

National Council for Research
Energy Research Council

SUDAN RENEWABLE ENERGY PROJECT

Third Annual Work Plan

1985



THIRD ANNUAL WORK PLAN

May, 1985

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I. Introduction

The Sudan Renewable Energy Project (SREP) prepares an annual report for every 1 July to 30 June work period. This represents the third such work plan.

The second work year has been a very productive one for SREP, with advances made in all of its 5 technology areas and in short and long term training. Dissemination of these technologies has been extended to new areas in the Northern, Central, Eastern Kordofan, and Equatoria Regions. The new Dissemination Unit of the Renewable Energy Research Institute (RERI) has been very active in this work. The grants program, too, has been expanded, and is now under the day to day management of a full-time Grants Administrator.

The Third Year Work Plan calls for the continuation of the successful work of the past 2 years, and further expansion of SREP activities in the various regions of Sudan. It contains a continuing reliance on grants, overseas and local technical assistance, and short and long term training to support the dissemination of the 5 technologies.

More emphasis will be given this year to two areas; fuelwood production on mechanized farms and briquetting of agricultural residues. The major activities of last year, fuelwood production in small farms and communities and promotion of energy efficient charcoal stoves, will expand to other geographic areas.

II. Report on Second Year Implementation
July 1984 - June 1985

A. Institutional Development:

The focus of work in this area remains the development of Sudanese counterpart personnel within the RERI and other related institutions to undertake the field testing and dissemination of renewable energy technologies.

1. Organizational Structure:

SREP was designed to focus on the development of outreach, extension, and dissemination activities within the Renewable Energy Research Institute (RERI).

The Director of the Energy Research Council (ERC) serves as the counterpart to the Chief of Party from Georgia Institute of Technology (GIT). They, in turn, report to the ERC Board (through its 6 member Technical Committee) which oversees the general direction and emphasis of SREP and the German Special Energy Project (SEP).

The majority of the manpower to implement the SREP comes from RERI. Other staff have been seconded from other government institutions and hired on personal service contracts.

Also, the ERC cooperates with government organizations, and private enterprises, which are involved in renewable energy activities in the Sudan.

For example, the SREP has developed a strong working relationship with the Forest Administration, particularly in the fuelwood and charcoal production area. Six foresters have been seconded during the past 2 years to the Seleit shelterbelt project. The FAO sponsored fuelwood project within the Forest Administration has cooperated with SREP in a joint study of conversion factors in charcoal production. SREP has also worked closely with the private voluntary organizations CARE and PLAN on charcoal stove dissemination.

2. Staffing & Technical Assistance:

a. Overseas Consultants:

Overseas technical assistance received in the Second Work Year was:

- Carolyn Huskey (Dissemination)	1.0 pm
- Claudia Huff (Dissemination)	3.5 pm
- Maxwell Kinyanjui (Charcoal Stoves)	1.0 pm
- Lester Bradford (Fuelwood)	4.0 pm
- Derek Earl (Charcoal Production/Agro-Forestry)	2.5 pm
- Grant Curtis (Briquetting)	<u>2.0 pm</u>
	14 pm

In the latest budget revision by Georgia Tech (April 1985), the total actual overseas short term technical assistance received through June 1985 was 28.7 person months. Georgia Tech now estimates that 8 person months now remain under the contract. An additional 10 person months of technical assistance has been requested and it is anticipated that USAID will be acting on this before the beginning of the Third Annual Work Plan. This would give a total for the remainder of the project of 18 person months. Assuming that additional technical assistance is provided, the Third Year Plan reflects all technical assistance needs for this period.

b. Local Consultants:

The SREP has continued to rely on Sudanese experts on local consultancies to implement the program. During the past year the following local consultancies were used:

- Hamza Homoudi (Fuelwood)	- Project Leader
- Khalaffala Sid Ahmed (Fuelwood)	- Seedling Demand Study and Small Farm Grant Promotion.
- Hanafi Obeid (Fuelwood/Charcoal Production)	- Mechanized Farm Study with D. Earl.

- Mohamed Ali Hamid (Photovoltaic) - Field installation and testing.
- Ibrahim Abdalla Suliman (Photovoltaic) - Field installation and testing.
- Endi Amin (Dissemination) - Charcoal Stoves Production.
- Somaya Suliman (Dissemination) - Charcoal stoves and general publications
- Dr. Taj Eldin Nasroun (Charcoal Production) - Testing wood species for charcoal production.
- Dr. Harbi (Charcoal Production) - Mechanized Farm Corporation
- Ust William Ibrahim Asaad (Fuelwood Combustion) - Training on bomb calorimeter
- Jamal Sharback (Charcoal Stoves) - Charcoal Stove Production
- Ali Mohamed Hassan (Charcoal Production) - Charcoal Fines Supply

This method of local consultancies has proven to be a very effective method of mobilizing resources to implement SREP projects. It is planned that local consultancies will continue to play a major role in SREP activities.

C. Peace Corps:

November 1, 1984, Five Peace Corps Volunteers started their work with the SREP. These are the first U.S. Peace Corps Volunteers to come to Sudan. Under this experimental program, in which there is no Peace Corps office in Sudan, the volunteers are administered by Georgia Tech. A Peace Corps administrator was hired to take care of volunteer housing and other subsistence needs. The volunteers' work assignments and responsibilities have been developed by the Coordinator, Chief of Party, and the Project Leaders for their respective technology areas. All five Volunteers work on different aspects of extension and dissemination of renewable energy technologies.

Their work has definitely assisted the Dissemination Unit and allowed the SREP to expand its activities to other geographic areas. The Peace Corps Volunteers are currently assigned to the following project areas:

- Mary Clarkin (Dissemination Unit) - Workshops organization and implementation; publications.

- Brad Tyndall (Dissemination Unit) - Workshops organization and implementation; publications
- Jon Dorre (Charcoal Production) - Charcoal conversion study, briquetting charcoal fines and agricultural residues.
- Kevin McNally (Charcoal Stoves) - CARE El Obeid charcoal stove program, including workshop organization, technical assistance in producing clay liners for stoves, and marketing.
- Jim Adams (Fuelwood) - Um Tureibat Village Nursery and shelterbelt project.

The PCVs will continue working on the project through October 1986.

3. Participant Training:

The training emphasis for the past year has been on the further implementation of the Renewable Energy Technology MSc Program and the short term training for SREP staff. In the Second Work Year the eight students initially enrolled in the Program completed their first year at the University of Khartoum and took exams to qualify for the second phase at the University of New Mexico. Six students qualified to continue five will be attending UNM through July 1985. The sixth student, studying forestry, is attending Texas A&I for 2 months.

All 6 students will be completing their MSc in December 1985. The areas of study for the students are:

- Optimization and Application of Photovoltaic Systems.
- Wind Energy.
- Solar Ponds and Thermosyphon system.
- Solar Passive Tracking.
- The Economics of Charcoal Production from Cotton Stalks.
- Growth and Energy Characteristics of Different Tree Species in Sudan.

The other 2 students completed shorter research projects and were awarded Diploma degrees in January 1985. One of these students has decided to attempt on M.Sc. by research at the University of Khartoum, supported by SREP. This data collection will be of a great value to SREP's fuelwood/forestry work.

