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UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

PROJECT PAPER
THE PHILIPPINES
RURAL ENERGY DEVELOPMENT PROJECT

492-0375

AUGUST 1982

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Special Note

Project Paper - Rural Energy Development Project (492-0375)

During the final authorization of the Project, the Charcoal Production Subproject (Annex III) budget was reduced by \$1.0 million (from \$12.37 to \$11.37 million). This reduction was necessary to increase the Wood-fired Power Plants Subproject (Annex I) budget from \$9.0 to \$10.0 million. (The total AID contribution remains at \$25.0 million.) This change was made to finance the Engineering Implementation Plan inserted as Appendix D-1 of Annex I.

Revisions have been made throughout the final project paper and in Annexes I and III to reflect this change.

July 8, 1982

Philippines
Rural Energy Development Project

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List of Abbreviations

ADB	Asian Development Bank
AGE	Architectural and Engineering
AID	Agency for International Development
B/C	Benefit/Cost
BFD	Bureau of Forest Development
BHP	Brake Horse Power
BISA	Barangay Irrigation Service Association
BOD	Biological Oxygen Demand
BOE	Barrels of Oil Equivalent
BS	Bureau of Soils
Btu	British Thermal Unit
CDC	Cash Disbursement Ceiling
CDSS	Country Development Strategy Statement
CP	Conditions Precedent
CPA	Charcoal Producers Association
DA	Development Assistance
DTDO	Dendro-Thermal Development Office
EIA	Environmental Impact Analysis
ESF	Economic Support Fund
FAA	Foreign Assistance Act
FORI	Forest Research Institute
FORPRIDECOM	Forest Products Research and Industries Development Commission
FPU	Fuel Production Unit
FSDC	Farm Systems Development Corporation
FX	Foreign Exchange
GEMCOR	Gasifier and Equipment Manufacturing Corporation
GOP	Government of the Philippines
HA	Hectare
HP	Horse Power
HR	Hour
IFB	Invitation for Bid
IRR	Internal Rate of Return
ISA	Integrated Service Association
KAISA	Kalipunan ng mga ISA
KW	Kilowatt
KWH	Kilowatt Hour
LSF	Livelihood Support Fund
MA	Ministry of Agriculture
MAC	Management Advisory Committee
MC	Moisture Content
M&E	Mechanical and Electrical
MHS	Ministry of Human Settlements
MBOE	Million Barrels of Oil Equivalent
MBTU	Million British Thermal Units
MW	Megawatt
MWH	Megawatt Hour

MNR	Ministry of Natural Resources
NEA	National Electrification Administration
NFA	National Food Authority
NPC	National Power Corporation
NPCC	National Pollution Control Commission
NPK	Fertilizer
PH	Acidic Factors
R&D	Research and Development
REC	Rural Electric Cooperative
RFP	Request for Proposal
TA	Technical Assistance
TFA	Tree Farmers Association
TPO	TREE Program Office
TREE	Tree Research for Energy and Enterprise
UP	University of the Philippines
UPLB	University of the Philippines at Los Baños
WB	World Bank
YR	Year

PROJECT AUTHORIZATION

PHILIPPINES

Rural Energy Development
Project No. 492-0375

Pursuant to Part II, Chapter IV, Section 531 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Rural Energy Development Project for the Philippines (Cooperating Country) involving planned obligations of not to exceed Twenty-Five Million United States Dollars (\$25,000,000) in grant funds over a three (3) year period from 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 costs and local currency costs for the project, including reimbursements up to \$1.5 million for certain costs incurred by the Cooperating Country in preparation for and in anticipation of this project.

The project is one of a series designed to provide ESF assistance of \$200 million pursuant to the Amended Bases Agreement between the Republic of the Philippines and the United States. The project is directed at reducing the Philippines' dependency on imported fuels. This reduced dependency will be accomplished by the Cooperating Country in three specific ways: the development of three wood-fired power plants, use of gasifiers for irrigation, and charcoal production. The A.I.D. grant will provide U.S. dollar support to the foreign exchange requirements of the Cooperating Country's wood-fired power plant program as well as annual dollar transfers in exchange for increased efforts by the Cooperating Country to use charcoal and wood as a fuel substitute by appropriating and using for agreed local currency costs an amount of pesos equivalent to the annual dollar transfers. The Cooperating Country also will finance additional local costs of the three subprojects.

The Project Agreement(s) which may be negotiated and executed by the officer(s) to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

a. Source and Origin of Goods and Services:

Goods and services, except for ocean shipping, financed by A.I.D. under the project shall have their source and origin in the United States or the Cooperating Country, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

2.

b. Conditions Precedent to Disbursement

Prior to the first disbursement of funds for each of the following components of the project, or to the issuance of commitment documents with respect thereto, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish in form and substance satisfactory to A.I.D. the documents listed under each such component:

1. Wood-fired Power Plant Component

A copy of an executed agreement between the Ministry of Human Settlements (MHS) and the National Electrification Authority (NEA) for NEA to implement this component, and a copy of the format for the subordinate agreement between NEA and the Rural Electrical Cooperative farmers' associations supported under this project.

2. Gasifier Component

A copy of an executed agreement between MHS and the Farm Systems Development Corporation (FSDC) for FSDC to implement this component, and a copy of the format for the agreement between FSDC and the Irrigator Service Associations (ISAs) supported under this project.

3. Charcoal Production Association Component

(a) A copy of an executed agreement between MHS and FSDC for FSDC to implement this component, and a copy of the format for the agreement between FSDC and the Charcoal Production Associations (CPAs) supported under this project.

(b) A copy of the implementation plan establishing the feasibility and planning requirements necessary for the creation of each CPA or group of CPAs.

(c) A copy of the plan for the review and evaluation of those CPAs which do not have pre-established sources to purchase their charcoal.

c. Covenants

1. The Cooperating Country shall agree to provide, through FSDC and NEA, financial resources required by the farmers' associations, ISAs and CPAs for the effective implementation of this project.

2. The Cooperating Country shall agree that prior to disbursing local currency to each of the various associations participating

3.

in this project for tree farming, appropriate land rights (purchase, lease, etc.) will be obtained by each such association.

Clearances:

Eugene Staples, A/AA/ASIA	<u>ES</u>	Date	<u>5/9/82</u>
John R. Bolton, AA/PPC	<u>JB</u>	Date	<u>5/9/82</u>
Chandler L. van Orman, GC	<u>Clvo</u>	Date	<u>6/2/82</u>

Signature

M. Peter McPherson
 M. Peter McPherson
 Administrator

16 AUG 1982

Date

GC/ASIA:ST19:hp/dw:7/19/82:28092

SAT

PHILIPPINES - RURAL ENERGY DEVELOPMENT PROJECT

I. SUMMARY AND RECOMMENDATIONS

A. Grantee: The Government of the Philippines (GOP) will be the Grantee. The executing agency will be the Management Advisory Committee's Secretariat (MAC). The implementing agencies will be the National Electrification Administration (NEA) and the Farm Systems Development Corporation (FSDC).

B. Amount: Grant - \$25.0 million

C. Purpose: The purpose of this project is to provide funds, resulting from the amended Military Bases Agreement of 1947 to assist the GOP with the economic and environmentally sound production and use of biomass energy resources and conversion technologies. The assistance will be in the following areas: (a) wood-fired power plants; (b) gasifiers for irrigation; and (c) charcoal production. In accomplishing its purpose, the project will provide: direct economic/financial benefits resulting from fuel substitution; employment and income generation; increased income transfer to rural areas; and have very positive effects on the environment.

D. Project Description: Under this project, monies will be made available to:

1. Procure boilers, turbo-generators and control systems for three 5 MW wood-fired power plants, plus the services of two U.S. firms an architectural and engineering (A&E) consultant and a design and build contractor.

2. Provide credit to purchase up to 1,150 gasifier units (equipment that produces combustible gases by burning wood) to modify current diesel driven irrigation systems, plus to develop the woodlots to support the gasifiers at approximately 500 small farmer sites nationwide.

3. Provide credit to develop tree farms to grow feedstock for charcoal production, and construct the necessary kilns for such production. This will involve up to 19,500 hectares of tree farms.

Revised 7/7/82

D. Project Costs:

	(\$000) 1/		
	<u>AID Grant</u>	<u>GOP</u>	<u>TOTAL</u>
Wood Fired Power Plants	10,000	12,570	22,570
Gasifiers for Irrigation	3,380	3,920	7,300
Charcoal Production	11,370	4,880	16,250
Evaluation	250		250
	<u>25,000</u>	<u>21,370</u>	<u>46,370</u>

F. USAID View: AID/Manila strongly endorses the proposed project.

G. Summary of Contents: This Project Paper consists of four parts: A summary Project Paper and three annexes. The annexes are organized as distinct project papers and provide detailed discussions for each of the separate subprojects under this project.

H. Recommendation: That an ESF grant of \$25.0 million be authorized for the proposed Rural Energy Development Project.

II. BACKGROUND AND DETAILED PROJECT DESCRIPTION

A. Problem Statement

1. General: The Philippines is among the top ten oil-importing developing countries in the world. Recently it has imported nearly 80 million barrels of oil annually at a cost of around \$2.5 billion per year (accounting for 71% of trade imbalance since 1974). Imported oil accounts for about 83% of total commercial energy consumption and is consumed roughly as follows: 45% for transportation, 23% for electrical generation, 4% for lighting and related uses, and 28% directly by industry. Industrial users consume the largest share of electricity generated with oil. This heavy dependency on oil is the result of past investment decisions based on the earlier low costs of fossil fuels.

With the dramatic increases in oil prices beginning in 1973, oil import costs now absorb a major share of Philippine export earnings. To reduce this drain on the economy, and to enhance the security of energy supply which is jeopardized by the heavy dependence on imported oil, the Philippines recently declared energy its number two priority, after national security. This led to preparation of an ambitious national energy development program intended to reduce oil imports to an equivalent of 45% of total commercial energy consumption by 1986. While the country is already seeing some change in its oil consumption patterns as a result of this program, major structural shifts are not expected until the mid or late-1980s.

1/ Numbers are rounded off at nearest ten thousand dollars for presentation purposes.

2. Rural Energy: To reduce the dependency upon imported oil in the rural sector, the GOP is emphasizing the development of new indigenous energy supplies, especially in the area of noncommercial fuels (also known as "traditional fuels", e.g., wood, charcoal and bagasse), which supply more than 30% of the total energy used in the Philippines. Annual consumption of these fuels is roughly equivalent to 40 million barrels of oil. A 1979 World Bank/Asian Development Bank study suggests that this amount is distributed in approximately equal shares between household and non-household use. Household consumption of firewood is the largest single category and is estimated at 12.4 million barrels of oil equivalent or 60% of total household energy consumption. Demand for noncommercial fuels is expected to increase by 2.9% a year, or about 8 million barrels of oil equivalent during the period 1981-1986.

Population growth will further increase the demand for rural, mainly firewood, energy sources. If steps are not taken to meet these fuel requirements, the projected growth in demand for traditional fuels is expected to exacerbate the already serious deforestation problem in the Philippines. Further complicating the deforestation problem is the fact that population growth has contributed to increased rural unemployment and underemployment. Driven to cultivate marginal upland areas because of ever decreasing availability of lowlands, more slash-and-burn farmers are contributing to deforestation.

It is estimated that deforestation from all causes is occurring at a rate of 172,000 hectares per year, while reforestation efforts are, at best, replacing only 50,000 hectares. Current estimates of denuded foothills and uplands range between five and six million hectares. This situation has stimulated the development of nonconventional energy programs involving the planned exploitation of biomass resources as an alternative to continuing the haphazard destruction of the nation's forest resources.

Table 1 presents the 1979 consumption patterns for traditional energy resources by source.

Table 1
Traditional Energy Consumption
1979 (MMBOE)

<u>Sector/Source</u>	<u>Consumption</u>
Households:	20.683
- Firewood	<u>12.452</u>
- Woodwastes	0.100
- Charcoal	5.310
- Coconut shells	2.454
- Rice hulls	.367
<u>Non-Households</u>	20.601
- Bagasse in industrial	<u>8.091</u>
- Woodwastes in industrial	5.057
- Firewood in tobacco	4.045
- Firewood and coconut shells for miscellaneous use	3.408
TOTAL	<u>41.284</u>

Source: Philippines: World Bank/ADB Joint Energy Sector
Survey Report, 1981

B. Energy Program

1. General: The Philippines has abundant domestic energy potential to exploit. For example, in assessing the outlook for developing domestic energy resources in the Philippines, a World Bank team found that in addition to its probable modest oil and gas resources, the country has excellent hydro-electric potential, is among the most promising geothermal reservoirs in the world, has a considerable amount of low quality coal, and has a considerable amount and variety of biomass materials.^{1/} To take advantage of these resources the GOP has recently accelerated programs for: geothermal, alcohol and other engine fuel substitutes; the conversion of major oil consumers to coal or a coal/charcoal mix; mini-hydro and wood-fired power generation; and firewood production. Included in the new programs is an increased emphasis on: (a) adapting available technologies to the rural setting; and (b) developing alternative, renewable fuel sources for electrical generation. Table 2 presents a summary of national energy program targets for 1981-1986 by energy resource.

^{1/} Findings are included in a 1981 report resulting from an IERD review of the Philippine energy situation and the adequacy of the country's energy program as reflected in its National Energy Program, 1981-86.

Table 2
National Energy Program Targets
1980-1986 (MMBOE)

	1980	1981	1982	1983	1984	1985	1986
Hydro	<u>6.19</u>	<u>7.10</u>	<u>8.09</u>	<u>11.85</u>	<u>14.07</u>	<u>15.29</u>	<u>16.01</u>
Geothermal	3.84	5.34	6.28	7.89	8.58	13.97	16.64
Coal	0.97	1.36	6.25	11.64	14.20	20.57	25.58
Oil	77.49	73.08	71.14	67.98	69.93	61.64	56.38
Nuclear	-	-	-	-	-	2.81	5.61
Non-Con	<u>0.02</u>	<u>0.65</u>	<u>0.86</u>	<u>1.13</u>	<u>2.19</u>	<u>2.74</u>	<u>2.96</u>
TOTAL	88.51	87.53	92.62	100.49	108.97	117.02	123.18

Source: MOE; The National Energy Program 1981-86

To realize significant levels of oil substitution, the Philippines has adopted an energy diversification strategy in which biomass is destined to play an increasingly important role. As a tropical country with unused denuded uplands and an available labor force, the Philippines has the potential for large increases in both woody and non-woody biomass production. Through processes such as carbonization, gasification, combustion, and liquification, biomass can be converted to fuels that provide efficient energy for the power, industrial, agricultural, transportation and household sectors.

The GOP is currently pursuing programs to: develop small power plants to produce an aggregate of 200 MW of wood-fired power by 1987; produce 1.1 MMBOE per year of alcohol to mix with gasoline; produce 1.4 MMBOE per year of coconut oil to displace diesel fuel; substitute producer gas for diesel fuel in vehicles, and certain stationary power generators; and expand charcoal production for industrial and household use.

The GOP's commitment to reducing dependence upon imported oil through developing alternative energy supplies rests partially in the belief that greater fuel supplies at affordable prices are critical in promoting rural development. If development is to proceed, energy supplies must expand to meet increasing demands for power and heat. A basic premise of the rural energy program is that technically, economically, and financially viable alternatives to oil-based fuels exist, which can be developed for the rural areas and part of the urban industrial sector.

These efforts to develop indigenous rural energy sources are in their nascent stages. Their success will have a profound impact on Philippine development over the next 20 years, and can provide valuable

experience to other developing countries. Two of the GOP organizations vested with responsibility to implement these programs are the NEA, which is pursuing the development of biomass for wood-fired electric generation, and FSDC which is seeking both to substitute producer gas for diesel fuel in pump irrigation systems and to produce charcoal for domestic and rural industrial use.

2. Project Components:

a. Wood-Fired Power Generation: NEA's wood-fired power plant program was started in 1979 as a first major step in developing biomass-based energy resources. Its target is quite ambitious; to develop up to 2,000 MW of electricity by the year 2000, approximately 20% of projected electricity requirements countrywide.

Total potential for biomass energy in electricity generation is hard to define because improved tree farm and conversion technologies and experience are still evolving. Theoretically that potential is estimated at more than 50,000 MW. Equally important are the side benefits that can be derived from well designed biomass programs including employment generation for the rural unemployed and underemployed, and reversal of the serious environmental degradation occurring in the nation's uplands.

By 1987, NEA's goal is to have 70 wood-fired power plants (producing 200 MW) operating nationwide. The plants will be fueled with wood produced from more than 70,000 hectares of tree farms. The hardware for the first 17 wood-fired power plants, using Leucaena leucocephala (ipil-ipil) and other fast-growing species, is on order and 11 are scheduled to be in operation in 1982. Planting of the tree farms for these 17 sites is well underway. During this first phase of the program, emphasis will be placed on improving tree farm development production and management procedures adaptable to a variety of physical and climatic situations. Analyses and testing will be undertaken simultaneously to improve the efficiency of conversion technology.

b. Gasifiers for Irrigation: Of the 3 million hectares of paddy rice under cultivation in the Philippines, about 1.3 million hectares are irrigated. Current government policy calls for irrigating the remaining 1.7 million hectares at a rate of 100,000 hectares per year, mainly through expanding and upgrading existing systems. About 10% of the irrigation systems will employ large pumps (100-500 hp), another 10% will use small pumps and the remainder will be gravity fed. Support to the smaller pump systems falls under the jurisdiction of FSDC, which is charged with increasing agricultural productivity in areas that are to be serviced by small systems.

