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| Agency for International Development PACR Project Assistance Completion Report | 1. Cooperating Country Sudan | Page 1 of 7 Pages |
| | 2. Project Name & Number Sudan Renewable Energy Project (650-0041) | |

3. Functional Account(s) SDA/ARDN

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| 4. Project Assistance Completion Date (PACD) Original <u>09/03/86</u> Amended <u>02/28/90</u> | 5. PRO/AG No. and Date 650-0041 Amend. 7 - 5/18/88 |
|--|---|

6. Type of Agreement and Grantee: Bilateral Grant Government of Sudan

Grant Cooperative Agreement LSCA Other

7. Financial Inputs (000's)

| Project Element | | PP Budget | Latest Budget | Earmarked | Unearmarked |
|---|---------|-----------|---------------|-----------|-------------|
| #1 Technical Assistance | Dollars | 1,230 | 4,800 | 4,783 | 17 |
| | LS | \$ 285 | LS. 4,572 | 4,271 | 301 |
| #2 Training | Dollars | 458 | 149 | 149 | - 0 - |
| | LS | \$ 54 | LS. 30 | 31 | (1) |
| #3 Commodities | Dollars | 323 | 562 | 565 | (3) |
| | LS | \$ 174 | | | |
| #4 Other costs Construction and Staff support | Dollars | 65 | 0 | 0 | |
| | LS | \$ 319 | | 300 | (300) |
| #5 Dev. Grants | Dollars | 2,001 | 48 | 48 | - 0 - |
| | LS | 0 | | | |
| #6 Inflation | Dollars | 316 | 0 | 0 | |
| | LS | \$ 192 | 0 | | |
| #7 Contingency | Dollars | 207 | | 0 | |
| | LS | \$ 1,976 | | | |
| Totals | Dollars | 4,600 | 5,559 | 5,545 | 14 |
| | LS | \$ 3,000 | LS. 4,602 | 4,602 | - 0 - |

Note: 1. Project debts, this FY90, total USD 40,881.80
 2. PP budget for LS includes other GOS counterpart contributions, where as latest budget, earmarked and unearmarked LS amounts represent Mission administered trust funds only.

8. Outputs (Per Grant Agreement)

Expected Outputs

Actual Outputs

- | | |
|--|--|
| 1. Energy Studies on demand | 1. Over 15 studies prepared during Phase I and II. |
| 2. RET's developed, field tested and disseminated | 2. Most RET's identified in P.P. discarded Stoves, agroforestry technologies and pumps disseminated. |
| 3. RET Assessments/Counterparts trained | 3. Team developed in technology evaluation. |
| 4. Technologies evaluated (see above) | 4. Over 115 small grants distributed, monitored and evaluated. |
| 5. Technologies installed and marketed (see above) | 5. Training of staff of participating PVOs undertaken on stoves, agroforestry and briquetting. |
| 6. Grant Funds provided | 6. Dissemination unit developed materials on technical subjects. |
| 7. Training of PVO and GOS staff | |
| 8. Training materials prepared | |

9. Remaining Actions

a. Monitoring

Monitoring of continuing activities being funded with counterpart funds.

b. Covenants and Conditions

All covenants and conditions met

c. Audit Recommendations

No audit undertaken

d. Status of Final Evaluation

Final evaluation cancelled (As a result of Section 513 Phase-out).

e. Estimated Deobligation Amount: \$ 13,784

This estimated amount is after FY90 project deobs thru May 29, 1991 of US Dollars- 40,881.80.

f. Terminal Date for Disbursement: 11/30/90

10. Close Out Check-List

- X a. The Project Officer, in conjunction with the Controller and Contracting Officer, has reviewed all AID-financed commitments (contracts, sub-grants, PIO/Ps) to ascertain what, if any, amounts remain to be billed and paid; to discover any disputes that have arisen or are likely to arise and to expedite their settlement to the extent possible. An accrual worksheet has been filled in with the help of the Controllers office and all amounts committed but no longer required have been de-committed.

- X b. The Project Officer, in conjunction with the Controller and Contracting Officer, has reviewed all earmarking documents to ascertain whether all disbursements can be made under existing earmarking documents and, where necessary, to make appropriate adjustments to ensure that sufficient funds will be available to cover all anticipated disbursements. All earmarked funds in excess of those required to complete the project's activities have been de-earmarked.