Short term training has focused on developing staff assigned to the SREP to achieve the immediate objectives of the Project. Special emphasis has been given to economic evaluation project management and dissemination of renewable energy technologies. Specific training given:

- El Tayeb El Bashir (RERI)- Charcoal Stove Production and Dissemination in Kenya.
- Awatif Mahmoud (RERI) - Charcoal Stove Production and Dissemination in Kenya.
- Dr. Mohd Osman Sid Ahmed (RERI) - Project Management, Denver Research Institute
- Dr. Ahmed Hassan Hood - Bio Energy 84 Conference, Jotheriburg, Sweden.
- Gaafar El Faki (RERI) - Course on Plantation species; establishment, management and tree improvement; North Carolina State U.

- Study tour on commercialization of renewable energy technologies, Georgia Tech.
- Somaya Suliman (SREP) - Study tour on commercialization of renewable energy technologies, Georgia Tech.
- Dr. El Tayeb Idris Eisa (ERC) - R & D Management; Institutional policies, procedures, goals plans and strategies; Denver Research Ins.
- Dr. Hasssan Wardi Hassan (RERI) - R & D Mgt. Institutional policies, procedures, goals plans and strategies; Denver Research.
- Hamza Homoudi (SREP) - Short course on irrigated agriculture and forestry integration techniques in Cairo, Egyptian Ministry of Agriculture.
- Dr. El Sheikh El Magzoub & Asma El Amin Ahmed - Briquetting of Agricultural Residues, Georgia Tech.

In addition to overseas training, the SREP organized a Project Evaluation course for the MSc students, RERI Staff and others interested. The course covered techniques for the appraisal of energy technology projects.

Other local training of SREP staff occurred in several workshops held during this year. Peace Corps Volunteers Brad Tyndal, Mary Clarkin, and Kevin McNally were trained in canun el duga production during the first charcaol stove producers training workshop. Shadia Nasr el Din was trained at the Nursery Training Workshop. Maha Hassan Osman attended the FAO sponsored workshop on Forestry Extension techniques.

B. Technology Development and Dissemination:

1. Grants Program:

The Renewable Energy Development Grants (REDG) Program has become the primary vehicle for the dissemination of all 5 SREP technologies. This program has enabled forestry techniques, energy efficient charcoal stoves, photovoltaic equipment, and surveys developed in Khartoum to be transmitted to Sudan's regions through local groups and organizations. Grants have been awarded to Government agencies, such as the Forestry Department, Gedaref; to village groups, such as Um Inderaba, Um Tureibat, and Timaede Haj al Tahir; to private voluntary organizations such as CARE Sudan; and to individual farmers and entrepreneurs.

During the first implementation year 19 grants were awarded in the areas of fuelwood/forestry, charcoal stoves, and photovoltaics. By April of the second year another 30 grants had been issued, covering all 5 technology areas, with 5 applications pending review. The 41 grants represent a total funding commitment of over LS 400,000 and \$ 50,000. It is expected that grant commitments will exceed LS 600,000 by the conclusion of this implementation year.

Monitoring and evaluation of REDG's continues according to the same procedures outlined in the 2nd Annual Work Plan. The newly hired Grants Administrator, Ms. Nahid Hussein, is insuring that monitoring is carried out in a timely fashion. She is also administering the review of new applications along existing guidelines. Most grant proposals are reviewed and decided upon within 6 weeks of receipt of a completed application.

2. Fuelwood/Forestry:

During the Second Work Year, more progress has been made on the projects initiated in the first year, and new work has begun in the regions. The number of grants has increased from 13 to 29. Follow-on grants were awarded to the successful Seleit and Um Inderaba projects. As of April 1985 it is estimated that over 130,000 seedlings have been distributed and over 120 feddans planted in shelterbelts and woodlots through SREP assistance.

The first grant project, at the Seleit Food and Livestock Production Scheme, continued to excel, with over 50 feddans of woodlot planted, nursery capacity exceeding 50,000 seedlings, and new shelterbelts and shade plantings begun. The Seleit project received a follow-on grant for a second year of operation. Khartoum area nurseries produced and distributed a record number of seedlings, and local small farmers, for the most part, had good success with their agroforestry plantings. Fuelwood planting and productivity in the Khartoum region would have been even greater, had not poor rainfall constrained the supply of irrigation water.

Village forestry in Um Inderaba saw the successful planting of a shelterbelt and shade trees in the face of difficult environmental conditions. The village showed such good participation and enthusiasm that their project was expanded through follow-on grants for improved water supply and new plantings. The program attracted much favorable attention in Kordofan, and a second village west of El Obeid, El Khoi, received a grant to begin a similar project with the assistance of the local Forest Department. A village forestry project for an irrigated area was started in Um Tureibat, Gezira Province, which is being assisted by a Peace Corps Volunteer, Jim Adams.

Three new projects were initiated in the Nile Province: nursery establishment at Wad Ban Naga, canal-side planting on the Seyal Scheme (including rehabilitation of Shendi nursery), and village forestry at Timaede Haj el Tahir. Another four grants were issued to recipients from the Blue Nile region - two small farmer agroforestry projects, a private nursery, and material support for 4 Forest Department nurseries.

A nursery management workshop was developed and executed in February 1985. Its goals were to teach SREP grantees and other interested parties basic techniques for nursery establishment and tree propagation. Some 12 persons from the Khartoum, Central, and Kordofan regions attended the workshop, which ran for one week at the Khartoum Nursery. Instruction

was offered by foresters from the Khartoum, Soba and Seleit Nurseries, and SREP Staff.

Work began on a conference on the integration of agricultural and forestry activities on irrigated schemes. The conference is planned for August 1985 (see 3rd Year Work Plan activities in next chapter).

3. Charcoal Stoves:

This program expanded dramatically during this implementation year, with all-metal canun el duga and metal/ceramic stoves now produced and sold commercially in the Khartoum, El Obeid, Wad Medani, and Shendi urban areas. Dissemination efforts utilized market demonstrations and producer training workshops to stimulate both supply and demand through traditional channels.

By May 1985, 3 producer training workshops had been held in Khartoum, 2 in Shendi, 2 in El Obeid, and one in Abu Gulfa Village (between Wad Medani and Rufaa). It is estimated that over 40 producers now manufacture and distribute more than 10,000 improved stoves per anum. This provides a new livelihood for traditional stovemakers, savings to consumers, and, hopefully, conservation of rapidly diminishing forest resources through the utilization of duga (small charcoal pieces normally discarded as waste) in the new efficient stoves.

SREP has worked with CARE Sudan, PLAN Sudan, FAO, the Adult Education Centre (Shendi), and the Community Development Department of Eastern Equatoria in executing these workshops and demonstrations. Without the participation of these regionally based groups the improved charcoal stoves program would not have been able to expand so far and so fast. The groups provide local contacts, logistical support, and extension workers to support the dissemination of the new stoves. SREP's Peace Corps Volunteers Mary Clarkin, Brad Tyndal and Kevin McNally have also played an integral role in

this program.

SREP has also been fortunate to have been able to work closely with experts from the Ministry of Energy and KENGO of Kenya on the development of stove designs and dissemination strategies. Maxwell Kinyangui has spent over 2 months working in Sudan, and 4 RERI staff have undertaken training in Kenya. This cooperation with neighboring country programs has helped everyone significantly.

4. Charcoal Production:

The results of the Charcoal Conversion Study conducted by Dr. Hassan Osman El Nour (Aug 1984) redirected the activities of charcoal production project area to focus more on effective utilization of trees being cleared in agricultural schemes and on the briquetting of charcoal fines and agricultural residues.