To date, FSDC has organized, extended loans and provided technical assistance to approximately 1,800 farmers associations or

Integrated Service Associations (ISAs), representing some 94,000 farmers. The FSDC program covers 140,000 hectares with the construction or restoration of about 1,800 pump and gravity communal systems. Of the total number of pump systems, 272 are electric driven and 466 are diesel engine driven, the latter at sites where the local electric cooperatives are not able to extend power lines. The ISAs also have been the beneficiaries of continuing education and training activities for adaptive farm technology packages, including small-scale farm mechanization and management schemes for different farming activities.

The economic position of small farmers participating in the FSDC program has been threatened in recent years, however, because of increasing costs of electricity and diesel fuel, which have significantly raised operation and production costs. FSDC has initiated two efforts to respond to the energy problem: the first, beginning in 1979, is experimentation with alternative energy technologies and systems (windmills, photovoltaics and producer gas) to ensure and increase pumping efficiency; and second, beginning in 1980, is a shift to gravity irrigation systems and improved on-farm water management. More recently, FSDC embarked on a program of reducing diesel fuel use through the application of gasifier units to diesel engine-driven pumps. The gasifiers convert indigenous renewable energy resources (wood and charcoal) into combustible gases. To this end, FSDC established a subsidiary, the Gasifier and Equipment Manufacturing Corporation (GEMCOR), to produce the gasifier equipment in commercial volume, and to design other applications. It is conservatively estimated that outfitting pumps in the ISAs with gasifiers will reduce their diesel fuel requirements by 70%.

c. Charcoal Production: Charcoal accounts for 25% of household energy consumption and about 4% of total commercial and non-commercial energy consumption in the Philippines. It is used primarily for cooking and, because of increasing prices for Liquefied Petroleum Gas (LPG) and kerosene, demand for charcoal is increasing, particularly in urban areas. In line with GOP fuel substitution goals, increased charcoal use in the industrial and commercial sectors is being emphasized and promoted.

The GOP's charcoal production program is another effort to create and use indigenous renewable energy resources through the establishment of tree farms to serve as a resource base for local charcoal manufacture. One of the newer programs started under FSDC's mandate is Tree Resources for Energy and Enterprise (TREE). Its objectives are: development of a reliable and renewable energy resource (charcoal), employment generation, and improved ecological balance. The charcoal produced in this program will be used to meet concentrated industrial demands for process heat such as cement manufacturing, ore smelting, and urban cooking needs. The cement industry has been instructed (LOI No. 1094) to stop using fuel oil and is in the process of converting to a coal and coal/charcoal fuel capability. In rural areas, increased production of charcoal will be used primarily for household cooking, but in a more efficient and environmentally sustainable manner than at present,

and expanding small industry consumption in enterprises such as brick, tile and lime kilns. The charcoal will also be used in the future to fuel commercially produced gasifier units adapted to irrigation pumps, rice mills, electrical generators and small ice plants, and to help meet fuel requirements of gasifier-operated farm and transport vehicles.

C. AID Assistance Strategy in Rural Energy

AID views the Philippines' energy diversification program as an excellent activity to support under the ESF commitment made in association with the 1979 amendments to the US-RP Military Bases Agreement. By means of this Project, we can support an important development effort which is consistent with our CDSS strategy and we can provide foreign exchange to assist the balance of payments and economic stability of the Philippines consistent with our ESF strategy. In as much as we are pursuing two objectives with our ESF assistance to the Philippines; i.e.; to provide \$200.0 million over a certain period of time, and to maximize achievement of development goals, this Project is designed to meet both objectives as closely as possible.

The GOP's development strategy and AID Philippines assistance strategy gives highest priority to generating more productive employment in the rural sector. Two major goals of the AID country development strategy (CDSS) are creating more jobs, both on and off farm, and promoting higher productivity among those already gainfully employed. In order to achieve these goals, AID is planning long-term assistance in: (1) rainfed resources development; (2) rural private enterprise development; and (3) local resources management. Energy concerns are incorporated across all DA and ESF programs. As AID's involvement in these energy efforts increases, it becomes increasingly clear that alternative energy technologies and systems, based on renewable resources, will be a key requirement in the development of the rural sector, and in reducing foreign exchange costs of imported fuels.

The availability and cost of energy will continue to play a decisive role in determining the direction and pace of planned economic and social development in the Philippines. This is particularly true in the rural sector where shortages of energy are continuing to have an immediate adverse impact on production costs and on the lives of the poor, thus further diminishing the prospects for increasing production and alleviating rural poverty. Demand for wood and charcoal is outstripping natural regrowth and reforestation efforts resulting in deforestation, soil erosion, reduced upland water storage capacity and siltation of reservoirs and coastal waters. Rural areas suffer from inefficient and inadequate means of food production and preservation, severe shortages of potable water, and extremely high levels of underemployment. Energy shortages exacerbate these factors and contribute to a cycle of low income levels, poor health and substandard living conditions.

Among the energy development problems confronting the Philippines, two crucial challenges are the regeneration and management of the rural

resource base, particularly biomass resources, and the development and dissemination of technologies to convert these resources efficiently into usable energy forms.

While many conditions exist that are conducive to the adaptation and use of renewable energy forms, the rate at which their application is realized will depend on the ability of the Philippines to: (1) plan and implement large-scale programs to develop renewable energy resources, particularly biomass; (2) develop a pool of skilled personnel through technical training; (3) introduce technologies and systems that are economically and culturally acceptable; (4) promote and disseminate information regarding renewable energy information; and (5) strengthen institutional capabilities for improving energy planning, programming, and interagency coordination. This project paper describes how AID assistance will be used to support programs which use renewable energy forms and, to a greater or lesser degree, help to address the above points.

The benefits of rural energy availability at affordable prices include such things as increased agricultural yields through irrigation; reduced food and crop losses through refrigeration; the adoption of more efficient harvesting, hulling and drying techniques; new sources of power and heat for small rural industries; improved lighting for village households and schools; and the prospect of slowing urban migration by providing a higher quality of rural life.

On January 7, 1979, the U.S. and Philippine Governments concluded the renegotiations on the 1949 Military Bases Agreement by signing an amendment to its terms and by making certain, related commitments. One such commitment on the part of the U.S. Executive Branch was to use its "best efforts" to secure, from the U.S. Congress, during the period FY 1980-1984, \$200 million of additional economic assistance under the Security Supporting Assistance (now Economic Support Fund) authority.

ESF assistance may be provided in a broad range of ways, but after consultations with the Congress, AID decided that projectized assistance which addressed development concerns to the maximum extent feasible would be the best approach. This decision was well received by the GOP which established a Management Advisory Committee (representing all GOP ministries and agencies with any interest or relevance to the program) with its own Secretariat to handle projectized ESF assistance. The GOP did make the request, though, that the dollar assistance be segregated from the local cost expenditures of the projects so that there could be an expedited transfer of the dollars.

In an effort to be responsive to this request, AID agreed to a system of annual dollar transfers based upon estimation of the progress of the local cost components, which would be funded with the GOP's own appropriated pesos. This system was approved by the AID Administrator in the first ESF Project (Elementary School Construction, 492-0342) and has continued in subsequent ESF projects. It is the system which is followed in this Project proposal.

D. Project Description

There are three subprojects within this AID-assisted rural energy project, all of which support the biomass production activities described herein. Each depends on the production of wood and the conversion of that wood to energy. In the wood-fired power plant subproject, the wood is converted to electrical energy; in the gasifier subproject, wood is converted to mechanical energy to run irrigation pumps; and in the charcoal subproject, wood is converted to charcoal and then substituted for petroleum-based fuels for a variety of uses. The detailed technical descriptions of these processes, including those associated with wood production, are found in Annexes I, II and III to this Project Paper. This summary Project Paper presents each of the production/conversion systems. It also summarizes the AID participation and budget allocated to each of these three subprojects.

1. Wood-Fired Power Plants: NEA has established 115 rural electric cooperatives (RECs) since its creation in 1969 with the assistance of AID and other external donors. By the end of CY 1981 NEA, through its system of RECs, had made over 1.6 million connections countrywide. It has a program to establish 70 wood-fired plants by 1987, along with the tree farms (30 are underway) and related production facilities necessary to fuel them. As part of this program, this AID supported subproject will assist NEA in constructing and developing three sites in the Visayas. ^{1/} Each site will include a 5 MW, wood-fired power plant and a tree farm to support the plant. To accomplish this, NEA has arranged for three RECs to lease between 1,800 and 2,000 hectares of currently denuded land from the Bureau of Forestry Development (BFD) for 25 years with automatic renewal for another 25 years.

The three cooperatives have already organized some Tree Farmers Associations (TFAs) of indigenous farm families located on part of this land and the TFA members have elected their officers. The associations are legally incorporated as distinct entities, but at the same time are an integral part of the REC. The RECs, assisted by NEA's central office staff, are in the process of providing these families with information and assistance concerning the program concept, technical requirements, legal assistance, and a broad range of extension services needed to develop tree farms.

Each TFA consists of approximately 10 families which manage a 100-hectare module of land. Planting on several modules has started on a four-year planting and harvesting cycle by the members of the responsible TFAs. The TFAs see to the planting, maintenance, cultivation and harvesting of the unit's wood production. Production loans, from the GOP-financed portion of the project, are made to the TFAs by NEA through the REC. These loans are passed to the TFA members in the form of farm

^{1/} See MADECOR report on the three sites - Bohol, Negros Occidental and Iloilo, Annex I, Appendix L.

inputs and as payment for labor. In the fourth year, the association will begin harvesting and selling its wood to the cooperative and begin repayment of the production loans. During the same four-year period that the tree farm is being developed, the REC will borrow from NEA to contract for the construction of the power plant and for the required power generation equipment.

AID will finance all foreign exchange costs of the three 5 MW power plants and the services of an (A&E) firm to develop plant specifications and assist in procurement. Under a separate AID-supported technical assistance (TA) project, technical services and training associated with tree production, farm management and other wood production processes will be provided. ^{1/} Total AID-funded costs of the three power plants and the required A&E services associated with them is estimated at \$9.0 million. The GOP is financing the cost of wood production units, transportation systems, the plant and other required civil works, at an estimated cost of \$12.7 million.

Approximately 600 farm families will benefit from employment and income increases from tree farming under this subproject, and an additional 250 people will receive employment in the 3 new power plants. Moreover, 73,000 current customers, both households and businesses, of the three electric cooperatives involved in this subproject will directly benefit from relatively reduced electricity costs.

2. Gasifiers for Irrigation: To promote the organization and support of irrigation organizations, the FSDC forms Integrated Service Associations (ISAs), each composed of about 60 farm families. FSDC provides these associations with assistance in organizing, registering, training in financial and technical matters, construction, credit, farm systems technology, and follow-on extension services. At the end of 1981, there were approximately 1,800 farmer-owned ISAs nationwide representing 94,000 farm families and covering 140,000 hectares.

FSDC has a program to convert 495 of the wholly diesel-driven pump systems to systems incorporating wood-fed gasifiers to promote energy savings. A complete description of the technical process is contained in Annex II. The ISAs involved in this conversion program represent about 26,000 farm families and cover an area of 46,000 hectares, requiring approximately 1,150 gasifier units (2-3 units for each pumping system). Each ISA in the subproject will identify an available six hectare area of land, either held by BFD, the community or private individuals, which is suitable for tree production and can be leased. In addition, the ISA will recruit three new members who will comprise a Fuel Production Unit (FPU) responsible for developing and maintaining the woodlot and producing woodchips for the gasifiers. Provisions of AID assistance will facilitate financing the gasifiers and woodlot

^{1/} Under this separate project, coordinated TA will be provided to assist with all three rural energy subprojects.

development at the 495 sites, for a cost of \$3.38 million. This is estimated to represent 49% of project costs. FSDC's capital funds will be used to finance project management, overhead, shipping, installation, engineering and contingencies estimated to cost \$3.75 million. ISAs, with assistance from FSDC, will be responsible for securing and leasing necessary land for the tree farms.

The direct beneficiaries of this subproject will be the 26,000 farm families who belong to the ISAs currently using diesel to operate their pump systems, plus the approximately 1500 new families who will receive employment through establishing and maintaining the woodlots and woodchip production.

3. Charcoal Production: The FSDC is also responsible for implementing a major GOP program to substitute charcoal for household, industry, and agricultural consumption of petroleum-based fuels. FSDC is in the process of establishing up to 76,000 hectares of tree farms with charcoal production facilities by 1987. Over 1,300 hectares were planted in 1981. A key private sector element of this program is the formation of Charcoal Producers Associations (CPAs). Working through its provincial and Area Offices, FSDC is helping to organize upland farmers, landless laborers, and other indigenous unemployed into groups to obtain independent legal status as incorporated CPAs. During the initial phase, FSDC provides training and other assistance focused on administration, management, technical requirements for tree farms and marketing. Charcoal production training takes place in a second phase during the second and third years.

As legal entities, the CPAs are non-stock organizations. Any benefits/profits which they generate are shared equally among members. FSDC will assist each CPA lease land from the BFD on a 25-year, automatically renewable-term lease. Each CPA, composed of approximately 15 families, will lease and manage tree farms in units of up to 100 hectares with up to five charcoal kilns. In cases where demand warrants, the unit size will be reduced. The production system for the woodlots is similar to that described in the section on wood-fired power plants.

A supervised credit program administered by FSDC will cover the costs of developing the wood production unit and the construction of kilns. In year 4, when charcoal production and sales start, the CPAs will begin their loan repayment from charcoal sales. The marketing of the charcoal will be done by the CPAs. This subproject will have three distinct markets for charcoal:

a. Industrial Uses: CPAs will market primarily to nearby industrial enterprises such as foundries, cement and ceramic plants which are substituting charcoal for imported fossil fuels; and tobacco curing, grain drying and other heat processing operations. There could be as many as 20 CPAs (about 2,000 ha.) in the same area to supply a single industrial enterprise. These CPAs will enter into long-term supply contracts with the concerned enterprises, thereby having a relatively

assured market for their charcoal. About 130 of the estimated 200 CPAs to be funded under this subproject are expected to be involved in the production of charcoal for industrial uses. Twelve major enterprises have been identified which are already designed for charcoal use or are in the process of converting to charcoal (See Annex III). Annual charcoal requirements of these initial enterprises are estimated at approximately 550,000 MT. The demand for charcoal by these enterprises exceeds current supply in the area. Given the supply situation and the fact that supply contracts will be used, this is considered a relatively low risk market. Prior to any funding in these areas, detailed feasibility studies will be made by FSDC to look into the technical aspects and financial viability of the potential users, and market considerations.

b. Major Urban Center Uses: Approximately 50 CPAs will be located near major population centers and will have as their primary market households and medium and small scale enterprises located in these urban market centers. CPAs may market alone or group themselves together depending on projected demand. CPAs may enter into supply contracts, but their major market will rely on broader demand situations fostered by the large and increasing populations. This urban market is considered more risky than the industrial charcoal market, but well within acceptable limits. Before proceeding with subproject funding for a particular CPA or groups of CPAs, FSDC will perform feasibility studies including demand and existing marketing structures for charcoal.

c. Rural Uses: An estimated 20 pilot CPAs will be in locations where markets are less well defined and effective demand for charcoal not developed or assured. These CPAs are expected to service small urban centers, rural and agricultural users, and households and will generally be smaller -- 20 to 100 ha. per CPA. The FSDC plans to expand this CPA network throughout the country as demand is confirmed. The smaller rural user pilot areas will provide valuable experience to determine market demand under varying conditions. While more risky than the industrial and urban center oriented CPAs, the pilot activities are considered essential for possible future program expansion.

Provision of AID assistance will facilitate financing the costs associated with tree farm development and construction of the kilns on a level equivalent to 212 modules of 100 hectares each. This is estimated at 75% of the total cost or \$12.37 million. FSDC's capital funds will finance organizational and project management overhead costs plus contingencies which represent the remaining 25% or \$4.18 million.

An estimated 3,000 farm families will be organized into CPAs and will directly benefit from the employment and sales generated under this subproject.

E. Additional Technical Assistance

Under a separately funded ESF project (Project Design Fund), AID is providing assistance to NFA and FSDC to further develop their technical

capabilities to implement their rural energy/reforestation activities. This technical assistance includes three distinct efforts:

1. Applied research to develop and modify tree farm models which are appropriate to site specific variables (including: species selection and seed/seedling development; yield response; pest and diseases advisory services; transport system review; fuelwood production cost analyses; cogeneration possibilities; and potential uses of wood biomass derived energy); assisting in the expansion and further development of the technical unit responsible for the program--the Dendro Thermal Development Office; provide central office and field staff training; improve conversion technologies, as appropriate; developing a library and information dissemination program; and limited commodities, e.g., vehicles, tools and training aids.

