

**PROPOSAL FOR PDF BLOCK B GRANTS**

**COUNTRY:** Ghana

**FOCAL AREA:** Climate Change

**PROJECT TITLE:** Renewable Energy-Based Electricity for Rural Social and Economic Development

**AMOUNT OF FUNDING REQUESTED:** \$59,000

**CO-FUNDING:** NREL: \$10,000  
Government of Ghana: \$5,000

**REQUESTING AGENCY:** UNDP/Government of Ghana

**COLLABORATING AGENCY:** U.S. National Renewable Energy Laboratory (NREL)

**BLOCK:** BLOCK B

**DATE OF RATIFICATION OF UNFCCC:** 6 September 1995

**BLOCK A GRANT AWARDED:** None. Project concept initiated by the government and later developed with the help of the UNDP Country Office in Ghana and NRECA (US National Rural Electric Cooperative Association)

**I. Summary Project Objectives and Description:**

The Government of Ghana, in close collaboration with the private sector, non-governmental agencies, and the United Nations, proposes to design and implement a programme to demonstrate the potential for using small-scale renewable energy-based electric power technologies for decentralized rural delivery of essential electricity-based services to support social and economic development.

Under the proposed project up to twelve communities in one or two clusters will be selected as pilot sites within the Mamprusi East District of the Northern Region. Each of the communities will be equipped with (1) photovoltaic (PV) power systems only, or (2) a mix of stand-alone PV units and PV/diesel or PV/wind/diesel hybrid power units to supply local AC microgrid power systems. Individual PV systems will be used for residential lighting and entertainment, and for some community services and small commercial enterprises. Hybrid power systems will be used to support residential, community and economically productive activities. In some communities the most effective approach may be a mix of individual residential PV units for lighting and communication, and a renewable energy-based hybrid power system for full-time AC power for local "microenterprise zones" where they already exist.

This project will be established under the National Electrification Scheme (NES) as an extension of the Government's Self Help Electrification Program (SHEP). The Volta River Authority/Northern Electric District (VRA/NED) which will be responsible for system installation and checkout, will train the users in preventive maintenance, stock spare parts, provide both routine and urgent maintenance and repair services, and collect user fees. The utility will be responsible for operation and maintenance of the community microgrid systems. Periodic technical, social, and economic evaluations for all of the electrified communities will be carried out by the project implementation team. The project will be the first of its kind in Africa, and will be linked to similar projects in Asia and Latin America.

The proposed scope and scale of this pilot project is sufficient to evaluate the potential for widespread use of renewable energy technologies for off-grid rural electric power delivery in Ghana, and the requirements for these options to be sustainable. Sustainability may require that communities, through payment of market-based fees, will be able to pay a substantial fraction of the monthly costs, both for capitalization and for operation and maintenance (O&M). The renewable energy options will be compared directly with grid extension, isolated prime diesel, and isolated cycle-charge diesel power systems.

The objectives of the project are:

1. To increase the Government of Ghana's understanding of the technical requirements, equipment options, and capital and operating costs for the use of photovoltaic (PV)-based energy systems, both as stand-alone units and in hybrid power systems, for rural electric power delivery.
2. To demonstrate in Ghana the technical, economic, institutional, and social feasibility of sustainable largescale diffusion and application of small-scale PV units and hybrid power systems to the people of Ghana, government officials, the private sector, and the international development community.
3. To enable the Volta River Authority/Northern Electricity Department (VRA/NED) to integrate the use of renewable energy systems into its ongoing rural electrification activities.
4. To provide electricity services to about 12 communities in a remote area of Ghana and,
5. To catalyze large-scale use of these technologies in the country.

## **II. Description of Proposed PDF Activities**

Funds are required to send a mission to Ghana to finalize a GEF Project brief in accordance with GEF requirements. The team will include a senior staff member of the U.S. National Renewable Energy Laboratory (NREL) who is participating in similar projects in Latin America. The objective of these activities is to gather necessary information to determine:

1. the least-cost and most appropriate electricity supply options for rural Ghanaian communities and
2. the extent to which these options are affordable and can be adopted to contribute to a programme of rural electric power delivery which is sustainable and replicable.