The Second Year Work plan called for training charcoal producers to use small metal and Cassamance kilns. This work was suspended when the earth kilns proved to be more efficient than anticipated. Costs for improved kilns appeared too high and hence discouraging for traditional charcoal producers. Therefore, emphasis were given to:

- testing and refining the results of the original charcoal conversion study completed in August 1984.
- better estimating briquetting techniques for charcoal fines and other agricultural residues.
- Introducing the idea of recovering trees cleared by mechanized farming schemes in rainfed areas to produce charcoal.

A second charcoal conversion study was begun in November, 1984, in Rawashda Forest, Gedaref District. The study was supported by SREP, the FAO Sudan Fuelwood Project, the Central Forests Administration, and the Eastern Region Forestry Department. Jon Dorre of SREP and Kamal Satie of the Central Forests Administration were the field researchers, supervising a team of forest inventory assessors and charcoal producers.

In order to eliminate possible errors in measurement of weights and volumes, a limited number of kilns were constructed and fired in the Rawshda Forests. The entire volume of wood in kiln and charcoal produced was weighted rather using sampling techniques. Field work was completed in April and final results are expected soon. It appears that although the original efficiency calculations were too high, earth kiln efficiencies are quite good, and there is little opportunity for technical improvement.

A local consultant was hired to further estimate the charcoal fines available in the depots in the Blue Nile Regions. This draft report was submitted in December; however, it was not specific enough to evaluate the charcoal fines resource.

As a result, the investigation of briquetting technologies which initially focused on charcoal fines as a feed stock, was expanded to consider several other possible feed sources, such as cotton stalks and ground nut shells.

Mr Grant Curtis, Georgia Tech Senior Research Engineer, provided a short term consultancy in the production of fiber bound fuels. He introduced three RERI staff members, Dr. El Sheikh El Magzoub, Asma El Amin and Jon Dorre, to the fiber binding process which has been patented by Georgia Tech. Followup activities to this consultancy included testing the briquettes fabricated to determine (1) their potential to substitute for traditional fuels used in cooking, (2) calorific values using different briquette compositions of binder and feed stock, (3) most appropriate density required for burning. In addition to this work the briquetting team is evaluating the feasibility of commercializing the technology and designing and testing a prototype briquetting system in Sudan.

Dr. Derek Earl, Forest Economist, who assisted in the first SREP study of Charcoal Production (Report of April 1984), returned to evaluate the economic feasibility of charcoal production and agroforestry establishment on large farming

schemes, assisted by Mohamed Hanafi Obeid, SREP Consultant. His findings showed that charcoal production on lands earmarked for clearing was economically attractive, and his work greatly stimulated the interest of 3 scheme directors. The result was the initiation of charcoal production on remaining lands to be cleared during this season to provide sorely needed cooking fuel for the refugee camps in the Eastern Region. The scheme directors also began leaving shelterbelts in all cleared areas, per Dr. Earl's recommendation.

The prompt, enthusiastic response of the mechanized farming sector to Dr. Earl's work has led SREP to anticipate new grant proposals from the Damazine area schemes for further charcoal production and agroforestry development. This should form a major part of the work in this technology area during the coming year.

5. Wood Fuels Combustion:

Early in this implementation year work on woodstoves was completed and technology development and dissemination efforts turned entirely to industrial wood fuels combustion systems. Woodstove work finished with reports on a literature survey and efficiency testing of open fires by Shommo Sha'a El Din, the woodstove project leader. Dr. El Sheikh El Magzoub then took over as project leader for the new work with industrial combustion systems.

Work in this new subject began with a survey of industrial wood fuels combustion systems in the Khartoum area executed by the National Energy Administration under a Renewable Energy Development Grant. The report from this survey was completed in April 1985. This report found the greatest technical and economic potential for combustion system improvement in the brickmaking industry.

Work during the rest of the year concentrated on more detailed investigation of local brickmaking operations and the development of a work plan for the coming year.

6. Photovoltaic Applications:

In the last year, four photovoltaic systems were purchased through grants to local entrepreneurs. All systems were to be used in areas that did not have access to the electricity grid. The systems purchased were:

- Portable lantern with self contained solar cell (80 units)
- Portable lanterns with centralized recharging system (1 recharger- 24 lamps)
- Street lamps recharged by solar cells (10 units)
- Refrigerator for vaccines with solar recharging system (1 unit)

The portable lanterns arrived in Sudan in September, 1984. By April 1985, thirty five (35) lamps had been sold at subsidized prices for field testing and consumer reaction. Twenty more lanterns were sold to the Adult Centre in Shendi for lighting classrooms.

The solar street lamps were received in Sudan in September, 1984. A field test plan to install seven of the lanterns in rural villages was agreed to in December, 1984. To date only one system has been installed.

The centralized lantern recharging system is now being tested in a rural village near Wad Medani.

The refrigerator, which was scheduled for installation in a medical refugee camp in Tokar in Summer 1984 has had several mechanical problems. It is now being installed in Tokar after extensive testing and repairs in Khartoum.

The remainder of this year (through June 85) and the first three months of the Third Annual Work Plan will be dedicated to continued field testing and economic evaluation of all systems.

7. Dissemination:

The Information Dissemination Unit considerably expanded its activities -- notably in the area of training workshops.

During one 6-month period (November 1984-April 1985), the unit produced or co-produced six different week-long workshops. Five of the workshops were stove producer training programs, while one workshop taught participants how to start and/or maintain a tree nursery. Of the six workshops, three were outside the Khartoum area.

In addition, the unit became a more active outreach agent to other donor institutions also involved in promoting renewable energy technology. The SREP staff, for instance, played a key role in the printing of a stove poster that had been ordered (and later distributed) by CARE- El Obeid.

On a larger scale, SREP worked closely with Foster Parents PLAN- Wad Medani and the Adult Education Centre at Shendi -- two groups with whom SREP co-sponsored stove producer workshops. SREP took the initiative in contacting other organizations to ascertain their interest in co-sponsoring such workshops.

The staff also was responsible for:

- Organizing an office into an information dissemination workroom;
- Preparation of a SREP T-shirt, stove poster and tree poster through school art contests;
- Publication of articles in newspapers and magazines, as well as distribution of press reports to television and radio;
- Participation in the Khartoum International Fair 1985;
- Development of a stove production monitoring system;
- Promotion of the stove through market demonstrations;

- Aiding the government - run Khartoum Nursery in publicity and outreach plans.

In addition in the area of information dissemination, SREP produced numerous reports and publications.

Reports documenting the status of SREP activities include:

- Monthly progress reports from the contractor to USAID;
- Semi-annual reports from the Counterpart to Ministry of Finance and Economic Planning;
- Regular appraisals by project leaders to the Technical Committee.
- Monthly reports by foreign and local consultants on their individual projects;
- Follow-up studies for each SREP-sponsored workshop;
- "How-to" handouts detailing steps in replicating information dissemination activities.