2. Pest and disease advisory services of consultants to review and improve support, as needed, in this important area, and to act as an action team for problems that arise in either agency's programs.

3. Technical assistance from one or more Brazilian groups to further design and assist in implementing kiln construction and operation courses, and to critique current training efforts and recommend any necessary changes.

This technical assistance, to start by August 1982, will be carried out by Filipino, Brazilian and American professionals. While the project is designed to support each agency's broader program, the consultants will be readily available to focus their efforts on the three subprojects funded under this project.

III. PROJECT ANALYSIS

A. Technical Analysis

The technical analysis is divided into four parts: (1) the fuelwood production system which supports each of the energy subprojects; (2) the wood-fired power plants; (3) the gasifier-driven irrigation pumps; and (4) the conversion process for charcoal production.

1. Wood Production Systems: Because the agro-forestry approach in the GOP Rural Energy Program is basically the same in the case of each of the separate subprojects, with differences in scale which do not affect basic feasibility, this section describes only the wood production process for the wood-fired power plants. Site-specific technical requirements for each of the three locations where power plants will be located are described in Annex I, Appendix L. Social/organizational aspects are described in subsequent sections of this Project Paper and points specific to particular subprojects are in each annex.

- a. Planting: After the TFAs are organized, land clearing,

land preparation, and planting begins in rows. The land preparation and grubbing reduce competition from other vegetation during the first stages of tree growth and help to establish healthy root systems.

Seeds are pre-treated by soaking, inoculated with rhizobium, and planted at the start of a wet season. Direct seeding on existing sites has given the best technical results at the lowest cost so is the preferred method of planting. The first tree farms are planted primarily to ipil-ipil (*Leucaena leucocephala*) as a major species because (a) experience with it is widespread in the Philippines, (b) seed supplies are assured, (c) potential yields are high, (d) *Leucaena* is easily established by direct seeding, and (e) leafmeal can provide additional farm income. Other species are also being planted and tested for suitability. Where specific sites require fertilizer or lime, they are being incorporated into land preparation and seeding operations.

b. Maintenance: Maintenance after planting is critical, particularly when the direct seeding method is used. This consists basically of regular ringweeding and cultivation of 50-100 centimeters surrounding the new seedling. Normally, three to four ringweedings are required during the first year. As the tree grows larger, weeds are shaded out. Initial planting densities of 10,000 trees per hectare should assure that competing vegetation is shaded out. The other major maintenance task is construction of firebreaks and organizing regular fire patrols.

c. Harvesting: Harvesting will be managed on a four-year rotation cycle with one hectare producing approximately 25 MT/ha/yr growth or a yield of 100 MT of wood per harvest.^{1/} At harvest time, the trees will average between 16-20 centimeters in diameter and weigh approximately 20 kilograms. This size makes it feasible to use (a) hand tools (bolos, bow-saws) and chainsaws for felling/topping operations, (b) hand stacking onto sleds and (c) skidding by animal power from field to satellite log-decks where the wood is weighed and credited to the farmers' accounts. The appropriate materials handling systems to move wood from the log-deck to the power plant are site specific. Simple bullock carts may be sufficient. Alternatively, trucks or trailers pulled by farm tractors or a cable-based system or a combination may be required. All of these systems are currently used in the Philippines. All of these technologies are technically feasible. Systems selection will be largely one of economics given specific site characteristics.

d. Differences Between Subprojects: The standard tree farm area required to produce the wood needed for a 5 MW power plant is 1,800-2,000 hectares. A wood transport system to support a 5 MW power

^{1/} The growth figure of 25 MT/ha/yr is considered by many in the discipline to be a rather safe production estimate. Much higher levels have been achieved in the Philippines and other countries. Some examples of other production levels are in Annex I, Appendix E.

plant needs to move an average of 100 metric tons (MT) of wood per day. Some wood may have to be transported as far as five to seven kilometers, the distance between the outlying farm and the centrally located power plant. This will, however, depend on the configuration and layout of specific sites.

For the gasified irrigation pump subproject, wood production techniques will generally be the same as those described above except: (1) woodlots will average only six hectares and will be planted adjacent to irrigated rice fields on the undulating, non-irrigable lands; and (2) because of proximity, transportation of wood to gasifiers will be quite simple but will still require substantial labor. Trees will be cut and skidded out from a field directly to the gasifier unit, generally only a few hundred meters. During pre and post-season activities, when the pumps do not operate, the FPU members will maintain the woodlot and prepare a stockpile of woodchips for the coming cropping season.

The system to produce wood for the charcoal program differs in scale and harvesting cycle from that used for power plants. Tree farms for charcoal production will range up to 1,000 hectares or more and will be harvested on a three-year cycle. Wood will be converted into charcoal in "beehive" or other kilns situated on the tree farms. Each beehive kiln can handle approximately 41 cubic meters of feedstock every 12 days or about 820 cubic meters/year, a volume roughly equivalent to the amount of wood produced on 20 hectares of sustained yield operations. Therefore, tree farms can range in size from 20 hectares required to supply one beehive kiln up to as many as 1,000 hectares to feed 50 kilns. Since kilns are located throughout the tree farm, transportation problems of wood are minimized. The lighter charcoal will be much easier to transport than green wood. Based on analyses undertaken during the design and preparation of this paper, and drawing on existing field level experience in the Philippines, the tree farming systems for all of the subprojects are technically feasible.

2. Conversion Technologies

a. Wood-Fired Power Plants: The well established technology of wood-fired power plants is widely used in many developed and developing countries. The plant operation follows the basic steam cycle. Fuelwood is cut into 12 to 18-inch lengths and burned in a boiler to produce steam. The slightly superheated steam is allowed to expand through a turbine which is coupled to the generator to produce electrical energy. The steam is then condensed in a shell and tube-type heat exchanger. Cooling water is passed through one side of the heat exchanger to provide a low temperature reservoir. The spent steam is pumped back to the boiler and reused.

Ancillary equipment required for plant operation includes conveyors for fuel loading and ash removal, pumps, and controls to maintain combustion temperatures, steam pressure, temperature, and power output.

The discharges from the plant are air emissions resulting from the combustion process, ash, and cooling water. Air emissions, which are principally ash particles, are controlled with multicyclone separators. The ash can be returned to the land. Cooling water is discharged back into the supply stream at a temperature five to ten degrees warmer than when it entered the plant. This temperature increase is considered low enough to preclude environmental damage.

Given the years of success in using this technology, the power plant technology is feasible.

b. Gasifiers for Irrigation: Gasification involves the thermal conversion of biomass to combustible gases ("producer gas") which can be ignited and converted to mechanical and/or electric power. Gasifiers became popular during World War II when, because of fuel shortages, they were used in many countries to power automobiles and other small engines. Since 1979, FSIC-sponsored ISAs have introduced and successfully operated 25 gasifier units for irrigation use at 12 different sites.

Producer gas consists mostly of carbon monoxide and hydrogen, and two incombustible components: carbon dioxide and nitrogen. It is applicable for use in both diesel and gasoline engines.

In a typical producer gas installation for irrigation, woodchips are fed directly into the downdraft gasifier where they are slowly burned with a limited air supply, creating producer gas. The gas then passes through a series of cleaning and cooling devices to remove solid particles, cool and condense the gas, and collect impurities. Diesel is added at this point and the diesel/gas mix enters the engine and ignites, driving the engine.

The gasifiers produce a low-Btu gas which may be burned directly in a boiler or cleaned and burned in a diesel engine combined with a small amount of diesel fuel. Gasifier systems are available in a variety of sizes; size is normally dictated by available engines rather than by gasifier capacity. Operating a manual feed gasifier is simple because the gasifier itself has few or no moving parts and operates at near ambient pressure.

The gasifier, when applied to diesel engines, offers several advantages: minimal engine modification, displacement of up to 80% of diesel fuel, higher thermal efficiency than on pure diesel, and a cooler and cleaner engine exhaust. The gasifier has proven feasible for irrigation pump application.

c. Charcoal Production: For charcoal production, the wood is harvested, stacked in piles along the roadways/trailways and air dried for approximately 80 days to reduce the moisture content. It is then transported by bullock or tractor to a marshalling yard adjacent to the kilns and cut in lengths of about 1.3 meters. After charging the

kiln with wood, it is ignited and monitored by the kiln operator as carbonization proceeds. When near-colorless smoke appears at the top of the stacks, air inlet ports are closed, terminating carbonization. After closing all openings, the kiln is carefully brushed with clay slurry to prevent air from entering and rekindling the fire.

Unloading charcoal from a coal kiln is done manually. All uncharred pieces and ash are separated from the well carbonized, solid chunks. Incompletely carbonized pieces are reloaded in the next batch. Discharged charcoal is cured by stacking in loose piles for at least two days before being transported to permit thorough aeration and to prevent spontaneous combustion.

In this subproject, the Brazilian "beehive" brick kiln will be used. It is dome-shaped, simple to construct, rugged, and easily operated and maintained. Kilns will be built in groups throughout the tree farms.

This technology has proven very successful in Brazil, Malaysia, India, and Argentina and should prove the same in the Philippines.

B. Economic Analysis

1. Economic Analysis Objectives and Methodology: The objectives of this project include import substitution and foreign exchange savings through the use of biomass-based fuels to substitute for liquid petroleum fuels in various end-uses, such as electricity generation and agricultural pumping. While other important results include employment generation and the environmental benefits associated with the reforestation of denuded marginal lands, the key economic question is whether the biomass-based fuels and associated end-use energy can compete with fuels and end-use energy based on internationally priced oil supplies.

The activities in this project produce both "raw" or unimproved energy in the form of wood, and improved or converted forms of energy in the form of electricity, producer gas, and charcoal. Consequently, the technology-specific economic analyses included in the annexes draw comparisons at various stages in the fuel cycle which start with the exploration or identification of the resource and continue to the fuel's ultimate use, such as heating or running diesel pumps. While the fuel cycle for conventional fossil fuels has stages such as exploration not explicitly found in that of wood-based fuels, renewable sources such as forests or marginal lands to be reforested must be identified and in some cases assessed for their potential. Both fossil fuels and wood, and other traditional fuels, share such steps in the cycle as mining or harvesting, refining or conversion, storage, transportation, marketing, and end-use. In the case of woodfuels which are renewable, there is also a stage not found in fossil fuel cycles, namely managed or unmanaged regeneration.

Given the complex nature of energy as an intermediate good, and the multiple uses of the different feedstocks under consideration, two different but complementary approaches to economic analysis were used. In the first approach, Analysis I, emphasis is given to the economics of fuel substitution, detailing the costs involved at each stage of the fuel cycle, for each subproject. The approach delineates the key cost factors in each alternative and allows for an analysis of impacts caused by changes at any stage of the fuel cycle.

The second approach, Analysis II, is the more standard calculation of the macro-economic implications of the subprojects for the Philippines, including estimations of cost-benefit ratios and internal rates of return (IRR).

In both approaches, imported petroleum substitution is assumed to be the emphasis of the subprojects, although both analyses, from their own particular perspectives, briefly identify labor, rural income, social and environmental benefits accrued.

2. Analysis I

a. Methodology: Because the project involves all stages of the fuel cycle of a wood-based energy system, the first series of economic analyses presented in the respective annexes^{1/} examine in a disaggregated fashion the economic costs of various stages of the fuel cycle. The economic viability of the components is based on the comparative economic costs of the effective energy end-use. Since these activities--electricity generation and pumping irrigation water, for instance--are ongoing in the Philippines, the private and/or societal benefits apparently warrant current costs based on imported petroleum systems. Therefore, each subproject is deemed economically viable if the same end-use is met at an equal or lower economic cost as a result of the project.

Economic cost estimates rely on international prices where applicable, for example for capital goods, crude and petroleum products all purchased on the international market. "Shadow price" analysis is used to capture the real economic value of other inputs (and outputs), such as capital, unskilled labor and foreign exchange.

In the analysis of fuelwood production, no opportunity value for the land is included. In most cases, this would be incorrect, but, because the NEA and FSIC activities are being undertaken on government lands which are currently denuded, there is little or no opportunity value. Such value as can be attributed to the land as a result of existing swidden and slash-and-burn agriculture will be replaced by intercropping agriculture with the tree farm.

b. Summary Economic Inferences: The energy development activities of this project are considered economically viable based on the

^{1/} Annexes I, II and III.

efficiency-related objectives of substituting less costly domestically produced, wood-based energy for more costly imported fuels. It is estimated that "raw" energy fuelwood can be grown and harvested at an economic cost of about \$0.74 MBTU,^{1/} compared with the cost of \$5.60 MBTU for crude oil.^{2/} However, before this raw energy can be turned into effective output, the related costs of transport, conversion and end-use modification are usually much higher for wood-based fuel than they are for petroleum fuels. Nevertheless, the total economic costs argue strongly for the project. The analysis indicates, for example, that electricity based on wood-fired generation has an economic cost of \$0.059 kWh as opposed to \$0.119 kWh based on diesel generation. (In the Visayas, where the wood-fired power plant subproject will be implemented, the alternatives of coal-fired and large oil-fired plants are not viable, and geothermal in the medium term is limited.) For some subproject activities, such as gasifiers, and in some project areas for charcoal production, it will not be necessary to construct roads, and the raw energy economic cost will be even less.

End-uses that require converted or refined fuel are also economically attractive. For example, charcoal can be produced at an economic cost of about \$2.44/MBTU.

While there frequently will be some transport costs for industrial users removed from the charcoal production sites, delivered costs of \$3.00/MBTU or less will be common. This compares with an economic value of \$5.60/MBTU for heavy fuel oil and \$8.50/MBTU for diesel oil or \$8.80/MBTU for kerosene. Thus the wood-based system can afford to bear still further end-use conversion losses because of relative efficiency costs.

In many cases these end-use conversion losses and capital costs are considerable. For example, the effective losses in gasification are some 39% resulting in an effective cost of \$1.52/MBTU for producer gas based on chipped (and delivered) wood valued at \$1.09/MBTU, but still much cheaper than the \$8.50/MBTU diesel. For applications such as pumping, capital costs are significant because pumps do not run all the time and the effective output based on a producer gas/diesel mixture must bear this capital cost.

The economic analysis nonetheless indicates that various end-use alternatives are economically attractive when full fuel cycle costs are included. In most cases, there are significant savings; for example, operating irrigation pumps partially using woodchips is approximately 40% cheaper than a totally diesel-fueled system.

In the Philippines, some households are shifting back to

^{1/} MBTU - Million British Thermal Units.
^{2/} Based on \$34/barrel crude, FOB Persian Gulf.

charcoal for at least part of their cooking requirements.^{1/} Based on only 30% substitution, the shift produces an effective annual cooking fuel cost of \$141.00, including economic capitalization of new charcoal stoves, compared to the \$194.00 that a household would have to spend annually if it uses kerosene to meet all of its energy requirements. The relative net benefits of charcoal use in industry are somewhat less since it will substitute for lower cost fuel such as bunker oil and retrofitting capital costs to convert to charcoal must be incurred. Therefore, as analyzed in the annex, charcoal is economically feasible when a shadow price is used for the foreign exchange savings and the lower discount rate of 15% is used to represent the opportunity cost of capital.

Although only direct economic benefits resulting from fuel substitution were analyzed, there are in addition employment/income generation benefits and the effects of income transfer to rural areas which could be quantified. More specifically, the production scheme, in addition to providing substantial wage payment for labor, will yield a considerable farmer's margin (given a crop growth of 25 MT/ha/yr), and thus help raise many rural families above the poverty line. Moreover, sizeable resource flows generated by project activities will remain in rural rather than urban areas and in the Philippines rather than going abroad to pay for fuel imports. Expected environmental and watershed management benefits, while considerable, are less amenable to quantification.

3. Analysis II

A standard economic analysis was conducted on each subproject to derive the internal rates of return (IRR's) and benefit/cost (B/C) ratios to the economy as a whole, the results of which are presented in the Table 3. In each case the economic costs of the subproject, estimated 25 years into the future, are compared with the economic value of the imported diesel or bunker fuel its energy outputs are expected to replace. Shadow prices have been used to more closely approximate the true value to the Philippines of unskilled labor and foreign exchange. Unskilled labor is included at half of its nominal cost in recognition of the high level of seasonal and other underemployment in rural areas and the subsequently low opportunity cost of such labor. Foreign exchange costs and benefits have been revalued upward by 25% to reflect the overvaluation of the peso at the current exchange rate.

The economic B/C ratios derived in this basic economic analysis are all quite high, even at a relatively high 20% rate of discount: 1.6 for the wood-fired power plant and its associated tree farm, 4.1 for

^{1/} In 1981, for example, LPG sales decreased by 7% while charcoal sales increased. Charcoal sales continue to rise in 1982.

the woodlot and gasifier for irrigation pump engines, and 7.0 for the charcoal producing tree farms. The economic IRRs are also high: 29% for the wood-fired power plant and 119% for charcoal production. The IRR for the gasifier cannot be calculated from the annual figures in the basic economic analysis, since there is no year in which costs exceed benefits. (The gasifier IRR could be calculated from a quarterly breakdown of the data. It would be higher than the 415% derived in the sensitivity analysis with no shadow prices, discussed below.)

