resolution Sec. 505. If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States?

B. Construction

1. FAA Sec. 601(d). If capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interests?

2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?

3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed $100 million?

C. Other Restrictions

1. FAA Sec. 122(b). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter?

2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights?

3. FAA Sec. 620(h). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries?

4. Continuing Resolution Sec. 514 If participants will be trained in the United States with funds obligated in FY 1981, has it been determined either (a) that such participants will be selected otherwise than by their home governments, or (b) that at least 20% of the FY 1981 fiscal year's funds appropriated for participant training will be for participants selected otherwise than by their home governments?

5. Will arrangements preclude use of financing:

a. FAA Sec. 104(f). To pay for performance of abortions as a method of family planning or to, motivate or coerce persons to practice abortions; to pay for performance of involuntary sterilization as a method of family planning, or to coerce or provide financial incentive to any person to undergo sterilization?

b. FAA Sec. 620(g). To compensate owners for expropriated nationalized property?

c. FAA Sec. 660. To provide training or advice or provide any financial support for police, prisons, or other law enforcement forces, except for narcotics programs?

d. FAA Sec. 662. For CIA activities?

e. FAA Sec. 636(i). For purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained.

f. Continuing Resolution Sec. 504. To pay pensions, annuities retirement pay, or adjusted service compensation for military personnel?

g. Continuing Resolution Sec. 506. To pay U.N. assessments, arrearages or dues.

h. Continuing Resolution Sec. 507. To carry out provisions of FAA section 209(d) (Transfer of FAA funds to multilateral organizations for lending.)

i. Continuing Resolution Sec. 509. To finance the export of nuclear equipment fuel, or technology or to train foreign nationals in nuclear fields?

j. Continuing Resolution Sec. 510. Will assistance be provided for the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights?

k. Continuing Resolution Sec. 516. To be used for publicity or propaganda purposes within U.S. not authorized by Congress?

5C(2) - PROJECT CHECKLIST

A. GENERAL CRITERIA FOR PROJECT

1. The EIA project appears in the FY 1981 CP Data Base on page 244. Congress will be notified prior to obligation of funds.

2. Yes

3. N/A

4. N/A

5. N/A

6. Subprojects may be executed in conjunction with other donors. Training and information exchange components are expected to contribute to and stimulate Africa regional development in energy planning.

7. Yes to all sections. In particular the EIA thrust is to stimulate development of private sector entrepreneurship.

8. Subproject commodity procurement will draw on U.S. private resources.

9. 25% host country contribution will be required in all subprojects.

10. N/A

11. Yes

12. N/A

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

   a. Maximum extent

   b. FAA Sec. 101, 101A, 104, 105, 106, 107.

      (1)

         (a) Maximum extent
         (b) Maximum extent
         (c) N/A

      (2) N/A
      (4) Maximum extent

(5) (i) Maximum extent for all questions
(ii) Maximum extent
(iii) Maximum extent
(iv) N/A
(v) Maximum extent
(vi) Substantial

c. Yes

d. Yes. RLDCs will be exempted only if a waiver is requested and granted.

e. No

f. Maximum extent

g. Yes

5C(3) - STANDARD ITEM CHECKLIST

A. Procurement

1. Yes

2. Yes

3. N/A

4. N/A

5. No

7. Yes

8. Yes

9. Yes

B. Construction

1. N/A

2. N/A

3. N/A

C. Other Restrictions

1. N/A

2. N/A

3. Yes

4. N/A

5.

a. Yes

b. Yes

c. Yes

d. Yes

e. Yes

f. Yes

g. Yes

h. Yes

i. Yes

j. No

k. Yes

VII. INITIAL ENVIRONMENTAL EXAMINATION

ANNEX L

Project Country: Africa Regional (various areas to be determined in course of implementation)

Project Title: Energy Initiatives for Africa

Funding: FY(s) 1981 - 85 $ 16 million

Period of Project: FY 81 - 86

IEE Prepared by: Michael Cruit
Project Officer
AFR/RA

Date: 8 February 1980

Environmental Action Recommended: Negative Determination.
See attached narrative

Concurrence: E. Dennis Conroy 1/19/81
E. Dennis Conroy
Director
Office of Regional Affairs
Bureau for Africa

Assistant Administrator Decision:

APPROVED _____

DISAPPROVED _____

DATE 1-20-81

FEB 12 1981

ACTION MEMORANDUM FOR THE ACTING ASSISTANT ADMINISTRATOR FOR AFRICA

From: AFR/RA, E. Dennis Conroy, Director

Subject: Energy Initiatives in Africa (698-0424) PID

Problem: Your approval is required on this memo, the attached PID facesheet and the IEE for the Energy Initiatives in Africa PID authorizing us to proceed with Project Paper design.

Discussion: You chaired a meeting to discuss the merits and content of a proposed Energy Initiatives project on January 4, 1981. During this meeting, it was agreed to approve the PID by clearing this Action Memorandum and proceed with the Project Paper design with the following conditions:

1. That there was a clear need for a regional energy project in order:

   (a) to develop a specific bureau energy approaches upon which to build future energy projects;
   (b) to develop individual national energy assessments and strategies for small African countries;
   (c) to conduct experimental and pilot programs, including forestry research;
   (d) to develop and assist African regional institutions to assess African energy requirements through technical assistance and training;
   (e) to help establish an energy information network; and
   (f) to train Africans in the energy fields.

2. The PP design should move quickly drawing heavily upon the resources of AFR/DR and both REDSOs.

3. The scope-of-work for the design team will be circulated for clearances. AFR/DR will assist in the preparation. As part of the scope-of-work, the design team will be required to address the type of contractor needed to successfully implement the project. All agreed that the contractor should be able to provide multisector expertise.

4. The project intends to focus on woodlot development as well as other forms of renewable energy activities and to set aside funds for small scale pilot woodlot projects on a national basis.

5. The PP will address a means to accent the energy sector by generating future energy projects for funding by other donors and through the CADA initiative.

A previously prepared PID has now been modified to reflect the above changes and is attached herewith.

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ACTION MEMORANDUM FOR THE ACTING ASSISTANT ADMINISTRATOR FOR AFRICA - Page 2

Recommendation: That you indicate your approval by signing this memo and Block 18 of the PID facesheet (Tab A), and the IEE (Tab B) attached hereto, thereby authorizing AFR/RA to proceed with the Project Paper design.

Attachment: PID

APPROVED _____

DISAPPROVED _____

DAD'Antonio:AFR/RA:1/22/81 X22477

DATE 2/20/81

Clearances:

AFR/RA:JWDawson	(draft)	Date 1/23
AFR/RA:EGRuoff		Date 1/27
PPC		Date
GC/AFR:EADragon		Date 2/19
AFR/DP:EDonoghue		Date 2/19
AFR/DR:JBlumgart		Date 2/6
AFR/DR:LBond		Date 2/5
AFR/DP:RStacy		Date 2/6

H.N.
J. K's memo is out of date. The PID takes into account John's concerns. I have discussed this with DK & Blumgart agrees.
EA

Ms. North,
Pls see the attached memorandum concerning the AFR/DR clearances.
JWKaehning
6 Feb. 1981