New developments in publications include:

a. Brochures

- i. How to Use the Canun El Duga (revised, new printing)
- ii. How to Plant a Tree (revised, new printing)
- iii. How to Plant a Shelterbelt (additional printing)

b. Manuals:

- i. How to Build the Canun El Duga (Trainer's Manual) (November 1984).
- ii. How to Build the Canun El Duga (Trainees' Manual) (Nov. 1984, revised Feb. 1985)
- iii. Basic Tree Nursery Techniques (Arabic and English) (Feb. 1985, under revision)

c. Renewable Energy Reports:

- i. Charcoal Production in Blue Nile Province by Dr. Hassan Osman El Nour and Kamal Satie (Nov. 1984)
- ii. Canun El Duga: Improved Charcoal Stoves for the Sudan by Gaafar El Faki Ali and Claudia H. Huff (December 1984).
- iii. Seedling Availability and Potential Demand in Khartoum Province by Khalafalla Sid Ahmed (April 1985)
- iv. Charcoal Conversion in the Rawashda Forest, Gedaref District. by Kamal Satie and Jon Dorre. (May 1985)
- v. Irrigated Agriculture/Forestry Integration Potential by Khalafalla Sid Ahmed (June 1985).
- vi. Wood Fuels Consumption in Khartoum Area Industries, by National Energy Administration, assisted by Dr. El Sheikh El Magzoub. (May 1985).
- vii. Agroforestry Development in the Mechanized Farming Sector, by Dr. D. E. Earl. (May 85)
- viii. Charcoal Production and Marketing Economics by Gaafar El Faki (June 1985).

d. Extensive In-house Reports:

- i. SREP 3rd-Year Work Plan.
- ii. Long Term Training Program.
- iii. Dissemination Consultancy Report. by Claudia H. Huff.
- iv. Development of Metal-Ceramic Stoves in El Obeid, by Maxwell Kinyangui.
- v. Fuelwood/Forestry in SREP, by Lester Bradford.
- vi. Action Plan - Mechanized Farming Scheme and Forest Administration Activities, by SREP staff.
- vii. Charcoal Production from Five Wood Species Using a Portable Metal Kiln, by Tageldin Nasroun, Asma El Amin, and Abdel Wadoud Abd Alla.

C. Procurement:

A considerable amount of equipment was purchased this year under the SREP. The focus of this procurement was on dissemination equipment, field testing equipment and vehicles. All were intended to assist the SREP with its commercialization, extension, and dissemination of renewable energy technologies.

This includes purchase of three additional vehicles; audio visual equipment such as projectors, publication equipment, and photography equipment; laboratory and field testing equipment.

At this point in the project, most of the laboratory equipment and dissemination unit equipment is purchased. Future procurement will be dedicated to additional vehicles and spare parts for existing vehicles plus materials and equipment for the newly formed Energy Information Center.

Life of project expenditure on procurement through March 31, 1985 was \$ 131,347 and LS. 80,000.

By the end of June it is estimated that \$ 140,000 and LS. 85,000 will have been spent. This expenditure can be broken down into the following categories (figure are approximations):

<u>Item</u>	<u>Procurement Expenditure</u>
Laboratory Equipment	\$ 22,000
	LS 10,000
Office Equipment	\$ 25,000
	LS 75,000
Dissemination Equipment (audio-visual)	\$ 39,000
Information Center (books and microfiche)	\$ 6,000
Forestry Field Equipment	\$ 3,000
Transport Equipment	\$ 45,000
	<hr/>
	\$140,000
TOTALS	LS 85,000

D. Budgets and Expenditure:

1. Georgia Tech Contract

The expenditure through March 31, 1985 is \$ 1,570,194.76 of a total budget of \$ 2,906,570.

2. Renewable Energy Development Grants (Dollars):

To date \$ 50,500 has been committed in grants. Due to nature of this project, very few grants require a U.S. dollars and this trend will continue through the remainder of the project.

(For further details see Appendix B).

3. Trust Fund:

This fund was increased by USAID and the Government of Sudan during the second implementation year to cover new local costs for the Peace Corps program. Another minor modification was made to support the new position of Grants Administrator. The revised budget and expenditure were as follows:

	<u>Budget</u> (LS)	<u>Cumulative Expenditure</u> to <u>30 April 1985</u>
1. Office support	93,000	52,133.66
2. Local Travel	69,339	31,061.27*
3. Housing	308,000	67,086.91*
4. Communication	82,000	25,050.18
5. Grants Adminis- tration	15,661	900.00
6. Miscellaneous	60,000	40,189.00
7. Peace Corps Support	<u>505,440</u>	<u>180,568.35</u>
TOTAL	1,133,440	396,989.37

* Expenditure by USAID on these items through 31 December 1984.

The Peace Corps item includes volunteer in-country training and allowances, communications and office expenses, and administrative support services.

4. Project Account and REDG (Pounds):

This fund includes expenditure for the technology areas, local training, transport, and incentives, as well as the local currency portion of the Renewable Energy Development Grants program.

Budgeted funds and expenditures for all areas except grants through 21 March 1985, are shown in the table below. Grant funds, commitment, and expenditure are shown in a separate table. (for more details concerning grants, see Appendix B).

It is anticipated that some funds will remain and be carried over into the third year plan (see next chapter). However, a substantial portion of this carryover shall consist of already committed grant funds.

**Project Account - Budget and Expenditure, Year 2
(through 21 March 1985)**

	EXPENDITURE					Total	Budget	Balance
	Consultants	Field Test Support	Field Test Materials	Training Participants		LS	LS	LS
	LS	LS	LS	LS	LS			
Charcoal Stoves	2277.00	68.75	876.00	.00	.00	3221.75	22523.00	19301.25
Charcoal Production	12139.99	3614.13	1773.40	.00	.00	17527.52	42709.00	25181.48
Fuelwood/Forestry	9782.56	2729.50	1681.95	.00	.00	14194.01	45445.00	31250.99
Wood fuels compustion	.00	.00	.00	.00	.00	.00	31336.00	31336.00
Photovoltaics	1457.66	2662.37	4620.70	.00	.00	8740.73	18226.00	9485.27
Dissemination	3645.82	4360.01	17916.02	3781.26	2095.00	31798.11	47415.00	15616.89
			11156.00			11156.00	.00	11156.00
Office Equipment & Supplies			3877.00			3877.00	.00	3877.00
SUBTOTAL	29303.03	13434.76	41901.07	3781.26	2095.00	90515.12	207654.00	117138.88
Incentives						23056.10	50000.00	26943.90
Travel and Maintenance						33724.26	12000.00	21724.26
TOTALS						147295.48	269654.00	122358.52

Grants Program
(LS)

<u>Numbers</u>	<u>Budget Total</u>	<u>Disbursed (to 30 April 85)</u>
42 Approved	478,372.50	351,997.00
8 Pending	136,880.82	

**III. Third Annual Work Plan
(July 1985 - June 1986)**

A. Institutional Development

Many Government of Sudan organizations, private voluntary organizations, and private enterprises are involved in renewable energy activities in Sudan. The SREP through a grants program has helped these groups develop their capacity to work in SREP technology priority areas. Contractor and GOS Project Account funds (other than for grants) concentrate on the development of the institutional capacity of the RERI in these areas.

The RERI staff involved in the implementation of SREP are generally new to most of the five priority areas, and some of them are new graduates with very little practical experience. As in the second year, we plan to continue training staff by having them work with local and overseas consultants.

To meet the manpower needs of the project activities in the third year, more use of long and short-term local consultancies will be needed. This can be met by either secondment of or personal services contracts with experienced personnel from other relevant institutions to work with RERI staff, both for central and regional activities.

The SREP will continue to promote institutional support for its activities through the Renewable Energy Development Grants Program. Some of the institutions and organizations which have indicated interest in future participation are:

- National Energy Administration in charcoal production, briquetting, and wood fuels combustion.
- Forest Administration Regional and District offices, for fuelwood production, community forestry, charcoal production and improved stoves dissemination.
- Damazine Livestock and Agricultural Corporation, Sudanese Egyptian Agricultural Scheme, and Arab Sudanese Agricultural Scheme, in organizing a demonstration to produce charcoal on their individual schemes.
- CARE and Foster Parents Plan/Sudan - in dissemination of charcoal stoves and field testing of photovoltaic lighting systems.