Two sensitivity analyses were conducted to test the effects on these feasibility indicators of (1) possible errors in the cost estimates and projected benefit values (imported oil prices) and (2) the use of shadow prices.

In the first instance, the projected savings in imported fuel bills were reduced by 25% (which would approximate a reduction in the average world market price of crude oil from \$34 a barrel to \$25.50), and all estimated costs were increased by 20%. While the IRR and B/C ratios dropped for all three subprojects, they remained high and well within the "feasible" range. The IRRs were 20% for the power plant, 165% for the gasifier using quarterly data and 87% for charcoal production, while the B/C ratios became 1.0, 2.6 and 4.4, respectively, at the 20% discount rate. (At the more conservative 15% rate of discount the B/C ratios become 1.3, 3.0 and 5.2, respectively.)

In the second sensitivity analysis the use of shadow prices for unskilled labor and foreign exchange was dropped and the calculations were done on nominal cost and benefit estimates. While the effects on the standard indicators are noticeable, they all still remain well within the range of economic feasibility. With no shadow prices the B/C ratios become 1.3 for the wood-fired power plant, 2.9 for the gasifier and 3.7 for charcoal production, even at the higher 20% discount rate. The IRRs are 25%, 415% and 82%, respectively.

The analysis indicates that each of these subprojects will provide substantial economic benefits, in the form of foreign exchange cost savings, to the society at large in comparison with their identifiable costs, assuming the energy produced replaces imported diesel or bunker fuel that would otherwise be consumed. On the cost side the fact that the expenditures for energy will accrue to domestic factors of production, particularly to labor, thus providing more domestic employment and income, rather than to foreign producers of oil, also benefits the Philippine economy inasmuch as those factors are currently underutilized. The benefits of this cost transfer have been partially captured in this analysis by shadow pricing the cost of unskilled labor at only half its nominal market value, in recognition of the present lack of alternative rural employment, but the beneficial multiplier effects of the additional rural income on the local economy have not been captured.

Summarized below are annual savings derived from the subprojects on a macro economic level:

	<u>BOE</u>	<u>Foreign Exchange Savings</u> (<u>\$</u>)
Wood Fired Power Plant	109,730	3,730,820
Gasifiers for Irrigation	47,128	1,602,352
Charcoal Production	-	<u>17</u>
Total	<u>156,858</u>	<u>5,333,172</u>

Table 3

Summary of Internal Rates of Return (IRR) and Benefit/Cost Ratios
Rural Energy Development Project

	<u>Tree Farms and Wood-Fired Power Plant</u>	<u>Woodlot and Gasifier</u>	<u>Tree Farm and Charcoal Production</u>
<u>Internal Rates of Return (IRR):</u>			
1. Basic Economic Analysis	29.30	<u>2/</u>	119.30
2. Sensitivity Analysis			
A. -25% Benefits and +20% Costs	19.80	165.02	87.00
B. No Shadow Pricing	25.30	415.00	82.30
<u>Benefit/Cost Ratios:</u>			
1. Basic Economic Analysis			
A. At 20% Discount	1.58	4.07	6.99
B. At 15% Discount	2.13	4.72	8.29
2. Sensitivity Analysis			
A. -25% Benefits and +20% Cost			
1) At 20% Discount	0.99	2.55	4.37
2) At 15% Discount	1.33	2.95	5.18
B. No Shadow Pricing			
1) At 20% Discount	1.31	2.85	3.70
2) At 15% Discount	1.74	3.22	4.29

1/ It is not possible to calculate the imported oil savings from the charcoal subproject at this time. However, if only 15 to 20% of the approximately 150,000 MT of charcoal produced annually is used to replace imported oil, the savings would be substantial.

2/ Cannot be calculated from annual figures.

C. Financial Analysis

This section summarizes the financial costs and returns of establishing and operating the energy farms for each of the three subprojects as well as those related to each of the conversion processes. (Detailed cash flow analyses and tables are included in the respective annexes.) In each case, the analyses employ conservative assumptions. Total project costs are shown in Table 7.

Tree farms for the NEA wood-fired power plants and FSDC charcoal production subprojects are developed on 100 hectare modules operated by TFAs and CPAs. The wood is sold to electric cooperative power plants or processed in kilns. The fuelwood and charcoal are marketed at farm gate or contract prices. In the case of the FSDC gasifier subproject, a small woodlot of only six hectares will be necessary to meet the fuel requirements of each ISA's gasifier. In each of these cases, the average annual tree growth is estimated at 25 MT of wood/hectare/year.

The subsections below discuss the costs of developing, operating and maintaining each of the fuelwood centers, and the incomes earned by the farmers.

1. Wood-Fired Power Plant

a. Tree Farm: The estimated cost of developing a 100-hectare module, as prepared by NEA, is \$56,511 (P452,088). This includes costs for labor, planting, fertilizer, pesticides, tools, equipment, and contingencies, and works out to an average of \$565/hectare. Based on sales to NEA of all wood harvested at 100 MT/ha. at a guaranteed price of \$8.12/ton (P65), the TFA will generate sufficient cash to cover annual amortization payments during years 5-12 by 1.7 times. This will allow the tree farm development loan to be properly retired and leave sufficient funds to be distributed to the farmers.

The financial tables in Annex I show that during the first twelve years of the tree farm (based on an estimated growth of 25 MT/ha/yr) the farmers would receive in cash a minimum of \$480 (P3,840) annually, up to a maximum of \$911 (P7,290). These annual income estimates are projected to rise during years 13-25 to a minimum of \$1,187 (P9,500) and a maximum of \$1,780 (P14,250). Since the farmers selected to work the tree farms are currently a major component of the large group of unemployed/underemployed in the Philippines, these estimated levels of income will provide adequate incentive.

b. Power Plant: In addition to the employment/income benefits of this subproject the power plants will be able to produce power at a cost significantly cheaper than NEA currently pays for purchases from the power grid. Based on a fuelwood moisture content of 34%, the annual operating expense in Year 1 is expected to reach \$1,063,375 (P8,507,000/8) or an average of \$0.0475 (P0.38)/kwh; while the operating expense for a 40% moisture content is \$1,086,375 (P8,691,000/8)

or an average of \$0.04875 (₱0.39)/kwh. These costs compare favorably with the average 1980 rates of \$0.10 (₱0.80) and \$0.12 (₱0.96) charged by electric cooperatives located in Central and Eastern Visayas. More significantly, the wood-fired power plant will be (a) an effective substitute for more expensive oil-based power, and (b) enable the RECs to produce and distribute energy at a rate lower than existing oil-based power plants are charging.

2. Gasifiers for Irrigation: The estimated cost of developing a 6-hectare woodlot, as prepared by FSDC, is \$6,551 (₱52,413) including \$2,569 (₱20,550) for program management. In order to compare costs with the wood-fired power plant and charcoal tree farms, the \$2,569 would have to be deducted from the \$6,551, leaving a cost of \$3,982 for 6 hectares or \$663 per hectare. Whereas this is approximately 17% higher than the per hectare cost for the 100 hectare module tree farms, this is a much smaller operation and accordingly, will be less efficient. Thus, we do not consider this differential unreasonable.

The gasifier woodlot differs from the two tree farm operations in that the woodlots will be owned/leased by the ISA and the end product, woodchips, will not be sold. The farmers who develop, maintain and harvest the woodlots will be paid directly by the ISA. They will each earn \$150 (₱1,200) during the first three start-up years and \$587 (₱4,698) annually thereafter.

The financial viability of this project for the ISA is demonstrated by the projected cost savings when using the gasifier to produce 70% of the energy required to operate the irrigation pumps. The average savings to the ISA over a 25 year period are in excess of \$2,737 (₱21,900) annually. This calculation is net after deducting (1) total amortization costs for both the gasifier and developing the woodlot, and (2) labor costs for harvesting the wood and preparing woodchips. This subproject will remain financially viable for the ISA as long as the gasifiers are able to provide 52% of the energy required by the irrigation pumps.

3. Charcoal Production: The estimated cost of developing a 100 hectare tree farm, as prepared by FSDC, is \$82,000. However, this amount includes \$24,225 for costs of roads, kilns and project management, which were absorbed by NEA in the wood-fired power plant project. Thus, to compare FSDC's estimates with those of NEA, the \$24,225 must be excluded leaving a cost of \$57,775, or approximately 27% higher than NEA's. Since this differential will not affect the viability of either activity, we are not modifying either calculation.

During the start-up period of three years (smaller trees are harvested for charcoal vs. power plant requirements), the farmers would receive a minimum of \$500 (₱4,000) and a maximum of \$1,000 (₱8,000). These projections increase to a minimum of \$3,875 (₱31,000) and a maximum of \$7,750 (₱62,000) between years 4 and 25. These levels will provide an adequate incentive to the farmers, as in the section above.

Charcoal sales are projected at ₱1,000/ton, compared to the current market price around the country ranging from ₱1,400 to ₱1,800. On this basis net cash generations are more than 4 times annual amortization payments. Even at a sales price of ₱500/ton, one third of today's prices, adequate cash would be generated to retire the loan on schedule and still provide the farmers net cash distributions 30% larger than they would receive during the start-up years.

The CPA will produce and sell the final product, the charcoal. The CPA will cover its operating costs and amortization payments and distribute the net cash inflows to the members. Because this activity projects very high net cash returns to the individual members, the project may ultimately include additional members.

D. Social Soundness Analysis

Success in all three subprojects is dependent upon an efficient, timely, and adequate supply of fuelwood. A critical feasibility issue in the project thus concerns the viability of the associations organized to establish, operate, and maintain the tree farms. In the Fall in 1981 an AID/Washington Team^{1/} spent several days in the field examining this feasibility issue. The team concluded that:

"The social mechanism being employed to recruit and retain participants in the program is attuned to cultural sensitivities which have been identified as crucial to success in the rural areas of the Philippines. An authority with credibility is supervising the program, the program is perceived by the participants as fair, immediate rewards are being realized by the participants which tends to reinforce their faith that the longer-term rewards will not be denied them, the associations required for participation in the program are not artificial, and the organizational structure and detail is not overwhelming."

In reaching this conclusion, several specific questions were addressed. These can be summarized as follows:

1. In the proposed organizational format of farmers associations viable from both a theoretical standpoint and in terms of the local socio-cultural context of rural Philippines? The team concluded that several key features of the organizational arrangements proposed in the project are conducive to long-term group viability. These include:

a. Membership within farmers associations is voluntary; those who do not wish to join are not required to vacate their land and may continue to farm.

^{1/} The AID/W team composed of Bruce Gair, Ann Wahlgren, Paul Weatherly, Kathleen McNamara, Gerald Hickey, Joseph Benabouhal and James Brewbaker, collectively traveled to seven sites in Luzon and the Visayas.

b. Farmer associations are small and are comprised primarily of kin, neighbors and friends.

c. Organizational structure is simple and voting rights of members are guaranteed.

d. The organizational format is compatible with existing village organization.

e. Membership in farmers associations does not prevent farmers or their families from pursuing other economic activities.

2. Would the lease arrangements provide members with tenure security? The team found that many farmers see the program as a means to establish legal claim to the land. Moreover, the lease arrangements (described in Annex I and III) offer far greater tenure security than any other arrangement to which the farmers have been exposed.

3. Did the participating farmers understand the loan terms and repayment requirements? Although the team found that some farmers did not completely understand the loan repayment requirements, farmer perceptions of immediate gain in terms of access to land and steady income are so strong that current lack of understanding should not affect long-term group viability or project success. In any case, any misunderstanding can be corrected by an improved information campaign. An important point is that by the time loan repayments begin, farmer incomes after amortizations will still be two to three times higher than those earned during the period of tree farm establishment (i.e., up to the time of first harvest).

4. Do rural Filipinos have sufficient trust in the lead agencies to join farmers associations and enter into loan and tenure agreements? The team concluded that both NEA and FSDC have established strong credibility among rural Filipinos over the years, and that people will voluntarily join farmers associations based upon their trust in the promises of these agencies. Moreover, the delegation of authority by these two agencies to regional and provincial organizations has enhanced their credibility in the eyes of the rural farmers.

In addition to the group viability issues, social soundness concerns related to spread effects, socio-economic equity, negative social consequences, the role of women, and general cultural compatibility were also addressed, either by the Gair Team or directly by GOP and AID analysts. The general conclusion is that: (1) the project is expected to have significant positive spread effects, such that the project will be sustainable after AID funding has expired and will be replicable on an equal or smaller scale in many areas of the country; (2) the project has at all times focused primarily upon poor direct beneficiaries and should make positive contributions to the improvement in unemployment, underemployment, low household incomes, and inequities in rural income distribution; (3) negative socio-economic impact is minimal and project

design remains flexible in regard to the few areas where potential problems might arise; (4) the project design has given careful consideration to the present role of woman in society and their participation in this project and women should benefit significantly either as active participants or as indirect beneficiaries through membership in households; and (5) the project is basically compatible with Filipino culture and society and indeed strengthens the desirable trend toward local private organization for self-help productive activities.

E. Environmental Analysis

Summary conclusions of the Environmental Analysis are presented below. More detailed discussions of environmental impacts are located in Annexes I, II and III.

1. Tree Farms and Woodlots

This project supports the nationwide development of tree farms and woodlots for energy. Tree farms and woodlots will be planted with fast-growing rotation tree species. Inasmuch as the sites will be located mostly on denuded lands, the planting will have a beneficial effect on the immediate physical environment. Furthermore, the resulting reforestation should reduce the siltation of waterways. Finally, the techniques involved in developing and maintaining tree farms and harvesting wood will be labor-intensive, involving the participants in both the management (including profit sharing) and the physical development of the sites.

2. Conversion Technologies

a. Wood-Fired Power Plants. A wood-fired power plant in the 5 MW range will have a relatively minor adverse impact on the surrounding environment. Wood is essentially a sulfur-free fuel, while oxides of nitrogen can be controlled in the combustion process. Cooling requirements can be met from nearby rivers in two cases, and with assistance from a cooling pond in the third. Further, unlike other fuels, with a wood-fired plant there is no potential danger for major spillages or leaks which could harm the surrounding environment.

b. Gasifiers. This program involves converting existing fuel pump irrigation systems to gasifiers to reduce the cost of fuel. Chipped wood will substitute for diesel. The degree to which the environment will be affected is a function of the location and size of the project. Given that the largest project will consist of two or three gasifiers, each generating gas for a 65-horsepower engine, the total impact on the environment will be minimal. Negligible excavation or soil displacement will result from installation of the devices. Because of the limited number of units and their small size, no major air quality impacts are expected. Reliance on proper criteria for siting, as well as sound engineering principles, will ensure that the proposed systems do not create public hazards.

c. Charcoal Production. Construction of the kilns will require neither excavation nor major soil displacement that could lead to the development of hazardous conditions. The production of charcoal, however, can generate relatively large quantities of gases which, in sufficiently high concentrations, could be toxic or explosive. Air emissions could also adversely affect surrounding wildlife and vegetation. However, careful siting and sound engineering principles can mitigate potential adverse effects. Also, certain precautionary measures can be taken in charcoal manufacture to prevent inhalation of the relatively high concentrations of poisonous gases which may be present in the kilns.

3. Conclusion: On the basis of the detailed Environmental Assessment, AID has concluded that this project as presented in this paper is environmentally sound.

F. Administrative Feasibility/Description/Arrangements

This section describes the organizations which will implement the three subprojects. These are the Ministry of Human Settlements (MHS), the National Electrification Administration (NEA) and the Farm Systems Development Corporation (FSDC). It also describes how these organizations relate to one another in implementing the three subprojects, and in the case of NEA and FSDC there is a further explanation of how these organizations relate to the Tree Farmers Associations and the Charcoal Producers Associations. Finally, this section identifies and analyzes the major administrative and organizational issues associated with this project.

1. Ministry of Human Settlements (MHS): The project will be under the general oversight of the ESF Management Advisory Committee (MAC) and its Secretariat. The MAC is an inter-ministerial committee created by President Marcos on May 27, 1980, and composed of eight GOP ministers. It provides policy and program guidance to the President in the execution of projects under the ESF program. The Secretariat, organized under the Ministry of Human Settlements, conducts day-to-day coordination of the ESF program and is headed by an Executive Director with a full-time staff in addition to being able to call upon a broad range of consultants. The staff of the secretariat is composed of engineers, economists, development planners, public accountants, systems designers, and project managers. The Secretariat is a funding agency with coordinating and planning responsibilities. As such, it does not directly implement projects. It relies on GOP line agencies and local government units to implement programs financed with ESF proceeds and works with these implementing agencies to design projects. It also monitors implementation progress, establishes procedures and standards, participates in evaluations, and sponsors or performs project audits.

The Secretariat has procured or is in the process of procuring technical services from six local and U.S. firms or institutions to assist them in executing their responsibilities under the ESF program. Of relevance to the rural energy program are: certified public accountants

to perform project audits, architectural and engineering (A&E) firms to assist in monitoring and supervising construction projects, planning, design and management firms to work with municipalities to improve their project design and management skills. In addition, a \$3.0 million ESF and GOP-financed technical assistance project to support rural energy programs over a 2.5 year period has been approved by the MAC and will be in operation by August 1982.