The consultants will specifically

- a. Evaluate the potential for increased use of photovoltaic and hybrid power technologies to provide electricity in rural areas of the country through the expanded involvement of the private sector in providing energy services.
- b. Determine the necessary technical, financial, social, and institutional requirements to expand the market for PV and hybrid power systems on a demand-driven, full cost-recovery basis in an environmentally responsible manner.
- c. Conduct discussions with appropriate bilateral and multilateral donor agencies regarding possible project co-financing.

### **III. PDF Outputs**

The primary output from this PDF-funded mission will be a full GEF project brief for submission for consideration by the Council. The amount of funding required from UNDP, GEF, and other sources will be determined during the course of the preparation activity.

### **IV. Eligibility**

Ghana is a signatory to the U.N. Framework Convention on Climate Change and has ratified the convention (September 6, 1995).

The proposed project meets the interim guidance for 1995 which stipulates that "activities would not only be restricted to the installation of wind, solar or other renewable power systems but would also help sponsoring utilities agencies and other organizations to develop and implement strategies which would both reduce emissions and meet the energy service needs of rural and remote communities" (P.7)

The major output of the project will be a national utility-based programme of sustainable rural electric power delivery using renewable energy-based power systems for both pre-electrification and entry-level electrification. This will include a well-trained technical staff able to support all aspects of a renewable energy-based rural electrification programme in Ghana.

Specific outputs will include up to twelve clustered communities equipped with renewable energy-based power services, a trained staff within the VRA/NED electric utility, development of local operation and maintenance facilities and capabilities; a set of carefully designed assessments of

decentralized PV and hybrid power systems and hybrid power systems used for important rural development applications; and significantly increased understanding of the role of small-scale decentralized renewable energy-based power systems for addressing social and economic development needs of rural communities in West Africa. An additional output will be the information, experience, and analysis skills required to design a programme of investment in large-scale use of renewable for providing electricity to off-grid communities in a technically, economically, financially, and environmentally sustainable manner.

#### **V. National Level Support:**

The project is country-driven and has the full support and approval of the Government (letters from the Ministry of Energy and Mines are available upon request).

#### **VI. Justification:**

The goal of the project is to support the development of a national capacity, combining both private sector and public sector efforts, to use renewable energy-based technologies, primarily photovoltaics (PV) in stand-alone and hybrid configurations, for sustainable rural electric power delivery for both individual applications and centralized village electrification. The proposed project is a high priority of the Government of Ghana, which is committed to the extension of electricity services for social and economic development throughout the rural regions of the country.

The project will be unique in Africa (and in the GEF portfolio) in the elements that it will combine. These include the following:

1. A national electric utility parastatal company will assume the primary responsibility for the dissemination and support of the renewable energy-based electric supply equipment and systems,
2. The approach will combine both decentralized stand-alone applications and the use of renewable energy-based village AC electric power systems,
3. Innovative financing mechanisms will be established for suppliers of equipment and services, intermediaries (eg. NGOs) and end users (individuals, communities, cooperatives, commercial enterprises, etc.),
4. To the extent possible, investments in power systems will be linked with investments in social and economic development, and
5. Working links will be established with related programmes and projects in Africa, Asia, and Latin America, and on an ongoing basis with the village power programme at the U.S. National Renewable Energy Laboratory.

**VII. ITEMS TO BE FINANCED**

<b>Expense</b>	<b>GEF US\$</b>	<b>Cofinancing Sources US\$</b>	<b>Total US\$</b>
International consultants (3) fees*	30,000	10,000	30,000
International consultants travel	17,000		17,000
National consultant (1) and travel**		5,000	5,000
Preparation of Project Document	10,000		10,000
Project Support Services (including executing agency support costs)	2,000		
<b>TOTAL</b>	<b>\$ 59,000</b>	<b>\$ 15,000</b>	<b>\$ 74,000</b>

\* Fees of NREL expert financed by NREL

\*\* Provided by Government of Ghana