- Faculty of Engineering, University of Khartoum - testing of briquetting techniques.
- Forestry Research Centre - Nursery development.
- FAO/Central Forests Administration - improved stoves dissemination.
- Adult Education Centre, Shendi - improved stoves dissemination, photovoltaic lighting field testing.

1. On the Job Training:

All local and foreign experts will be used to the maximum extent possible in this area. In the coming year RERI staff as well as staff from other institutions will work directly with both local and foreign consultants in those areas which are of high priority, and where the involved institutions has limited experience. To ensure this, more short term consultancies are planned, and one or more counterpart personnel will work with each overseas consultant.

2. Participant Training:

The Renewable Energy Technology M.Sc. will complete its first cycle in December 1985. Budgeted funds for long term training will be essentially used up by this time. Therefore, in this program year, it is important to seek additional funds to continue the program. Dr. Yahia Hamid, Administrator for the Renewable Energy Technology Program, is now considering alternative methods of funding, one of which would be private industry and governmental organization support for the individual students.

USAID will not consider additional funding until after the first cycle is completed and evaluated, which would mean that any possible continuation of the program by USAID would not be until September 1986.

The students will be returning from their U.S. portion of the program in July, 1985 and will complete their research projects and dissertations at the University of Khartoum. The UNM part of training is emphasizing practical applications of renewable energy technologies and development

- 2 Electronics Experts Photovoltaic system field testing.

In addition to long term consultancies, each project will allocate funds for short term technical assistance as needed. This approach has proven to be extremely flexible and effective in meeting project objectives and deadlines. Invariably, development projects require special technical assistance that was not anticipated at the beginning of the implementation year. For this reason we budget funds for these manpower demands.

b. Overseas Consultancies:

The remaining overseas technical assistance now available to the SREP is eight (8) person months. However, the Georgia Tech has requested an additional 10 person months of technical assistance which should be approved before the beginning of the 3rd Annual Work Plan. Assuming additional funds will be made available by USAID the following is an estimate of technical assistance requirements for this period:

- Marketing of Renewable Energy Technologies (Consultant to be determined)	5 pm
- Combustion Engineering (Consultant to be determined)	3 pm
- Energy Information (Carolyn Huskey)	3 pm
- Charcoal Stoves (Consultant to be determined)	2 pm
- Briquetting (Grant Curtis)	2 pm
	<hr/>
	15 pm

4. Energy Information Centre

The RERI will establish an Energy Information Center this year. SREP support for this work will include technical assistance and \$25,000 for procurement of equipment and periodicals. Ms. Carolyn Huskey will work with the RERI librarian to organize the center. Work will include procuring periodicals, organizing existing documents, and establishing a communication network among other renewable energy institutions in neighbouring countries. In addition, a system will be set up to access nationally generated energy information.

B. Technology Development and Dissemination

1. General Strategy:

The overall strategy for technology development and dissemination will continue to rely on the private sector and local government and non-governmental organizations agencies to help implement and promote Renewable Energy Technologies. The dissemination of technologies to more distant areas is impossible to do with RERI staff alone. The approach taken by the SREP is to demonstrate a technology, determine its economic feasibility, and then rely on the private sector to promote the technology. This approach is also taken in dissemination.

The case of "canun el duga" serves as a good example. Workshops, market demonstrations, pamphlets and posters are developed to promote energy efficient charcoal stoves. These techniques are then taught to other government and private organizations so that they can initiate dissemination work in their regions. SREP can then provide further technical assistance and small grants to help financially support these activities.

Technical support comes from the Dissemination Unit of the RERI. This Unit now has 7 trained Sudanese Staff and 5 Peace Corps Volunteers experienced in regional technology dissemination activities. It also possess publications and other audiovisual aids to support these activities.

Thus the success of SREP technology dissemination will depend upon a combination of mobilizing private and public institutions, providing technical assistance to these groups and, in some cases, offering financial assistance through grants. In this way the SREP resources can be multiplied to provide a much greater impact on renewable energy technology adoption in Sudan.

2. Fuelwood/Forestry

As fuelwood/forestry activities have increased greatly in geographic scope during the past year, one of the key activities of the coming year will be monitoring projects' progress. Special attention will be paid to the contribution of local Forest Department staff in assisting grantees, while SREP staff will play a reduced role in grant implementation. If local technical

support is found adequate, further expansion of SREP fuelwood/forestry activities through new grants will be possible. Without adequate local assistance, SREP will not have sufficient manpower to take on substantial new work commitments.

The work plan for project monitoring is included in the general implementation plan for fuelwood/forestry below. Projects in the Khartoum area will be visited at least once per month, with projects in other regions visited at least once every 3 months. The addition of Mohamed El Fadl and Abbas from the M.Sc. program, along with Peace Corps Volunteers Kevin McNally, Jim Adams and Brad Tyndall to fuelwood/forestry staff will greatly increase monitoring and evaluation capacity. It is expected that the Central Region Forestry Department will appoint a forester to succeed Jim Adams in Um Tureibat when he moves to Damazine to begin work on assistance to the mechanized farming schemes. (For details of this work, see Mechanized Farming and Charcoal Production Section).

A conference on agriculture/forestry integration on irrigated schemes is planned for August 1985 in Khartoum. This will bring together scheme directors and senior foresters to discuss how both food and fuel wood production can be benefited by the inclusion of shelterbelts, canalside plantings, shade trees, woodlots, and other forestry activities within irrigated schemes. The successful Seleit Project will serve as a persuasive example to conference participants.

It is expected that this conference, to be named AFTAH (Agriculture and Forestry: Toward an Abundant Harvest), will generate new grant proposals for forestry work on irrigated schemes. Priority will be given to new projects in the Khartoum and Blue Nile area agricultural schemes, where interest has already been expressed in tree growing.

SREP village forestry is also planned to expand in the coming year. Specific sites of new projects will depend on local interest and participation. SREP staff expect new grant applications from the Blue Nile, Gezira, White Nile, Kassala, and Kordofan areas. Should the security situation improve in the Southern Region, projects in the Juba area may prove possible in coming years. Attention will be concentrated on village forestry during the winter season, when travel is easiest, and when new projects should start in order to have seedlings ready for rainy season planting.

To support village forestry efforts, new workshops in nursery establishment and shelterbelt planting will be held, based upon the first Khartoum Nursery workshop program. Schoolmasters, agricultural scheme managers, and other influential village citizens will be trained in basic techniques so that they can develop nurseries with minimal external assistance. One workshop will be held in Khartoum, with others possible in Damazine and Bara, which are centrally located for many potentially interested villages.

When SREP nurseries presently under development reach their projected production capacity, seedling production will exceed 700,000 per year. This can afforest over 1700 feddans.

Activity	1 9 8 5						1 9 8 6						Responsible
	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
1. Monitoring and Evaluation:	x	x	x	x	x	x	x	x	x	x	x	x	H.Hamoudi/Mohammed Izz el Din
a) Seleit													
b) Small Farmers + Khartoum Nurseries	x	x	x	x	x	x	x	x	x	x	x	x	Khelefalla/Abbas/B. Tyndall
c) Village Forestry:													
- Um Inderaba	x			x			x		x				H.Hamoudi/El Fadl
- Um Tureibat		x			x			x			x		J.Adam/H.Hamoudi/Seconded Forester.
- El Khoi			x			x			x			x	K.McNally/H.Hamoudi.
d) Nile Province Projects		x			x			x			x		H.Hamoudi/Local Foresters
e) Blue Nile Farms + Nurseries		x			x			x			x		H.Hamoudi
2. Agricultural/Forestry Workshop	_____												H. Hamoudi, Diss. Unit, Participants
3. Expand Irrigated Scheme Agroforestry	_____												
- Khartoum area	_____												H.Hamoudi, Local Foresters
- Blue Nile	_____												H.Hamoudi, Local Foresters, Hanafi
4. Village Forestry Expansion	_____												H. Hamoudi, El Fadl, Local Foresters, Hanafi
5. Preparation of Diss. Materials	_____												Diss. Unit
6. Shelterbelt and Nursery Workshops for Schoolmasters and others	_____												
- Khartoum				x									
- Damazine									x				H. Hamoudi, B. Tyndall, Hanafi
- Bara							x						

3. Charcoal Stoves:

The coming year will see continued application of the successful dissemination strategy of working with traditional stove makers and sellers on improved metal and ceramic/metal stoves. SREP expects to continue its work with CARE, PLAN, FAO, and other locally-based organizations that provide greater outreach capacity in the regions.