As with other ESF-financed projects, the Rural Energy Development Project Agreement will be signed with the Ministry of Human Settlements. The Ministry in turn will enter into formal memoranda of agreement with NEA and PSDC to implement subproject activities.

2. National Electrification Administration (NEA): NEA is a highly competent and professional organization which has over the past ten years brought electricity to 1,600,000 rural customers. NEA was assisted by AID in the formative years, and more recently by the World Bank and ADB. At the national level, NEA is considered by many a textbook example of a development institution. It has provided leadership, financing, policy guidance and technical assistance to the rural electrification movement in the Philippines in a highly participatory and decentralized way. By relying on a rural cooperative system, it has brought thousands of people into the development process and has created a development base in rural areas of the Philippines that can be built upon and expanded.

NEA has provided leadership to the rural electrification process and is accustomed to managing the complex implementation style that is required when a process relies on the participation of numerous dispersed groups of people. As early as 1972, NEA used a sophisticated line of balance analysis to manage the construction, procurement and organization of the first 36 rural electric cooperative systems. This familiarity with complex management now allows NEA to coordinate a system which connects 1,200 new households per day. This involves simultaneous construction in over 100 locations throughout the nation with the handling of about \$150,000 worth of supplies and equipment daily. NEA logistical apparatus ships required materials to 115 locations on a dozen different islands and still maintains very low overhead costs. This has meant that the RECs have averaged less than \$200 per household connection, a low figure by world standards.

It is the cooperatives which own and operate the local electrical distribution systems. Thus, while NEA provides central guidance, finances construction and performs procurement functions, the management of program implementation is the responsibility of the cooperatives. There are now 115 electric cooperatives serving from 2,000 to 45,000 consumers each. A typical cooperative has about 150 employees, an income of over P1 million per month, and expands its services at the rate of about 5,000 new customers per year.

As noted in the Background Section, the GOP has undertaken an

ambitious energy program. Part of this program has resulted in each REC being assigned the task of developing its own electric power resources, either, wood-fired mini-hydro or both. While new, these programs have made considerable progress. Over 30 tree farms have been established by farmer organizations as of 1981, and 9,173 hectares of trees have been planted. Seventeen power plant units are on order, with the first scheduled to be on-line in Summer 1982. Three mini-hydro power plants are operating and construction is under way on two more. The AID-financed increment to this program will add only modestly to the workload of NEA and therefore poses no administrative problems.

NEA has established a Dendro-Thermal Development Office (DTDO) with a staff of about 60 persons with a variety of engineering, financial, agricultural and administrative skills. During CY 1982, the staff will be increased to approximately 120 in order to meet the manpower demands of the program. Recruitment of the new staff members is under way. This office assists the RECs lease land from the BFD, arranges procurement of equipment, and it establishes general guidelines for tree farm development and power plant operations.

Once the DTDO and a cooperative reach agreement in principle for the establishment of a wood-fired power plant project, the responsibility for project implementation becomes the cooperative's. The cooperative establishes a coordinator's office, staffed with five to six people. This office, along with the cooperative general manager, handles project administration.

The relationship between NEA and the RECs is well defined and established through law and precedent. NEA's relationship to the TFAs will be through the RECs. The TFAs will be legally incorporated organizations and their members will also be members of the cooperatives. The cooperative will hold the lease on the land to be developed while the TFA members will own the produce of the farms and sell it to the cooperatives.

Under the present system, the cooperative receives a loan from NEA for tree farm development. The cooperative formally lends the money to the TFAs. In lending to the cooperatives, NEA adds a 3/4% service fee to the 9% charged it by NBS. The cooperative administers the loan and makes cash and in-kind inputs available to the TFAs as work on the tree farms requires. The TFA members receive, in addition to farm inputs, salary out of the loan during the development period prior to harvesting.

The cooperative coordinator's office coordinates technical assistance and extension for farmers through its staff foresters and/or agriculturists. The coordinator can also request NEA assistance or help from the University of the Philippines at Los Baños (UPLB) School of Forestry, The Forestry Research Institute (FRI) or other resource agencies and consultants as required.

NEA has certified seven local A&E firms which are knowledgeable about rural electrification to deal with engineering concerns. A cooperative will enter into a contract with one of these firms to provide the technical services required in planning and constructing the power plants. Firms will prepare designs and supervise construction. Construction will be done through a combination of force account by cooperatives and by contract.

The administrative arrangements described here derive from experience gained from over 10 years of rural electrification development and operation in the Philippines. NEA's administrative and operational approaches are tested and provide an effective mechanism for project implementation.

3. Farm Systems Development Corporation (FSDC)

a. Gasifiers for Irrigation

As with NEA, FSDC has a proven record as a development institution. Since its creation in 1975, it has organized 1,800 Integrated Service Associations (ISAs), representing 94,000 farm families. FSDC currently has over 1,300 employees at its central, area and provincial offices. The administrative organization and management procedures of the FSDC and the ISAs are described in the Project Paper Small Farmer Systems II (492-0333) available in AID/W. Under this project, FSDC coordinates and implements the gasifier conversion subproject and the charcoal production subproject. Under the gasifier subproject FSDC will provide financial, technical and management advisory services to adapt gasifiers to current diesel pumpsets, and to develop a fuelwood resource. Participating ISAs incorporate three new members to undertake the tree farming and woodchip aspects of the subproject.

Administratively, a typical equipment conversion request is processed as follows: At field level, the ISA submits a proposal to the provincial office in the form of a resolution for converting its diesel equipment. The proposal is then sent to the FSDC area office, where the Technical Services Division and the Farm Support Services Division assess the ISA's financial and technical performance in light of conversion requirements, including the woodlot area. The proposal is then endorsed as a loan application to the central FSDC office, where the engineering department evaluates the technical and financial analyses of the proposal. The proposal is then sent to the Board of Administrators for approval. That obtained, the engineering department orders the equipment from GMOR, a legally incorporated production subsidiary of FSLC, or from other manufacturers as they develop. Upon receipt of the gasifier, the supply management department ships it to the area office.

The installation, supervised by Technical Services Division personnel, is performed by ISA farmer-members. After installation, area office personnel train the gasifier operator and conduct periodic

visits to monitor technical performance. To assist in the early phases of this project, FSDC will use GEMCOR for training and equipment repair; local Bureau of Forest Development (BFD) offices for land access and advisory services for woodlot development; and the Bureau of Soils for soil analysis and land preparation.

At the ISA level the gasifier conversion and wood production is under the supervision of the ISA Board of Directors which manages operational committees. The business management committee, with assistance from the education, production and irrigation management committees, has general supervision of the conversion. The education committee is responsible for arranging and conducting training of ISA members on basic technical and maintenance operations. The irrigation committee organizes a repair and maintenance crew and is responsible for the actual operation of the gasifier unit. The fuel production committee is responsible for supervising the development and operation of the woodlot and production of woodchips.

Twenty-five gasified pumpsets are currently operational and results on these test units are quite encouraging.

The conversion to gasifiers will add slightly to the ISAs administrative workload, but the ISA is organized to handle this work and it should not compromise its effectiveness.

b. Charcoal Production

In 1979, FSDC was directed to expand its activities beyond irrigation to include the uplands, and to help improve the well-being of non-irrigated farmers and farmers with mixed cropping systems. An example is the Charcoal Production Program with its focus on livelihood improvement through reforestation activities.

The Charcoal Production Program is administered as follows: At the FSDC Central Office, CPA requests, for leasing land is reviewed and sent to the BFD for granting of leases. The FSDC Board of Administrators approves loan requests for tree farm development, based on results of technical and market feasibility studies. The central office also provides overall guidelines and policies for project implementation, and provides or arranges for technical and managerial advice as needed from hired consultants and other GOP agencies such as BFD and the School of Forestry at Los Banos.

The FSDC office at the provincial level assumes responsibility for the program by identifying potential project areas and farmer members, and conducting demand and market studies. It also serves as the focal point for training, technical assistance and advice to the CPAs. It coordinates with local BFD offices to assist in surveying and mapping the tree farm area and to provide access clearance. It reviews CPA proposals for incorporation and funding resolutions, and endorses them to the FSDC Area Office for feasibility evaluation (technical, mar-

kets, financial and social). If they meet feasibility requirements they are endorsed and forwarded to FSDC's Board of Administrators for final approval.

At the association level, activities are carried out and managed by a CPA composed of fifteen upland farmers and their families. Member activities include clearing and planting, maintenance of trees, and harvesting, transport, and charcoaling of wood. Tree farm and charcoal production management is coordinated by member-selected officers from within each association. A general assembly, representing all family heads, makes basic operating decisions and formulates CPA policy including revision of rules and policies governing the association.

While the CPA system is new, it is based on an organizational/management pattern that has proven very effective in other FSDC programs. Given the success of this pattern in the ISA program, and the fact that most of the FSDC personnel in the charcoal program have ISA program experience, we believe that the CPA system will prove equally effective.

As with the ganifier subproject, our conclusion is that the Charcoal Production subproject is administratively feasible.

IV. FINANCIAL PLAN AND BUDGET

This section presents the estimated amount and timing of AID obligations, dollar disbursements, dollar/peso expenditures and a Project Budget. Overall economic and financial analyses of the subprojects are addressed in Section III. B. and C.

A. Obligations: Following is the projected AID obligation schedule for: the three subprojects. These projections are based on the financial needs of the subprojects as well as the USG commitment to provide a total of \$50.0 million per year in ESF monies for the U.S. FY's '82, '83 and '84.

Table 4
PROJECTED AID OBLIGATIONS
(\$000)

	U.S. Fiscal Year		FY 84	TOTAL
	FY 82	FY 83		
Power Plants	7,000	3,000	-	10,000
Ganifiers	2,000	1,377	-	3,377
Charcoal	2,000	3,370	5,000	11,370
Evaluations	-	253	-	253
Total	11,000	9,000	5,000	25,000

10/13/82 7/7/82

B. Dollar Disbursement Schedule: Section V.E. discusses the AID disbursement procedure. The following table presents projected dollar disbursements. These dollar disbursements include both the transfer to the GOP Treasury as well as disbursements to U.S. suppliers covering off-shore equipment procurement.

Table 5

PROJECTED AID DOLLAR DISBURSEMENT
(\$000)

	<u>Project Year</u>						<u>Total</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	
GOP Treasury ^{1/}	2,400	2,800	3,400	3,200	2,000	947	14,747
Offshore Procurement	-	1,000	8,100	900	-	-	10,000
Evaluations	<u>20</u>	<u>60</u>	<u>20</u>	<u>40</u>	<u>58</u>	<u>55</u>	<u>253</u>
Total	2,420	3,860	11,520	4,140	2,058	1,002	25,000

C. Project Expenditure Schedule. This table presents a projected schedule for AID and GOP disbursements for project expenditures. It shows the timing of peso/dollar disbursements to finance subproject activities, as contrasted with Table 6 which shows the timing of annual dollar disbursements to the GOP Treasury plus the dollar disbursements for offshore procurement.

^{1/} Includes dollar disbursements to GOP Treasury in support of both Can-
ifers for Irrigation and Output Production subprojects.

Table 6
PROJECT EXPENDITURE SCHEDULE
(\$000)

	<u>Project Year</u>						Total
	1	2	3	4	5	6	
Power Plants							
AID	-	1,000	8,100	900	-	-	10,000
GOP	1,409	2,654	4,176	4,334	-	-	12,573
Sub-Total	<u>(1,409)</u>	<u>(3,654)</u>	<u>(12,276)</u>	<u>(5,234)</u>	<u>-</u>	<u>-</u>	<u>(22,573)</u>
Gasifier							
AID	1,310	1,365	464	238	-	-	3,377
GOP	1,384	1,800	400	236	100	-	3,920
Sub-Total	<u>(2,694)</u>	<u>(3,165)</u>	<u>(864)</u>	<u>(474)</u>	<u>(100)</u>	<u>-</u>	<u>(7,297)</u>
Charcoal							
AID	1,050	1,376	2,976	2,976	1,984	1,008	11,370
GOP	426	829	1,207	1,207	805	402	4,876
Sub-Total	<u>(1,476)</u>	<u>(2,205)</u>	<u>(4,183)</u>	<u>(4,183)</u>	<u>(2,789)</u>	<u>(1,410)</u>	<u>(16,246)</u>
Evaluations							
AID	<u>20</u>	<u>60</u>	<u>20</u>	<u>40</u>	<u>58</u>	<u>55</u>	<u>253</u>
AID Sub-Total	<u>2,380</u>	<u>3,801</u>	<u>11,560</u>	<u>4,154</u>	<u>2,042</u>	<u>1,063</u>	<u>25,000</u>
GOP Sub-Total	<u>3,219</u>	<u>5,283</u>	<u>5,783</u>	<u>5,777</u>	<u>905</u>	<u>402</u>	<u>21,369</u>
Grand Total	<u>5,599</u>	<u>9,084</u>	<u>17,343</u>	<u>9,931</u>	<u>2,947</u>	<u>1,465</u>	<u>46,369</u>

D. Project Budget The project budget below shows line item amounts to be financed by AID and the GOP.

Table 7
PROJECT BUDGET
(\$000)

<u>Source</u>	<u>AID</u>	<u>GOP</u>	<u>Total</u>
1. <u>Wood-Fired Power Plants</u>			
A. <u>AID Funding</u>			
1. Imported Equipment	9,000		
B. <u>NEA Contribution</u>			
1. Civil Works		2,079	
2. Local Equipment		234	
3. Tree Farms & transport		7,830	
4. A&E U.S.	1,000		
5. A&E, Local		564	
6. Contingencies/ Price Evaluation		1,866	
Subtotal	10,000	12,573	22,573
2. <u>Gasifiers for Irrigation</u>			
A. <u>AID Funding</u>			
1. Gasifier Units	2,156		
2. Woodlots	1,014		
3. Escalation	207		
B. <u>FSDC Contribution</u>			
1. Equipment, shipping, instal- lation, and engineering supervision		2,264	
2. Woodlot program management & contingencies		1,656	
Subtotal	3,377	3,920	7,297
3. <u>Charcoal Production</u>			
A. <u>AID Funding</u>			
1. Tree Farms, including kifu (212 modules)	11,370		
B. <u>FSDC Contribution</u>			
1. Program Management		1,654	
2. Cont Escalation		3,222	
Subtotal	11,370	4,876	16,246
4. <u>Project Evaluation</u>	253		253
<u>PROJECT TOTAL.</u>	<u>25,000</u>	<u>21,362</u>	<u>46,362</u>

V. IMPLEMENTATION PLAN

A. General

The implementation systems for the three rural energy subprojects, as summarized below, are presented in more detail in Annexes I, II, and III.

The wood-fired power plants subproject, which finances the foreign exchange costs of imported equipment will use standard AID financing and procurement procedures. The two local cost subprojects (charcoal and gasifiers) will use similar implementation procedures regarding AID disbursement of dollars, FSDC financing procedures, procurement, monitoring and reporting.

For the local costs, AID will provide dollars to the GOP in exchange for the government using its budget resources to carry out agreed upon projects and provide agreed upon outputs. When the Project Agreement is signed and Conditions Precedent are met, AID will disburse dollars to the Treasury of the Philippines equal to the estimated peso cash requirements needed to meet the annual local costs of the project. These disbursements will be annual features of the implementation plan, as will the use of regular GOP budgetary resources to implement the subprojects. This allows AID to rely on GOP procedures and administrative apparatus. This local cost procedure: (1) allows AID to disburse dollars in advance of local cost expenditures which support base-related reasons for providing ESF assistance; and (2) allows the GOP to use its own pesos to carry out agreed upon activities leading to agreed to outputs. However, the Mission will continue to be involved, in a reduced way, in monitoring these components. Monitoring will be similar to the type of monitoring the Mission does for FAR-type projects, i.e., it will be output not process oriented.

B. Implementation Arrangements

1. Management Advisory Committee: The Management Advisory Committee (MAC) provides general program and policy guidance to the ESF program. The MAC, composed of eight cabinet ministers is chaired by the Minister of Human Settlements. The MAC has a Secretariat to conduct day-to-day operations and to represent the GOP in working with AID and the various implementing agencies (in this case NEA and FSDC). The Secretariat has a staff of approximately 75 professionals and clerical employees. The Secretariat provides continuing liaison with implementing agencies and, working closely with AID, prepares appropriate project documentation, monitors project progress, arranges financing, trouble-shoots design and implementation problems, sponsors GOP project audits and evaluations, and provides a variety of other staff level functions for the MAC.

2. NEA and FSDC: NEA is the implementing agency for the wood-fired power plants subproject and FSDC is the implementing agency for

the gasifier and charcoal subprojects. AID has had years of experience working with these two organizations. (The capabilities of these institutions are discussed in the administrative analysis sections in each annex.) NEA and FSDC will implement their respective subprojects in accordance with standard GOP procedures and regulations, and the terms and conditions of the Project Agreement which will include provisions, among others, for reporting on procurement and financing, as well as audit and evaluation requirements.