Producer workshops and market demonstrations will remain the focus of the stoves program. Significant expansion of stove production and sales is expected in the Eastern, Central and Kordofan regions.

The Dissemination Unit will continue to develop instructional and promotional materials on all types of improved stoves. New materials to be prepared this year will include a stove production video, and manuals for trainers and trainees in metal/ceramic stove production. The planned marketing consultant will analyze progress in stove dissemination and will offer further suggestions for its advancement.

A stove testing laboratory will be set up at the RERI facility in Soba. This lab will carry out internationally recognized VITA test procedures for evaluating existing and new stove models. Test results will be discussed in brief monthly bulletins prepared by the Dissemination Unit staff.

The staff will also issue monthly stove production and sales updates, including information on numbers of producers, production levels, sales outlets, and customers comments. Occasional studies will be made of charcoal supply and stove fuel savings in households. The success of this monitoring program will require close cooperation between SREP and the various organizations working in the regions.

ANNUAL WORK PLAN

Project: Charcoal Stoves

Activity	1 9 8 5						1 9 8 6						Responsible
	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
1. Monitoring and Education.....	x	x	x	x	x	x	x	x	x	x	x	x	Dissemination Unit
2. Assistance to FAO Dissemination Activities.....	_____			x	x	x	x	x	x	x	x	x	Dissemination Unit
3. Workshops in Khartoum.....	_____			_____			_____			_____			Dissemination Unit
4. Public Demonstrations.....	x	x	x	x	x	x	x	x	x	x	x	x	Dissemination Unit
5. Expansion of Kordofan area activity.....	_____												CARE
6. Ceramic/Metal Stove Workshops (outside El Obeid)...	_____			_____			_____			_____			CARE, Dissemination Unit artisan trainers
7. Development of Ceramic Stoves in Khartoum	_____			_____			_____			_____			Local consultant, Dissemination Unit
8. Canun El Duga Production Production	_____			_____			_____			_____			Local consultant, Dissemination Unit
9. Port Sudan Workshop.....	_____			_____			_____			_____			Dissemination Unit
10. Marketing Study.....	_____			_____			_____			_____			Consultant, D. U. Staff
11. Stove Testing Laboratory Establishment at Soba.....	_____			_____			_____			_____			Local Consultant
12. Testing and Reporting.....		x	x	x	x	x	x	x	x	x	x	x	Local Consultant

4. Mechanized Farming and Charcoal Production:

This year "Charcoal Production" work expanded into several diverse areas: 1) briquetting of charcoal fines and other agricultural residues; 2) charcoal conversion efficiency studies and 3) charcoal production and agroforestry on mechanized farming schemes. Because of the size and technical variety of activities it is necessary to reorganize them under different project areas. Thus, the SREP is renaming the Charcoal Production project area to "Mechanized Farming and Charcoal Production." Its activities will consist of the latter two areas mentioned above.

The briquetting subproject will be moved into the wood fuels combustion area, where more skilled staff and time are available.

The major effort in this area this year will be the organization and implementation of charcoal production and natural forest management/agroforestry in three large agricultural schemes near Damazine. The SREP will help organize a demonstration with the three schemes and the Forest Administration Damazine Circle. The demonstration will involve participation by the schemes, the Forest Administration, and SREP staff as well SREP Grants. Work will begin in September 1985.

The new focus on forestry and agriculture related activities requires a strong agricultural background in the project leadership. Mohamed Hannafi Obeid, a forester with long experience in the Blue Nile Province, should provide the necessary leadership qualities.

ANNUAL WORK PLAN

Project: Mechanized Farming and Charcoal Production

1 9 8 5

1 9 8 6

Activity	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Responsible	
1. Seedling Collection.....	prior to July													Forest Adm/SREP
2. Nursery Establishment and Raising Seedling.....	_____						_____						Forest Adm & Roseires Nursery	
3. Planting seedlings in the field and beating up.....	_____												One pilot scheme	
4. Land Demarcation				_____									Individual farms in Cooperation with senior Forester	
5. Organizing labor and management for charcoal making			_____										Individual scheme with senior Forester	
6. Charcoal making				_____			_____						Individual scheme through Contractors or direct hire	
7. Shade and Ornamental trees planting	_____												Farms with assistance from seconded forester.	

5. Wood Fuels Combustion/Briquetting:

Industrial wood fuels combustion work will focus on the design and construction of a prototype improved brick kiln in cooperation with an existing brickmaking operation. This work will involve the project leader, a new technician, an engineer hired by RERI for this project, an overseas consultant in combustion engineering, and the brickmaking crew. The new kiln will be operated in comparison with traditional kilns for 4 months with extensive monitoring of fuel requirements, firing quality, heat losses, and other parameters.

The results of this field test will be analyzed, and a plan developed for subsequent modification (if necessary) and dissemination of this design. It is hoped that dissemination activities such as promotional material production and marketing missions to other brickmaking operations can be underway before the end of this implementation year.

The briquetting subproject is now included under the wood fuels combustion area. Since the potential feed stocks for briquetting has expanded beyond charcoal fines, it now more appropriately fits with this area. Also, Dr. El Sheikh El Magzoub, project leader for wood fuels combustion can provide the technical skills and leadership required.

The goals of the briquetting team for this year are to continue research, design and construct a prototype production system, investigate the feasibility of such a system in Sudan and to write up their major findings in a preliminary report.

The briquetting team will use appropriate surveying methods to investigate the availability of the charcoal fines and cotton stalk resources in Sudan. From November to December 1985, Ms. Asma El Amin will supervise a survey team composed of a survey leader and a small group of data collectors. One month will be dedicated to collection of existing data, then one month to data collection in the field and the writing of a report.

During the month of July, 1985, using information and advice obtained from Georgia Tech, the briquetting team will refine a prototype briquetting system design. In addition, they will search for competent and responsible builders to transform their prototype design into a working production system.

From August, 1985 to December, 1985, the briquetting team will supervise the construction of their prototype system and prepare a work site for briquette production.

In December 1985, after the prototype construction is complete, the team will begin production of briquettes on a pilot scale and continue performance testing. Later, the team will search for field testing sites in the Damazine Area. Once a field site and the prototype are completed, Jon Dorré will take the prototype to the Damazine site to supervise field testing. He will have the backup support of the SREP briquetting staff in Khartoum as well as that of a counterpart on location.

From December 1985 to March 1986, the briquetting team will undertake a survey on the potential demand for their final product in the Sudanese market.

From March 1986 to May 1986, they will write a preliminary report which will include the results of the resource availability and market demand surveys and the major findings of their laboratory and prototype tests.