3. Agency for International Development: Under the dollar portion of this project, regular AID procurement procedures will be used to purchase the three wood-fired power plants. Because of the many lessons to be learned from this project and its potential for replication in the Philippines and elsewhere, AID plans to monitor progress of the tree farm establishment and site preparation activities, as well as the off-shore procurement activities, more closely.

AID will have a reduced monitoring role for the local cost inputs of this project. AID will monitor progress primarily to insure that output targets are met in accordance with the Project Agreement, and that succeeding dollar disbursements are calculated accurately and made in a timely manner. AID's principal concern for these subprojects will be that tree farms and woodlots are established and that charcoal units and gasifiers are put into operation consistent with the schedules in the implementation plan. Given this output orientation, AID will minimize its implementation monitoring and approval workload. AID plans to conduct site inspections on a sample basis. The major implementation responsibility, however, will rest with the MAC Secretariat, which will monitor day-to-day implementation, and the two implementing agencies.

4. AID Approvals: In addition to approving Conditions Precedent, AID will require a limited number of implementation approvals. These will be detailed in the Project Agreement. In the wood-fired plant subproject, for example, AID will approve detailed plans, the bidding documents, and evaluations and awards. On the local cost components, AID will monitor activities to ensure progress/completion in accordance with the agreement, prior to approving the subsequent years' dollar disbursement. Beyond these types of approvals, AID does not plan to be involved in the various implementation or approval actions, which will be the responsibility of the MAC Secretariat and/or its implementing agencies.

C. Implementation Schedule

Detailed implementation schedules for each subproject are in Annexes I, II, and III. The major determinants of rate of implementation are the time required to grow the trees (3-4 years); and the lead time needed to order, manufacture, receive and install the wood-fired power plant equipment. A best estimate for a project completion date (PCD) is six (6) years from obligation. We are, however, proposing a seven (7) year PCD for delivery of project outputs and completion of the evaluations to permit some flexibility should unforeseen circumstances arise.

D. Procurement

Detailed procurement plans are discussed in Annexes I, II, and III. For the imported power plant equipment, Handbook 11 will be followed by NEA. NEA has used AID procedures numerous times over the last 10 years for offshore procurement and is considered capable of effectively executing host-country contracts. FSDC will use its own procurement procedures. These have proven, over the years, to be compatible with good commercial practice. They are considered adequate to insure cost effective and timely delivery of project outputs.

E. Dollar Disbursements

1. Foreign Exchange Costs

Foreign exchange expenditures (the wood-fired power plant equipment) will use standard AID Letter of Credit/Letter of Commitment disbursement procedures. AID will disburse the dollars directly to the suppliers in accordance with appropriate AID approved contracts.

2. Local Costs

AID will disburse dollars annually equivalent to the pesos required to finance the local cost components for one year. Dollar disbursements will be made to the Philippine Treasury and will become free foreign exchange at the time of the disbursement. The GOP will use appropriated pesos to execute the local cost components in accordance with the Project Agreement. The pesos will be disbursed from the GOP Treasury General Fund and will be owned, controlled and accounted for solely by the GOP. In the Project Agreement the GOP will agree to: (1) the AID review and approval procedures contained in Annex I of the Project Agreement, and elsewhere in the Agreement; (2) report to AID on the peso uses in quarterly programs, management and financial reports; and (3) allow for audit and inspection by AID of the agreed upon project elements financed by the pesos.

F. GOP Budgetary Procedures

The GOP peso/AID dollar disbursement system for local cost components is presented below:

1. A 11%-of-project appropriation for the project has been included in the GOP's CY 1982 General Appropriation Act.
2. After the Project Agreement has been signed and CP's met, the appropriated project pesos will be fully allotted to the MIS and sub-allotted to the appropriate implementing agency. This allotment/sub-allotment allows the implementing agency to enter into obligations such as contracts.
3. AID disbursements of dollars to the Philippine Treasury will

be equivalent to the estimated peso cash requirements of the project for the ensuing twelve months and will be linked as closely as possible to the date when peso disbursements are scheduled to commence. The GOP will then release a Cash Disbursement Ceiling (CDC) in peso equivalent to the amount of the dollar disbursement. The CDC is the GOP's internal authorization for disbursements of allotted funds.

4. Whereas dollar transfers will be based on estimated annual cash requirements, requests for additional amounts may be processed more frequently than annually if peso disbursements exceed projections. On the other hand, if peso disbursements are slower than predicted, the succeeding dollar disbursement would be held up or reduced accordingly.

Under this procedure, AID dollars are not directly linked to local cost subprojects. Rather, GOP pesos are used in accordance with GOP regulations to implement the project and produce the agreed upon outputs.

G. Retroactive Financing

FSDC has already started its gasifier and charcoal programs. Costs incurred for subprojects meeting requirements of this project will be considered by the implementing agencies for peso reimbursement of allowable costs incurred. Reimbursement would be from the peso appropriated funds for the project. This will be considered by AID in determining the initial dollar disbursements under the project for these subprojects. The GOP, with USAID concurrence, has requested retroactive reimbursements limited to up to \$1.5 million and incurred on or after October 1, 1981 (See Appendix D).

H. Loans/Repayments

The Electric Cooperatives, Integrated Service Associations and Charcoal Producers Associations will be provided with necessary resources in cash and/or in kind on a loan basis by NEA and FSDC. These will be repayable in pesos. Amortization payments flow back to the Philippine Treasury General Fund. The Project Agreement will not restrict the use of these peso re-flows to any particular activity(ies).

VI. EVALUATION PLAN

A. General: Lessons learned from this project will be of interest to AID, the GOP, and other developing countries as well as other bilateral and multilateral lending institutions. The lessons will contribute directly to similar energy activities in the Philippines and worldwide. This suggests the need for a rather comprehensive evaluation plan.

Given the nature of the three subprojects, a good deal of information can be obtained using routine records, monitoring reports, and simple field observation techniques. In addition to monitoring and reporting by consultants and the implementing agencies, three types of evalua-

I/ The Evaluation Plan is not repeated in the Annexes.

tions are planned for this project: (1) a process evaluation, in year two or three; (2) a life of project baseline evaluation, beginning in year one and ending in year six; and (3) impact evaluations on each of the subprojects in years four, five and six. These are discussed below.

B. Process Evaluation: A process evaluation will be conducted after substantial progress has been made on all three subprojects. Current thinking is that the evaluation should be conducted after: (1) thirty TFAs for the wood-fired power plants have been operating for one year; (2) one hundred gasifiers have been operating and fifty ISAs have been growing trees to fuel gasifiers for one year; and (3) fifty CPAs have been organized and growing trees for one year. The process evaluation should take place 18 to 30 months after project implementation starts. It will examine how the project is being implemented, identify problems and make recommendations on corrective actions.

A budget of \$40,000 is included for this evaluation effort, which will involve a roughly three to four week team effort. The team would have experience in such fields as socio-cultural aspects of Philippine rural development, social forestry, non-conventional energy, economics, and the operation of local and national Filipino institutions. Suggested methodology includes review of relevant documents, selected field observations, and interviews with appropriate officials and local project participants. In addition to looking at project sites, it would also review the experiences at non-project sites which will have a headstart in implementation. Preliminary baseline information will be provided to the process evaluation team. This evaluation could serve as the basis for providing additional AID assistance in this project area.

C. Baseline Evaluation: Each subproject introduces a relatively new application of known technology designed for a specific and easily measurable objective, i.e., production of electricity, producer gas or charcoal which may be substituted for imported fuels. Evaluation of the energy related objective thus is simplified, because it is relatively easy to measure the amount of energy produced and the efficiency of production. Socio-economic, technical and institutional evaluations, however, will require more comprehensive and continuous efforts. These efforts will extend over several years in order to understand evolving patterns and trends and to assess fully the impact of the project on people's incomes, lives and their environment. Accordingly, three to five sites^{1/} within each subproject will be randomly selected for long-term monitoring and evaluation. The plan is to commence baseline data gathering at the selected sites immediately after obligation. In the first year basic data related to the physical and human environment will

^{1/} A site refers to the organization sub-unit of each subproject activity, e.g., a site for the wood-fired power plants would be the 10-15 household TFA responsible for a 100 kw. module; a site for the gasifier subproject would be a single ISA and its FFD; and a site for the charcoal subproject would be a CPA and its module.

be gathered and studied. This will include employment, incomes, local social structure, and power relationships; and human needs indicators such as health, nutrition, family planning, and education; and physical variables such as rainfall, soil conditions and erosion. For each of the next 4 to 5 years, working with these same samples, these basic socio-economic and physical data will be up-dated and analyzed to assess changes that are occurring at the sites as direct and indirect consequences of the project.

A qualified Filipino institution(s) will be selected to carry out the data collection and analyses. Environmentalist, social scientist and other appropriate professionals will be responsible for the monitoring/evaluation process related to each subproject. The team will include appropriate research assistants assigned to each site. The team should be able to complete data collection and basic analysis within 4-6 weeks for a given year. The senior investigators would provide core time, monitor the efforts of the research assistants, and compile the findings from each site into a final report for each year. One of the senior investigators would be designated as Team Leader. The budget for the baseline evaluation is \$120,000.

D. Impact Evaluations: The final type of evaluation proposed is an impact evaluation on each of the three subprojects. The total cost of these evaluations is budgeted at \$90,000. This will include publication of final evaluation reports and appropriate workshops/seminars. The three impact evaluations are discussed below.

1. Wood-Fired Power Plants Impact Evaluation: An impact evaluation will be conducted after at least two of the three power plants have been in commercial operation for one year, i.e., roughly six to seven years after start of implementation. The details of the evaluation design will reflect information needs at the time of the evaluation. Issues which might be addressed include:

- Are subproject outputs and purposes being achieved?
- Are tree farms and power plants producing at their expected capacities? What problems have been encountered? How can they be resolved?
- Are Tree Farmers Associations (TFAs) and Rural Electric Cooperatives (RECs) operating as expected? How can any existing problems be resolved? Are TFAs repaying their loans on schedule?
- Are wood-fired power plants economically viable? How do costs per unit output compare with other types of power generation?
- What major lessons learned from this experience can be used in future development efforts?

2. Gasifier Impact Evaluation: An impact evaluation will be conducted after five hundred gasifiers have been operating using woodchips from the FPU woodlot for one year, i.e., roughly four years after the start of implementation.

While the final design for the evaluation will reflect evolving information needs and experience gained during implementation, the following types of questions will be addressed:

- Are subproject outputs and purposes being achieved?
- On average, how much diesel fuel is displaced per gasifier per year? Does this savings cover the capital and woodchips costs of the gasifier?
- What are the major maintenance or other operating problems associated with gasifiers? How can these be resolved?
- Are ISAs able to fuel and operate gasifiers efficiently?
- Are gasifiers being operated and maintained effectively and efficiently? What are the major problems? How can they be resolved?
- What are the major lessons learned from this experience that can be used in future development efforts in the Philippines and elsewhere?

3. Charcoal Production Impact Evaluation: The evaluation will be conducted after at least 75 CPAs have been harvesting trees, and producing and marketing charcoal for at least six months, i.e., roughly five to six years after the start of implementation. The evaluation will review industrial charcoal marketing CPAs, those servicing large population centers, and the small pilot rural market CPAs.

The final design for the evaluation will be developed later and will reflect information needs at the time of the evaluation. Questions which might be addressed include:

- Are subproject outputs and purposes being achieved?
- Are CPAs viable institutions? Have they obtained adequate access to land? Can they grow trees, operate kilns and sell charcoal at a profit? Are they repaying their loans?
- What are the major problems? How can they be resolved?
- Are yields from tree farms and kilns as high as expected? What are the technical problems? How can they be resolved?

- What is the current and future demand for charcoal?
- What are the characteristics of the market? What prices do CPAs get for charcoal? How do these compare to retail prices?
- What lessons learned from this experience can be used in future development efforts?

4. Impact Evaluation Methodology: Suggested evaluation methodology includes: review of FSDC, NEA, RECs, ISAs, CPAs, AID, MHS and other project documents; field observations of project and non-project power plant and gasifier operations; analysis of technical and financial information; and interviews with FSDC, NEA, REC, and AID officials, TFA, CPA and FFU members, power plant managers and operators, and others including a sample of customers. Evaluation teams will, as appropriate, include: economists, social foresters, professionals in the design, construction/manufacturing and operation of wood-fired power plants, gasifiers and charcoal kilns and specialists in farmer organization, nonconventional energy and project management. Both U.S. and Filipino specialists will participate in the evaluations.

VII. CONDITIONS, COVENANTS AND NEGOTIATING STATUS

A. Conditions. There will be no general initial conditions to disbursement. Rather each subproject will have its own conditions as applicable.

1. Wood-Fired Power Plants: Prior to disbursement under this subproject, AID will approve the executed agreement between MHS and NEA, and the agreement format between NEA and the RECs.

2. Gasifiers for Irrigation: Prior to disbursement under this subproject, AID will approve the executed agreement between MHS and FSDC, and the agreement format between FSDC and the ISAs.

3. Charcoal Production: Prior to disbursement under this subproject, AID will approve:

a) the implementation plan establishing the feasibility and planning requirements necessary to the creation of each CPA or group of CPAs.

b) the executed agreement between MHS and FSDC, and the agreement format between FSDC and the CPAs.

c) the plan for the review and evaluation of those CPAs which do not have pre-established sources to purchase their charcoal, i.e., those CPAs that fall in the third priority category.

B. Covenants. As a special covenant, the GOP will agree that prior to disbursing its funds to TFAs, CPAs or ISAs for tree farming, appropriate land rights (sale or lease) will be obtained by each such association.

C. Negotiating Status. All of the above conditions and covenants have been discussed in principle with appropriate GOP personnel and AID anticipates no problem in including them in the Project Agreement.

ATTACHMENTS

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

ATTACHMENT A
1 of 1
Life of Project: _____
From FY 82 to FY 84
Total U. S. Funding \$25.811M
Date Prepared: April 6, 1982

Project Title & Number PIRA, ENERGY EFFICIENCY AT SAC 2011

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																		
<p>Program or Sector Goal: The broader objective to which the project contributes: (A-1)</p> <p>and its impact on the economy:</p>	<p>Measures of Goal Achievement: (A-2)</p> <p>Annual net to the gross output of all reported:</p>	<p>(A-3)</p> <p>National trade accounts as measured against projected for 1982-84</p>	<p>Assumptions for achieving goal targets: (A-4)</p> <p>Other fuel substitution and conservation programs of GDP proceed as planned.</p>																		
<p>Project Purpose: (B-1)</p> <p>To provide funds resulting from the transfer of certain basic operations of PIRA to assist the GDP with the economy and development by energy production and use of better energy resources and conservation techniques to the PIRA energy area.</p> <ol style="list-style-type: none"> 1. Energy Production 2. Energy Conservation 3. Energy Distribution <p>IMPACTS:</p> <p>Energy production increasing electricity 1.7% PIRA and 0.7%</p>	<p>Conditions that will indicate purpose has been achieved: End-of-Project status: (B-2)</p> <ol style="list-style-type: none"> 1. Three (3) base-load power plants generating electricity of a net less than that for all generating plants 2. Total amount of power fuel oil stored 28,272,000 lbs. 3. Number of employees to be 1,000 4. Loss of electricity produced and sold annually 45,000 5. Power utilized to each generating plant. 6. Investment substituted to project area. <p>IMPACTS:</p> <ol style="list-style-type: none"> 1. More enterprise customers 2. Enterprise capacity used 	<p>(B-3)</p> <ol style="list-style-type: none"> 1. Field observation. 2. Examination of accounts and records. 3. Best service attention. 4. Field interviews. 	<p>Assumptions for achieving purpose: (B-4)</p> <ol style="list-style-type: none"> 1. NEA and FZEC continue with current program to expand and improve staff capabilities; separate GDP funded \$3.8 million IA project will assist to 80%. 2. Training program proceed as planned. 3. Program provide sufficient incentives to priority underemployed to upgrade. 																		
<p>Project Outputs: (C-1)</p> <ol style="list-style-type: none"> 1. Energy Production <ol style="list-style-type: none"> 1. Base load operation to be used 2. Production capacity to be used 3. Loss production capacity operation and the loss 4. Loss and other non-producing capacity to be used 5. Loss and other non-producing capacity to be used 2. Energy Conservation <ol style="list-style-type: none"> 1. Energy conservation 2. Energy conservation and training 3. Loss and other non-producing capacity to be used 4. Loss and other non-producing capacity to be used 3. Energy Distribution <ol style="list-style-type: none"> 1. Energy distribution 2. Energy distribution and training 3. Loss and other non-producing capacity to be used 4. Loss and other non-producing capacity to be used 	<p>Magnitude of outputs: (C-2)</p> <ol style="list-style-type: none"> 1. Three (3) base-load power plants installed 4,200 MW less (based on 80% of 50% treatment system installed) all the equipment, material, and supplies 2. 28,272,000 lbs. fuel oil stored (based on 80% of 50% treatment system) all the equipment, material, and supplies 3. 1,000 employees installed (based on 80% of 50% treatment system) all the equipment, material, and supplies 	<p>(C-3)</p> <ol style="list-style-type: none"> 1. Field site reports 2. Site inspection. 3. Progress and financial reports. 	<p>Assumptions for achieving outputs: (C-4)</p> <p>Timely delivery of all project inputs.</p>																		
<p>Project Inputs: (D-1)</p> <ol style="list-style-type: none"> 1. Energy Production <ol style="list-style-type: none"> 1. Energy production 2. Energy production and training 3. Loss and other non-producing capacity to be used 4. Loss and other non-producing capacity to be used 2. Energy Conservation <ol style="list-style-type: none"> 1. Energy conservation 2. Energy conservation and training 3. Loss and other non-producing capacity to be used 4. Loss and other non-producing capacity to be used 3. Energy Distribution <ol style="list-style-type: none"> 1. Energy distribution 2. Energy distribution and training 3. Loss and other non-producing capacity to be used 4. Loss and other non-producing capacity to be used 	<p>Implementation Target (Type and Quantity) (D-2)</p> <table border="1"> <thead> <tr> <th>Category</th> <th>US\$</th> <th>ECU</th> </tr> </thead> <tbody> <tr> <td>1. Base-load Power Plants</td> <td>10,000</td> <td>12,173</td> </tr> <tr> <td>2. Facilities for Installation</td> <td>1,000</td> <td>1,000</td> </tr> <tr> <td>3. Chemical Production</td> <td>12,000</td> <td>1,200</td> </tr> <tr> <td>4. Project Expenditure</td> <td>70</td> <td></td> </tr> <tr> <td>Total</td> <td>23,070</td> <td>25,373</td> </tr> </tbody> </table>	Category	US\$	ECU	1. Base-load Power Plants	10,000	12,173	2. Facilities for Installation	1,000	1,000	3. Chemical Production	12,000	1,200	4. Project Expenditure	70		Total	23,070	25,373	<p>(D-3)</p> <ol style="list-style-type: none"> 1. Contracts. 2. Shipping reports. 3. NEA and FZEC budgets. 4. Loan agreements. 5. Association charter. 	<p>Assumptions for providing inputs: (D-4)</p> <p>Timely availability of ECF and GDP funds.</p>
Category	US\$	ECU																			
1. Base-load Power Plants	10,000	12,173																			
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3. Chemical Production	12,000	1,200																			
4. Project Expenditure	70																				
Total	23,070	25,373																			

Revised 7/7/82

COUNTRY CHECKLIST

A. GENERAL CRITERIA FOR COUNTRY
ELIGIBILITY

1. FAA Sec. 116. Has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, can it be demonstrated that contemplated assistance will directly benefit the needy? No.

2. FAA Sec. 113. Has particular attention been given those programs, projects, and activities which tend to integrate women into the national economies of developing countries, thus improving their status and assisting the total development effort? Yes.

3. FAA Sec. 481. Has it been determined that the government of the recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully? No.

4. FAA Sec. 620(b). If assistance is to a government, has the Secretary of State determined that it is not dominated or controlled by the international Communist movement? Yes.
5. FAA Sec. 620(c). If assistance is to a government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies; and (b) the debt is not denied or contested by such government? No.
6. FAA Sec. 620(e) (1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? No.
7. FAA Sec. 620(a), 620(f), 620D; BI App Act. Secs. 512 and 513; ISUCA of 1980 Secs. 717 and 721. Is recipient country a Communist country? Will assistance be provided to Angola, Cambodia, Cuba, Laos or Vietnam? (Food and humanitarian assistance distributed directly to the people of Cambodia are excepted). Will assistance be provided to Afghanistan or Mozambique without a waiver? Are funds for El Salvador to be used for planning for compensation or for the purpose of compensation, for the confiscation No.

- nationalization, acquisition or expropriation of any agricultural or banking enterprise, or property or stock thereof? No.
8. FAA Sec. 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression? a. No.
b. No.
9. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent the damage or destruction, by mob action, of U.S. property? No.
10. FAA Sec. 620(k). Does the program furnish assistance in excess of \$100,000,000 for the construction of a productive enterprise, except for productive enterprises in Egypt that were described in the Congressional Presentation materials for FY 1977, FY 1980 or FY 1981? No.
11. FAA Sec. 620(l). If the country has failed to institute the investment guarantee program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason? N/A
12. FAA Sec. 620(m). Is the country an economically developed nation capable of sustaining its own defense burden and economic growth and, if so, does it meet any of the exceptions to FAA Section 620(m)? N/A

13. FAA Sec. 620(o); Fishermen's Protective Act of 1967, as amended, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters,
- a. has any deduction required by the Fishermen's Protective Act been made? N/A
 - b. has complete denial of assistance been considered by AID Administrator? N/A
14. FAA Sec. 620(q); 81 App. Act. Sec. 517.
- (a) Is the government of the recipient country in default for more than six months on interest or principal of any AID loan to the country? No.
 - (b) Is the country in default exceeding one year on interest or principal on any U.S. loan under a program for which the Continuing Resolution appropriates funds? No.
15. IAA Sec. 620(s). If contemplated assistance is development loan or from Economic Support Fund, has the Administrator taken into account the percentage of the country's budget which is for military expenditures, the amount of foreign exchange spent on military equipment and the amount spent for the purchase of sophisticated weapons systems? (An affirmative answer may refer to the record of the annual "Taking Into Consideration" memo: "Yes, taken into account by the Administrator at time of approval of Agency OYB." This approval
- This has not been a problem in the Philippines, and we understand such expenditures have been taken into account.

by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)

16. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? No.

17. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget? Up to date.

18. FAA Sec. 620A; 81 App. Act Sec. 520. Has the country aided or abetted, by granting sanctuary from prosecution to, any individual or group which has committed an act of international terrorism? Has the country aided or abetted, by granting sanctuary from prosecution to, any individual or group which has committed a war crime? No.

19. FAA Sec. 666. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. there is to carry out economic development program under FAA? No.

20. FAA Sec. 669, 670. Has the country, after August 3, 1977, delivered or received nuclear enrichment or reprocessing equipment, materials, or technology, without specified arrangements or safeguards? Has it detonated a nuclear device after August 3, 1977, although not a "nuclear-weapon State" under the nonproliferation treaty? No.

B. FUNDING SOURCE CRITERIA FOR COUNTRY ELIGIBILITY

1. Development Assistance Country Criteria. N/A

2. Economic Support Fund Country Criteria.

a. FAA Sec. 502B. Has the country (a) engaged in a consistent pattern of gross violations of internationally recognized human rights or (b) made such significant improvements in its human rights record that furnishing such assistance is in the national interest? a. No.
b. N/A

b. FAA Sec. 532(f). Will ESF assistance be provided to Syria? No.

c. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made? N/A

d. FAA Sec. 620B. Will ESF be furnished to Argentina? No.

PROJECT CHECKLIST

A. GENERAL CRITERIA FOR PROJECT

1. 81 App. Act. Unnumbered;
Sec. 653(b).
 - a. **Congressional Notification**
 - b. **Yes.**

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?
 - a. **Yes. Under terms of the "Fund" concept.**
 - b. **Yes.**

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?

N/A

4. FAA Sec. 611(b), 81 App. Act. 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, 1977?

N/A

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?
- Yes.
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.
- No.
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 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.
- a. Yes. Equipment will be purchased from U.S.
b. Yes. Project sponsors private institutions.
c. No.
d. Competitive principles will be followed.
e. Yes. Project will directly benefit these.
f. No.
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 enterprises).
- Equipment financed under this Project will be purchased from the U.S.

9. FAA Sec. 612(b); Sec. 636(h); 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. The U.S. owns no local currency which can be utilized for this Project. The implementation arrangements for this Project ensure 80% local currency contribution will be used for contributing to the cost of contractual services.
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? No.
11. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Yes.
12. App. Act. Sec. 521. 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? N/A

B. FUNDING CRITERIA FOR PROJECT

- | | |
|--|--------------|
| 1. <u>Development Assistance Project Criteria.</u> | N/A |
| 2. <u>Development Assistance Project Criteria (Loans Only).</u> | N/A |
| 3. <u>Project Criteria Solely for Economic Support Fund</u> | |
| a. <u>FAA Sec. 531(a).</u> Will this assistance promote economic or political stability? To the extent possible, does it reflect the policy directions of FAA Section 102? | Yes.
Yes. |
| b. <u>FAA Sec. 531(c).</u> Will assistance under this chapter be used for military, or paramilitary activities? | No. |

STANDARD ITEM CHECKLIST

A. Procurement.

- | | |
|---|--|
| 1. <u>FAA Sec. 602.</u> Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed? | Yes, as appropriate given the local cost nature of this Project. |
| 2. <u>FAA Sec. 604(a).</u> Will all procurement be from the U.S. except as otherwise determined by the President or under delegation from him? | Yes. |
| 3. <u>FAA Sec. 604(d).</u> 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.? | Yes. |

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 be reasonably procured in U.S.) N/A
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? No.
6. FAA Sec. 621. If technical assistance is financed, to the fullest extent practicable will such assistance, goods and professional and other services from private enterprise, be furnished 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? Yes. Private enterprise will be used to provide required T.A.

7. 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.--flag carriers will be utilized to the extent such service is available?

Yes.

8. 81 App. Act. Sec. 504. 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?

The U.S.G. is not expected to be a party to any contracts financed under this Project, but if it does, such provision will be included.

B. Construction.

1. FAA Sec. 601(d). If a 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 interest?

U.S. and Philippine firms will be used as appropriate.

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?

Yes.

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

Yes.

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? N/A

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? N/A

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? Yes.

4. 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? Yes.

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

- c. FAA Sec. 636(1). For purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained. Yes.
- d. 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? Yes.
- e. FAA Sec. 662. For CIA activities? Yes.
- f. 81 App. Act. Sec. 503. To pay pensions, annuities retirement pay, or adjusted service compensation for military personnel? Yes.
- g. 81 App. Act. Sec. 505. To pay U.S. assessments, arrearages or dues. Yes.
- h. 81 App. Act. Sec. 506. To carry out provisions of FAA Section 209 (d) (Transfer of FAA funds to multilateral organizations for lending.) Yes.
- i. 81 App. Act. Sec. 510. To finance the export of nuclear equipment fuel, or technology or to train foreign nationals in nuclear fields? Yes.
- j. 81 App. Act. Sec. 511. Will assistance be provided for the purpose of aiding the efforts of the No.

government of such country
to repress the legitimate
rights of the population of
such country contrary to
the Universal Declaration
of Human Rights?

- k. 81 App. Act. Sec. 515.
To be used for publicity
or propaganda purposes
within U.S. not author-
ized by Congress?

Yes.

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
Manila, Philippines

Ramon Magsaysay Center
1680 Roxas Boulevard

Telephone: 59-80-11

CERTIFICATION PURSUANT TO SECTION 611(a)
OF THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, ANTHONY M. SCHWARZWALDER, the principal officer of the Agency for International Development in the Philippines, having taken into account, among other things, the maintenance and utilization of projects in the Philippines previously financed or assisted by the United States, do hereby certify that in my judgment, the Philippines has both the financial capability and the human resources to effectively maintain and utilize the proposed Rural Energy Development Project.

This judgment is based upon the project analyses as detailed in the Rural Energy Development Project Paper and is subject to the conditions imposed therein.


Anthony M. Schwarzwald
Director, USAID/Philippines

25 Apr. '67
Date

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Department of State

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ACTION AID-35

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TELE-01 MAST-01 /030 A4 88

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E.O. 12065: N/A
SUBJECT RURAL ENERGY DEVELOPMENT PROJECT (492-0375)

REF STATE 183264

1. GOP REQUESTS RETROACTIVE REIMBURSEMENTS OF UPTO DOLLARS 1.5 MILLION MISSION FEELS THIS IS REASONABLE.
2. MISSION AND GOP CONCUR IN OCTOBER 1, 1981 AS LIMITING DATE AS RECOMMENDED RETTEL
3. RETROACTIVE REIMBURSEMENTS LIMITED TO FSDC PROJECT COMPONENTS ARMACOST

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INFO: CPU

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E.O. 12065: N/A

TAGS:

SUBJECT: LIVELIHOOD DEVELOPMENT FUND PID (492-0365)

REF: A. GAIR TEAM REPORT
B. MANILA 24707
C. STATE 209115 (LOU)

1. SUMMARY: ON 11/6/81, APAC REVIEWED SUBJECT PID IN LIGHT OF REFS A, H AND C AND APPROVED PROCEEDING WITH DETAILED PROJECT DESIGN/PROJECT PAPER. IN SO DOING, APAC DETERMINED THAT DESIGN OF THE DENDRO-THERMAL COMPONENT SHOULD BE BASED ON ACTUAL VISAYAN SITES SELECTED FOR AID SUPPORT. DETAILED GUIDANCE FOR PP DESIGN FOLLOWS UNDER FOUR CATEGORIES. BESIDE GUIDANCE CONTAINED HEREIN, SPECIFIC RECOMMENDATIONS OF REFA REPORT AND SUB-REPORTS SHOULD BE CONSULTED AND INCORPORATED INTO PP TO THE MAXIMUM EXTENT PRACTICABLE. WHERE CURRENTLY APPLICABLE, THE MANAGEMENT, TECHNOLOGICAL AND SOCIOLOGICAL CONCERNS OF REF C SHOULD ALSO BE ADDRESSED PP. END SUMMARY.

2. DENDRO-THERMAL (WOOD-FIRED) POWER GENERATION COMPONENT.

A. SITE SELECTION AND FEASIBILITY ANALYSIS.

(1) BASED ON EXTENSIVE DISCUSSION APAC DECIDED THAT VISAYAN SITES BE IDENTIFIED AND ANALYZED FOR FEASIBILITY IN THE PP. APAC CONSIDERED BUT DECIDED AGAINST AN OPTION WHEREBY SITE SELECTION WOULD FOLLOW PROJECT AUTHORIZATION BECAUSE: A. AID WILL BE ASSISTING A SMALL NUMBER OF SUB-PROJECT SITES (THREE); B. THE SUB-PROJECTS CONSTITUTE LARGE-SCALE CAPITAL ASSISTANCE; AND C. WE UNDERSTAND THAT USAID/GOP HAVE PRELIMINARILY IDENTIFIED A FEW PROMISING SITES, THE NUMBER OF WHICH CAN BE REDUCED TO THREE DURING AN APPROPRIATELY TIMED PP DEVELOPMENT EFFORT.

(2) FOR EACH SITE, PP SHOULD OUTLINE HOW SITE LENDS ITSELF TO HOUSING THE POWER PLANT IN TERMS OF PHYSICAL CHARACTERISTICS, CAPABILITY OF LAND FOR CULTIVATING FUELWOOD, AND POTENTIAL USE OF GENERATED ELECTRICITY OVER THE SHORT AND LONG RUNS. PP SHOULD ALSO OUTLINE THE MAJOR EVENTS - IN THE FORM OF A CRITICAL PATH OR PERT ANALYSIS - FROM WHICH POSSIBLE BOTTLENECKS AND CONSTRAINTS

COULD BE IDENTIFIED AND RESOLVED. APAC FELT THAT THE CRITICAL PATH APPROACH IS ESSENTIAL FOR PLANNING AND CONTROLLING THE RELATIONSHIP AND SEQUENCE OF THE VARIOUS TECHNOLOGIES BEING PROPOSED FOR PROJECT SITES.

(3) ECONOMIC ANALYSIS. SEVERAL DOCUMENTS AVAILABLE TO THE APAC WERE SUGGESTED TO GUIDE THE ECONOMIC ANALYSES OF PROJECT SITES. THESE INCLUDE: THE DE LUCIA (META SYSTEMS) DRAFT ANALYSIS; THE CT MAIN FEASIBILITY STUDY OF MARCH, 1980; AND NEA'S OWN GUIDELINES FOR DENDRO-THERMAL PROJECTS.

B. TECHNICAL ANALYSES.

(1) ENERGY CROP MANAGEMENT. CONCERN WAS EXPRESSED ABOUT THE TECHNICAL CAPACITY OF NEA TO MANAGE AND SUPPORT THE ENERGY CROPPING ASPECT OF THE PROJECT (E.G. SPECIES DIVERSIFICATION, TREE IMPROVEMENT EFFORTS, GROWTH YIELD PROJECTIONS, OPTIMUM PLANTATION SIZE AND RELATED ISSUES). ACCORDINGLY, THE DETAILED ANALYSIS/DESIGN OF PROJECT SITES SHOULD INDICATE:--(A) WHAT TECHNICAL MANAGEMENT SKILLS ARE REQUIRED FOR NEA STAFF, BOTH AT SENIOR AND JUNIOR LEVELS AND AT CENTRAL AND FIELD SITES; (B) HOW NEA WILL PROVIDE THE REQUISITE TECHNICAL MANAGEMENT SKILLS; AND (C) NEA RECRUITMENT PLANS TO ENSURE THE STAFF REQUIRED AT THE THREE PROJECT SITES. OF LESSEER PRIORITY

THAN TECHNICAL COVERAGE AT THE SITES, BUT ALSO IMPORTANT, THE ANALYSIS SHOULD INDICATE HOW THE PROJECT WOULD HELP STRENGTHEN NEA'S OVERALL TECHNICAL MANAGEMENT OF ITS NATIONAL DENDRO-THERMAL PROGRAM.