ANNUAL WORK PLAN

Project: Wood Fuels Combustion/Briquetting

Activity	1 9 8 5						1 9 8 6						Responsible
	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
a. <u>Wood Fuels Combustion</u>													
1. Technical Survey on Brick Kilns..... - Literature - Visiting sites to obtain technical data													El Sheikh
2. Design and Construction of a prototype brick kiln...	_____												El Sheikh + Local Consultancy + Engineer + Overseas Consultancy
3. Field Testing.....													Above + Technician
4. Analysis + Preliminary Report.....													El Sheikh, Gaafar El Faki.
5. Application on field.....													El Sheikh Dissemination Unit

ANNUAL WORK PLAN

Project: Wood Fuels Combustion/Briquetting (Continued)

Activity	1 9 8 5						1 9 8 6						Responsible
	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
b. <u>Briquetting</u>													
Charcoal fine and cotton Stalk Resource availability survey..						_____							Survey Team
Continued Testing.....	_____												SREP Briquetting
Prototype Preliminary Design (Prior to July)													SREP and Univ. Briquetting Staff
Training at Georgia Tech (prior to July)													Asma and Dr. El Sheikh
Prototype Final Design.....	_____												SREP Briquetting
Prototype Construction Laboratory Preparation.....		_____											SREP Contractor
Prototype Testing (Portable System).....							_____						SREP Briquetting Staff
Preliminary Report.....													SREP Briquetting Staff
Analysis of the Market Manufacturers and Demand.....							_____						SREP Staff

6. Photovoltaic Applications:

The SREP will continue to field test photovoltaic systems which were purchased with the REDGs. These include:

- Self Contained lanterns.
- Centralized charging stations to recharge portable lanterns.
- Solar refrigerator for vaccines.
- Sodium vapour street lighting systems.

In addition a study will be conducted to determine the economic feasibility of the various photovoltaic applications comparing with other energy sources. This report will use the results of the field studies of the past year. Based on this experience further work in photovoltaic applications will be determined.

ANNUAL WORK PLAN

Project: Photovoltaics Applications

Activity	1 9 8 5						1 9 8 6						Responsible
	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
A. Continuation on the 5 grants													
1. Self contained Lanterns (Bogo)													
a. Field visits.....	x	x		x									Grantee/RERI
b. Evaluation Report.....	x					x							
2. Centralized Lantern charging (Malouf)													
a. Procurement of 4 systems	x												
b. Villages selected and equipment installed.....		_____											
c. Field visits.....				x	x	x							
d. Evaluation Report.....						x							
3. Refrigeration System													
a. Field Visits.....	x				x								Grantee/RERI
b. Evaluation Report.....						x							
4. Street Lighting (SEDU)													
a. Field Visits.....	x			x	x								Grantee/RERI
b. Evaluation Report.....						x							
5. Solar Pump (U. of Gezira)													
a. Monitoring.....	_____												University of Gezira
B. Report.....	_____												

ANNUAL WORK PLAN

Project: Photovoltaics Applications (Continued)

Activity	1 9 8 5						1 9 8 6						Responsible
	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
B. Overall Evaluation and New Work Planning..... (Bogo)													SREP Staff
C. Economic Feasibility Study for P.V. in Sudan.....	_____												

C. Procurement

Additional procurement in this implementation year will include:

- 2 - CJ8 Jeeps.
- Spare Parts for all vehicles.
- Library/Information Center equipment.
- Photographic and dark room supplies plus other dissemination equipment and supplies.

Project Area	Consultancy & sub contracting	Field Test support	(LS)	Training Activities	Total
			Field Test materials & Equipment		
Charcoal Stoves		10,000	10,000	-	20,000
Fuelwood/Forestry	20,000	5,000	5,000	-	30,000
Mechanized Farming & Charcoal Production	20,000	15,000	5,000	-	40,000
Wood Fuels Combustion/ Briquetting	15,000	10,000	25,000	-	50,000
Photovoltaics	10,000	10,000	5,000	-	25,000
Dissemination	5,000	10,000	50,000	20,000	85,000
Sub Total					250,000
Grants					500,000
Travel & Maintenance					50,000
Incentive					<u>50,000</u>
TOTAL					850,000

D. Project Account Budget (by Technology Area)

Notes:

- 1) Budget assumes a carryover of LS 183,000 from the second implementation year. This, plus the LS 667,000 earmarked for the third implementation year from the Ministry of Finance and Planning, makes a total budget of LS 850,000.
- 2) The heading "Training Activities" encompasses funds to be used under the old headings "Participants" and "Project Training Activities". These headings were somewhat ambiguous and it is preferred to use one line item to cover all training operations.
- 3) No further expenditure under the "Construction" heading is planned, so it is not mentioned in this budget.

Date: May 11, 1985

TITLE	GRANT NUMBER	APPROVED BUDGET	ADVANCES RCVD TO DATE	GRANTEES DISBURSEMENT		
				THIS PERIOD	CUMULATIVE	BALANCE
FORESTRY/FUEL WOOD		LS	LS	LS	LS	LS
Seleit	001	67415	67415	11576.15	43815.62	23599.38
Khartoum Nursery	002	65450	65450	12612	57099.84	8350.158
Ibrahim Mohd Ibrahim	003	4000	4000	4000	40000	0
Soba Nursery	004	45940	19540	4922.11	18277.11	27662.89
Um Inderaba (1)	005	10500	10500	2759.6	9844.38	655.62
Um Inderaba (2)	005A	13500	13500	13500	13500	0
Um Inderaba (3)	005B	19645	19645	7788	7788	11857
Sudan Poultry Farm*	011	1000	0	0	0	0
Mahadi Musa*	012	500	0	0	0	0
Elamin Mohd A/Hafiz*	015	500	0	0	0	0
Abu Dom Cooperative	016	1000	500	500	500	0
Mohd Elkhair Agroforestry*	017	500	0	0	0	0
Ahmed Mohd Issa*	018	180	0	0	0	0
Ibrahim Talab*	019	22.5	0	0	0	0
Green Deserts	020	1000	1000	710	710	710
Ahmed Mohd Ali	021	500	0	0	0	0
Awoda Farm	022	4000	0	0	0	0
Zein El Abdin	023	4000	0	0	0	0
Omar Hassan Omar	024	500	0	0	0	0
Um Teirabat	026	997	997	997	997	0
A H Ramly	027	775	775	0	0	0

Appendix A. Grant Status Report
(Sudanese Pound Grants)

TITLE	GRANT NUMBER	APPROVED BUDGET	ADVANCES RCYD TO DATE	GRANTEES DISBURSEMENT		
				THIS PERIOD	CUMULATIVE	BALANCE
		LS	LS	LS	LS	LS
Abdel Rahman Ali Omer*	028	240	0	0	0	0
Elhoush Hospital*	030	135	0	0	0	0
El Khoi	031	12184	8784	0	0	0
Yahia Ibrahim Mohd*	032	300	0	0	0	0
Dr. Yousif ElKhalifa*	033	300	0	0	0	0
Mohd Ahmed ElShikh*	034	250	0	0	0	0
Wad Benaga	035	21300	21300	0	0	0
Seyal Scheme	036	8700	8700	0	0	0
B N Forest Nurseries	039	6900	6900	6900	6900	0
Timad Hag ElTahir	040	16310	10000	0	0	6310
ElDaw Idris	043	750	0	0	0	0
PHOTOVOLTAICS						
U of Gezira PV Water Pump	014	7200	6000	3396.05	3396.05	3803.95
CHARCOAL STOVES						
C. Coal Stove Contest	009	12745	4812	768	4812	7933
CARE C.Coal Stoves	013	44556	35156	29940	29940	14616
Juba Stove	037	1000	1000	0	0	0
Shendi Stove	041	6198	0	0	0	0
FAO Stove	042	55055	0	0	0	0
WOOD FUEL COMBUSTION						
NEA Survey	025	33725	31225	2861	31225	0
CHARCOAL PRODUCTION						
Gedaref Forestry Dept	029	8600	8600	8600	8600	0
TOTAL		478372.5	351997	111829.9	277405	74592

* Farmers received seedlings provided free to SREP by Khartoum Forest Nursery.