(2) ENERGY CROPPING ANALYSIS. SPECIFIC TECHNICAL RECOMMENDATIONS FOR INCORPORATION INTO THE PP ARE: (A) A PROJECTION OF BIOMASS GROWTH AND YIELD FOR EACH OF THE THREE PROJECT SITES FOR THE FIRST TEN YEARS. THIS PROJECTION SHOULD BE BASED ON SITE SPECIFIC FACTORS SUCH AS:

--SOIL TESTS FOR EACH SITE TO INCLUDE PH AND MACRO AND MICRO NUTRIENTS (E.G. PHOSPHORUS, MOLYBDENUM, ETC.) FOR OPTIMUM TREE GROWTH (IF SOIL IS ACID, OR IF NUTRIENTS ARE NOT ADEQUATE FOR OPTIMUM TREE GROWTH, WHAT ARE THE ECONOMICS OF NECESSARY SOIL AMELIORATION?);

TERRAIN IRREGULARITY, SLOPE, AND EROSIVITY;

SOIL FERTILITY, MINERAL STATUS AND TRACE ELEMENTS;

RAINFALL AMOUNT, SEASONAL DISTRIBUTION, AND SOIL DRAINAGE;

EXISTING BIOMASS ON OR ADJACENT TO SITE; AND

INNOCULATION OF LEGUME TREE SEEDS WITH RHYZOBIIUM BEFORE PLANTING.

(B) FOR EACH PROJECT SITE, A SPECIFIC SPECIES DIVERSIFICATION AND TREE IMPROVEMENT MANAGEMENT PLAN SHOULD BE ELABORATED. THIS PLAN, AS WELL AS GROWTH AND YIELD PREDICTIONS, SHOULD TIE INTO THE CRITICAL PATH APPROACH SUGGESTED ABOVE AS WELL AS INTO A WELL DEFINED AND FLEXIBLE EVALUATION ACTIVITY THAT PERMITS MID-COURSE MODIFICATION OF THE PROJECT.

(C) A SEED QUALITY CONTROL PROGRAM FOR EACH SITE (CERTIFIED VARIETIES WITH KNOWN PROVENIENCES SHOULD BE IDENTIFIED).

(D) DETAILED, SITE-SPECIFIC ANALYSIS FOR HARVESTING, TRANSPORTATION SYSTEMS, AND FEEDSTOCK PREPARATION (E.G. DRYING, CHIPPING, WHOLE LOG PROCESSING, ETC.). THIS ANALYSIS SHOULD INCLUDE AN EXAMINATION OF CURRENT PRIVATE AND GOP OPERATIONS. IN SELECTING CONSULTANTS FOR THE

ENERGY CROPPING TECHNICAL ANALYSIS, THE PAC SUGGESTS PREFERENCE FOR FIRMS/INDIVIDUALS WITH EXPERIENCE IN TREE FARM PRODUCTION SYSTEMS.

(3) EQUIPMENT: THE PP SHOULD INCLUDE A DETAILED PROCUREMENT PLAN. IT SHOULD IDENTIFY HOW THE ITEMS WILL BE PROCURED AND BY WHOM. IT SHOULD IDENTIFY THE ELECTRICAL/MECHANICAL EQUIPMENT AND MACHINERY TO BE USED THAT THE AID-ASSISTED PLANTS, INCLUDING THE NOMENCLATURE OF SUCH EQUIPMENT AND ALL AUXILIARY COMPONENTS, CONNECTIONS, CONTROL SYSTEMS, ETC. TO SUPPORT THE REQUIRED COST ESTIMATE. THE PP SHOULD INDICATE THOSE COMPONENTS AVAILABLE OFF THE SHELF AND THOSE THAT MUST BE MANUFACTURED FOR THE PROJECT AND THE LEADTIME FOR EACH. THE PP SHOULD INDICATE IF THE TRANSMISSION/DISTRIBUTION NET IN EACH LOCATION ALREADY EXISTS OR IF SUCH NET(S) ARE TO BE PROJECT FUNDED. IN ADDITION, THE PP SHOULD INCLUDE A LISTING OF ALL SUPPORT EQUIPMENT (WOOD HARVESTING MACHINERY, TRANSPORT VEHICLES, ETC.). A MAINTENANCE/SERVICE PLAN FOR ALL PROJECT EQUIPMENT AND MACHINERY SHOULD ALSO BE INCLUDED.

C. FINANCIAL ANALYSIS. BASED ON REF A REPORT, APAC EXPRESSED CONCERN THAT FARMERS IN THE FARMER ASSOCIATIONS (FAS) MAY NOT FULLY UNDERSTAND THE FINANCIAL AND CREDIT ARRANGEMENTS BEING PROPOSED DURING SITE DEVELOPMENT (I.E. THE FIRST FOUR YEARS) AND ESPECIALLY ARRANGEMENTS DURING THE REPAYMENT YEARS. FOR EXAMPLE, PAYMENTS TO FARMERS CURRENTLY PARTICIPATING MAY BE PERCEIVED AS DAILY WAGES RATHER THAN DISBURSEMENTS FROM A MEDIUM-TERM GOP LOAN TO THE ELECTRIC COOPERATIVES (ESPECIALLY IF THERE IS NO LAND-LEASE IN EFFECT). THE PP SHOULD FULLY DESCRIBE HOW THE PROJECT WILL OPERATE FINANCIALLY WITH SPECIAL ATTENTION TO HOW THE PAC AND PARTICIPATING FARMERS WILL BE EDUCATED TO FULLY UNDERSTAND THE FINANCIAL COMMITMENTS INVOLVED. FURTHER, THE PP SHOULD INCLUDE A FINANCIAL CASE-STUDY, INCLUDING PROJECTED FINANCIAL STATEMENTS (E.G. BALANCE SHEET, INCOME AND EXPENSE, SOURCES/USES OF FUNDS, ETC.) SHOWING HOW THE PROJECT WILL BE FINANCIALLY

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VIABLE AT THE COOPERATIVE, FA AND INDIVIDUAL FA MEMBER LEVEL. THE CASE-STUDY SHOULD COVER AT LEAST ONE HARVEST PERIOD AND SHOW HOW TIMBER SALE REVENUES WILL COVER COSTS INCURRED AT THE POINT OF SALE. KEY ASSUMPTIONS SHOULD BE SET FORTH, PARTICULARLY AS TO HOW THEY WOULD PERTAIN TO THE THREE SITES PROPOSED FOR AID SUPPORT.

D. ORGANIZATIONAL ASPECTS.

(1) THE FAS ARE RECOGNIZED AS THE GRASS-ROOT LEVEL

ORGANIZATIONS THAT WILL BE DEPENDED UPON TO PROVIDE A STEADY AND SUFFICIENT SUPPLY OF WOOD FOR THE DENDRO-THERMAL PLANTS. FOR PP PREPARATION, A SURVEY SHOULD BE TAKEN OF THE EXPERIENCE/PERFORMANCE TO DATE OF EXISTING FAS. FINDINGS AND RECOMMENDATIONS OF THE REVIEW SHOULD BE PRESENTED IN THE PP ALONG WITH A DESCRIPTION OF FA EXPERIENCE TO DATE AND LESSONS LEARNED THAT WILL BE USED TO IMPROVE THE PROSPECTS FOR PERFORMANCE UNDER THE AID-SUPPORTED PROJECT.

(2) BASED ON THE SURVEY OF EXISTING FAS, THE PP SHOULD SET FORTH IN DETAIL HOW THE VARIOUS ORGANIZATIONS - FAS, ELECTRIC COOPERATIVES, NEA, OTHERS - WILL INTERRELATE AND FUNCTION FOR PROJECT IMPLEMENTATION. OF SPECIAL INTEREST HERE WILL BE DENDRO PLANT MANAGEMENT AND LAND-LEASE ARRANGEMENTS. THE PP SHOULD DESCRIBE BOTH, ESPECIALLY LEASE ARRANGEMENTS IN DETAIL (E.G. THE PARTIES, LEGAL RIGHTS AND OBLIGATIONS, TENANCY, ETC.), AND CONTAIN A COPY OF THE LEASE FORM TO BE USED AT THE AID-SUPPORTED SITES. A KEY QUESTION FOR USAID CONSIDERATION IS WHETHER AN EXECUTED LEASE, ACCEPTABLE TO AID AND THE PARTIES, SHOULD BE A CONDITION PRECEDENT TO DISBURSEMENT AT EACH OF THE THREE PROJECT SITES.

E. IMPLEMENTATION AND MONITORING. THE IMPLEMENTATION PLAN OF THE DENDRO-THERMAL COMPONENT SHOULD BE OUTLINED BY PUTTING THE MAJOR EVENTS IN THE CRITICAL PATH ANALYSIS, INCLUDING INTERVENTIONS THAT WOULD RELIEVE POTENTIAL BOTTLENECKS.

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3. GASIFIERS FOR IRRIGATION AND CHARCOAL PRODUCTION COMPONENT.

A. IN GENERAL, THE APAC RECOMMENDS THAT THE PP CONTAIN THE SAME CATEGORIES OF ORGANIZATIONAL, FINANCIAL AND TECHNICAL MANAGEMENT ANALYSES (WITH APPROPRIATE MODIFICATIONS) AS RECOMMENDED ABOVE FOR THE DENDRO-THERMAL COMPONENT. THE TIMING AND MAGNITUDE OF EQUIPMENT FINANCING AND ARRIVAL SHOULD BE DEALT WITH IN THE CONTEXT OF THESE ISSUES. IN ADDITION, THE PP SHOULD PRESENT A SUMMARY OF THE JAPANESE ATTEMPT TO DEVELOP CHARCOAL PRODUCTION IN THE PHILIPPINES AND HOW LESSONS LEARNED IN THAT EXPERIENCE WILL BE USED IN THE IMPLEMENTATION OF THIS PROJECT COMPONENT.

B. THE ECONOMIC ANALYSIS SHOULD EXPLICITLY TREAT THE FOLLOWING ITEMS, AMONG OTHERS: APPROPRIATE SCALE OF THE GASIFIERS AND CHARCOAL OPERATIONS; LOCATION OF KILNS

RELATIVE TO RAW MATERIALS; TRANSPORTATION COSTS; PROCESSING REQUIREMENTS; AND ASSUMPTIONS RELATED TO ALL THESE, IN THIS CONNECTION, SPECIFIC PP ATTENTION SHOULD BE GIVEN TO MARKET AND DEMAND PROJECTION AND TO WHO MARKETS THE CHARCOAL.

4. MARKET MANAGEMENT/CONSTRUCTION COMPONENT.

A. MARKETING SYSTEM APPROACH. APAC APPROVAL FOR DETAILED DESIGN OF THE MARKET MANAGEMENT/CONSTRUCTION COMPONENT - BOTH SOFTWARE AND HARDWARE - IS BASED ON PRELIMINARY INFORMATION CONTAINED IN REF B AND AMPLIFIED IN ASIA/PTB'S 10-30-81 MEMO TO THE PROJECT COMMITTEE. THE APAC IS ASKING THAT ANY SIGNIFICANT DEVIATION FROM THE APPROACH OUTLINED BE EXPLAINED IN THE PP. ALSO, THE APAC WAS MINDFUL OF THE DANGER THAT MARKET MANAGEMENT/CONSTRUCTION ACTIVITY MAY BE IMPLEMENTED WITHOUT REFERENCE TO THE MARKET SYSTEM AS A WHOLE. THEREFORE, APAC STRESSED THAT DESIGNERS FOCUS ON IMPROVING THE PUBLIC MARKETS AS SOURCES OF REVENUE GENERATION FOR LOCAL GOVERNMENTS.

B. DEMAND FOR MARKET FACILITIES. THE APAC RECOMMENDS THAT THE PP INCLUDE AN ANALYSIS OF MUNICIPALITY DEMAND FOR MARKET FACILITIES, WHETHER THROUGH REMODELING, REPLACEMENT OR THE CONSTRUCTION OF NEW FACILITIES. SPECIFICALLY, THE PP SHOULD CONTAIN (1) THE SET OF CRITERIA USED TO SELECT SITES AND (2) A LISTING OF PROBABLE OR POTENTIAL SITES AND PRELIMINARY COSTS ESTIMATES FOR EACH. THE LIST SHOULD TOTAL NOT LESS THAN 50 PERCENT (AND PREFERABLY MORE) OF THE FUNDING LEVEL REQUESTED FOR THIS COMPONENT. FINANCIAL VIABILITY IS ONE KEY CRITERION AND THE PP SHOULD EXPLAIN HOW IT WILL BE DETERMINED AT EACH SITE.

C. DESIGN, CONSTRUCTION AND SUPERVISION PROCEDURES. THE PP SHOULD FULLY DESCRIBE THE PROCESS BY WHICH PROJECT MARKETS WILL BE DESIGNED, CONSTRUCTED AND THE MANNER IN WHICH THE WORKS WILL BE SUPERVISED. SINCE THE DESIGN OF EACH MARKET WILL LIKELY VARY, THE APAC SUGGESTS THAT CARE

BE TAKEN TO DEVELOP A DESIGN APPROACH THAT WILL REALISTICALLY DETERMINE WHEN REMODELING (VERSUS REPLACEMENT) IS FEASIBLE AND WHEN IT IS NOT ON A COMPARATIVE COST BASIS.

5. OTHER ITEMS.

A. PROPOSED CHANGE IN FUNDING LEVEL. AS REQUESTED IN REF B, TOTAL FUNDING FOR THIS PROJECT IS BEING REDUCED BY DOLS 1.8 MILLION TO DOLS 46.0 MILLION FROM THE DOLS 47.8 MILLION SHOWN IN THE PID. SEPTIL FOLLOWS ON INCREASE IN PROJECT DESIGN FUND (492-0343).

B. ENVIRONMENTAL. THE PID REQUESTED A NEGATIVE DETERMINATION AS TO THE NEED FOR AN ENVIRONMENTAL ASSESSMENT (EA). HOWEVER, THE PROJECT'S BENDRO-THERMAL, CHARCOAL/GASIFICATION AND MARKET COMPONENTS HAVE POTENTIAL FOR CREATING ADVERSE IMPACTS ON THE ENVIRONMENT. THE APAC RECOMMENDS THAT AN EA BE CONDUCTED ON THESE COMPONENTS AS PART OF PP PREPARATION. ADDITIONAL GUIDANCE ON EA TO FOLLOW IN SEPTIL.

C. TIMING OF PP DEVELOPMENT. THE PID PROPOSED PP COMPLETION AND REVIEW IN THE FIRST QUARTER OF FY 02. BASED ON THE NUMBER AND COMPLEXITY OF DESIGN TASKS REQUIRED, THE APAC RECOMMENDS THAT THE USAID/GOP NOT FEEL PRESSED TO TRANSMIT PP AND THAT NECESSARY TIME BE TAKEN IN THE COLLABORATIVE DEVELOPMENT OF THIS PROJECT. A - - - - - THIRD QUARTER TARGET FOR PP COMPLETION WOULD APPEAR MORE REALISTIC.

D. PROCEDURES AND RATES OF LDF DISBURSEMENT.

(1) THE PRIMARY PURPOSE OF THE LDF AND OTHER ESF PROJECTS IN THE PHILIPPINES IS COMPLIANCE WITH THE COMPENSATION ARRANGEMENTS ASSOCIATED WITH THE AMENDED MILITARY BASES AGREEMENT. CONSEQUENTLY, PROCEDURES FOR AND RATES OF DISBURSEMENT OF LDF PROJECT FUNDS ARE KEY CONSIDERATIONS. THE PP SHOULD SHOW, IN A SEQUENTIAL ORDER, WHAT THE USAID MUST KNOW AND DO BEFORE DISBURSEMENTS, EITHER IN DOLLARS OR PESOS, ARE MADE. THE APAC RECOMMENDS THAT,

FOR EACH LDF COMPONENT, SPECIAL CARE BE TAKEN TO DEFINE DISBURSEMENT PROCEDURES, TO REALISTICALLY ESTIMATE-DISBURSEMENT RATES, AND TO CLEARLY OUTLINE BOTH IN THE PP. (2) DURING DETAILED DESIGN, IT MAY BE POSSIBLE TO IDENTIFY APPROPRIATE GOP EXPENDITURES ALREADY MADE FOR PROJECT COMPONENTS. IF THE USAID WISHES TO PROVIDE FOR AID REIMBURSEMENT FOR EXPENDITURES ON A RETROACTIVE BASIS, PLEASE ADVISE AID/W WELL IN ADVANCE OF PP PRESENTATION IN ORDER THAT NECESSARY CLEARANCE OF THIS-APPROACH MAY BE OBTAINED.

E. TDY ASSISTANCE. AID/W PREPARED TO HELP ARRANGE NECESSARY TDY ASSISTANCE FOR PP PREPARATION. PLEASE ADVISE REQUIREMENTS AND DESIRED TIMING ASAP. HAIG