Date: May 11, 1985.

TITLE	GRANT NUMBER	APPROVED BUDGET	ADVANCES RCVD TO DATE	GRANTEES DISBURSEMENT		
				THIS PERIOD	CUMULATIVE	BALANCE
		LS	LS	LS	LS	LS
Solar Ref Med Vol Int	006	5000	5884.5	5884.5	5884.5	884.5
BOGO	007	18500	9000	9000	9000	8500
Fuad Malouf	008	17000	4113	4113	4113	12887
SEDU Ltd	010	10000	9893	9893	9893	107
TOTAL		50500	28890.5	28890.5	28890.5	20609.5

Grant Status Report
(Dollar Grants)

APPENDIX B

**PROCUREMENT UNDER SUDAN RENEWABLE ENERGY PROJECT
AS OF APRIL 1985.**

	DESCRIPTION	QTY	RECEIVED	ASSIGNED LOCATION
A.	<u>OFFICE EQUIPMENT</u>			
	1. OSBORNE COMPUTER	3	MAY 83	SREP
	2. NEC PRINTER	1	MAY 83	RERI
	3. NEC SPIN WRITER	1	MAY 83	SREP
	4. EPSON PRINTER	1	MAY 83	SREP
	5. IBM TYPEWRITER ENGLISH	3	OCT 83	SREP/RERI
	6. IBM TYPEWRITER ARABIC	1	OCT 83	RERI
	7. MINOLTA PHOTOCOPIER	1	OCT 83	SREP
	8. HP 12C CALCULATORS	2	NOV 84	SREP
	9. MINOLTA PHOTOCOPIER WITH SORTER	1	OCT 84	SREP
B.	<u>FORESTRY SUPPLIES</u>			
	1. DIR. RD. ANEMOMETER	1	JUN 84	RERI
	2. MOISTURE METERS	2	JUN 84	RERI
	3. 200 SAMPLING BAGS	200	JUN 84	RERI
	4. COMPASS	4	JUN 84	RERI
	5. 4 BAND SAWS/w blades	4	JUN 84	RERI
	6. PLASTIC FLAGGING '800 YDS'		JUN 84	RERI
	7. MEASURING ROD	1	JUN 84	RERI
	8. TRIPOD-BRUNTON TRANSIT W/ACCESSARIES	1	JAN 85	
	9. TREE MEASURES CHAINS	3	JUN 84	RERI
	10. TREE HEIGHT MEASURES	3	JUN 84	RERI
	11. CALIPERS, TREE DIAM MEASURES	3	JUN 84	RERI
	12. SUUNTO KB-20 COMPASS	2	JUN 84	RERI
	13. HAGA ALTIMATORS	4	JUN 84	RERI
	14. DIAMETER TAPE	4	JUN 84	RERI
	15. CALIPERS	4	JUN 84	RERI
C.	<u>AUDIO-VISUAL EQUIP</u>			
	1. TRIPOD & SCREEN	1	JUN 84	RERI/DISSEM
	2. SLIDE PROJECTORS	2	JUN 84	RERI/DISSEM
	3. OVER HEAD PRJECTOR	1	JUN 84	RERI/DISSEM
	4. 1000 TRANSPARENCY SHEETS	1000	JUN 84	RERI/DISSEM

DESCRIPTION	QTY	RECEIVED	ASSIGNED LOCATION
5. TECHNICAL GRAPHIC PENS	3	JUN 84	RERI/DISSEM
6. LETTERING SETS	2	JUN 84	RERI/DISSEM
7. ROLLSL-DRAWING PAPER	2	JUN 84	RERI/DISSEM
8. '35MM' FILMS	50	JUN 84	RERI/DISSEM
9. PARALLEL STRAIGHT EDGE	1	JUN 84	RERI/DISSEM
10. PANSONIC TUNER, CAMERA	1	JUN 84	RERI/DISSEM
11. HITACHI '20' MONITOR	1	JUN 84	RERI/DISSEM
12. 35 MM KONICA CAMERAS	2	JUN 84	RERI/DISSEM
13. POLAROID CAMERA	1	JUN 84	RERI/DISSEM
14. TAPES	2	JUN 84	RERI/DISSEM
15. PLASTIC SHEETS	1000	DEC 84	SREP/DISSEM
16. SPIRAL BINDER	500	DEC 84	SREP/DISSEM
17. SPRIAL BINDER MACHINE	1	DEC 84	SREP/DISSEM
18. "DAY" FRAMES	20	DEC 84	SREP/DISSEM
19. PAPER CUTTER	5	DEC 84	SREP/DISSEM
20. SLIDE PRJ/SC SCREEN	1	JAN 2/85	DISSEM
21. PLASTIC SHEETS - SLIDES	100	JAN 2/85	DISSEM
22. TRIPOD FOR VIDEO	1	JAN 2/85	DISSEM
23. PORT LIGHT TABLE	1	JAN 2/85	DISSEM
D. <u>TRANSPORT</u>			
1. JEEP CJ8s	3	JULY 83	SREP
2. JEEP CJ8 WAGONS W/PARTS AND ACCESSORIES MEASURES	2	OCT 84	SREP
3. CELIBRITY STATION	1	APR 85	SREP
E. <u>LAB & FIELD EQUIPMENT</u>			
1. THERMOMETERS	12	JUN 84	RERI
2. CONDUCTIVITY METER	1	JUN 84	RERI
3. VOLTAGE CONVERTER	2	JUN 84	RERI
4. MUFLE FURNACE	1	JUN 84	RERI
5. OXYGEN CALORIMETER W/ACCESSOR.	1	JUN 84	RERI
6. PH METER	1	JUN 84	RERI
7. SUPER CASE:ELCTRCL KIT	1	JUN 84	RERI
8. 6 CHANNEL MULTIPOINT RECORD	2	JAN 85	RERI

DESCRIPTION	QTY	RECEIVED	ASSIGNED LOCATION
9. HANDHELD THERMOMETER	2	JAN 85	RERI
10. HANDHELD MULTIMETER	4	JAN 85	RERI
11. VAR, SPEED MOTOR (NCR)	1	JAN 85	RERI
12. STRIP CHART RECORDER	2	NOV 84	RERI
13. WIND SPEED COMPILATOR	4	JUN 84	RERI
14. WIND ANFMOMETER A22	5	Jun 84	RERI
15. WIND SPEED & DIRECTION COMPILATOR	2	JUN 84	RERI
16. ANEMOMETER HEAD, 4 POLE	10	JUN 84	RERI
17. BATTERY LITHIUM	10	JUN 84	RERI
18. PRECSION PYRANOMETER	2	JUN 84	RERI
19. ELECTRONIC INTEGRATOR	2	JUN 84	RERI
20. HANDHELD SOLARMETER	4	JUN 84	RERI
F. <u>INFORMATION CENTRE</u>			
1. NTIS MICROFICHE COLLECT	1	SEPT 84	
2. VOLUNTEERS IN ASIA VOL 1 & 2	1	SEPT 84	