- X c. Official project files have been cleaned up and organized, those no longer required for implementation and monitoring have been retired to storage.

11. Other Comments

12. Clearances

| | | | |
|---------------------|---------|------------------|---------|
| Project Officer | Date | Program Officer | Date |
| Kenneth N. Randolph | 5-20-90 | Dirk Dijkerman | 5/27/90 |
| Contracts Officer | Date | Controller | Date |
| David Osinski | 5/24/90 | Harry Shropshire | 6/7/90 |
| Project Officer | Date | | Date |
| Raouf Youssef | 5/21/90 | | |

13. Authorized

| | |
|----------------------|---------|
| Frederick E. Gilbert | Date |
| Frederick E. Gilbert | 6/13/90 |

Mission Director

SUDAN RENEWABLE ENERGY PROJECT
(650-0041)

PROJECT ASSISTANCE COMPLETION REPORT

1. PROJECT DESCRIPTION

The Sudan Renewable Energy Project (SREP) was designed to develop, evaluate and promote renewable energy technologies, through the Renewable Energy Research Institute (RERI) and the Energy Research Council (ERC) of the National Council of Research (NCR).

2. PROJECTS STATUS

SREP had an initial PACD of September 30, 1986, but given the success of the first phase of the Project (as outlined in the 1984 mid-term evaluation) it was decided to extend SREP for an additional phase (Phase II).

The revised PACD of the Project prior to the imposition of Section 513 was September 30, 1990. The Mission's Section 513 Windup Plan terminated the Project on February 28, 1990. While this was not significantly earlier than the planned PACD, it should be noted that the approved Brooke Plan would have permitted an additional eighteen month extension of SREP to ensure the completion of Phase II project activities.

A. Technical Assistance:

The initial contract was awarded to Georgia Institute of Technology (GIT), which fielded a technical assistance team in Khartoum from August, 1982 until February, 1987. In December, 1987 a second contract was awarded to Associates in Rural Development (ARD) in support of Phase II of the Project.

B. Training:

All long term training has been completed under the Project, and the last two MSC candidates are returning to the Sudan.

C. Commodities:

All commodities procured under the Project were received by the PACD.

D. Evaluations:

A mid-term evaluation was carried out in September, 1984. No final evaluation is planned.

3. PROJECT ACCOMPLISHMENTS

General Summary

SREP was able to set up and support a center of technical expertise which appears to be viable even without continued external support, and one which is considered to be the country's primary research agency in several key areas, including stove testing, biomass research, and power systems (including diesel systems).

A primary reason behind this accomplishment was the ability of the contractors, especially under Phase I, to identify the Project with the ERC; all planning and implementation was accomplished collegially, with the counterpart staff taking primary responsibility.

On balance, SREP was also able to avoid the normal tendency of research organizations in the Third World not to concentrate on realistic, commercially viable applications. This was accomplished through two methods:

- o Rigorous elimination of technologies not meeting criteria of replicability and commercial potential;
- o Emphasis on a Dissemination Unit as the evaluation, monitoring and outreach section of ERC.

Many of the technologies initially identified in the Project Paper are no longer being pursued by the ERC. While this has limited somewhat the technical output of the Project, this elimination of marginal, economically questionable technologies is a significant achievement for a research institution, and augers well for the sustainability of the ERC after the completion of SREP. The ability of the ERC to review options rigorously provides the GOS and other donors with an impartial technical institution.

Overview of Phase I Accomplishments

During Phase I of the Project, the technical assistance team from Georgia Tech and its subcontractor, Energy/Development International (EDI), assisted in the evolution of the project away from the Faculty of Engineering of the University of Khartoum to the Renewable Energy Research Institute. In 1983, based on an interim review by REDSO technicians, SREP focused its activities on biomass-related systems, including improved stoves, briquetting, and agroforestry options for small farmers, mechanized farms and irrigated schemes.

A counterpart fund small grants program was established, with most grants being given during Phase I. The fund was well-managed, and served as a model for GOS and USAID for the establishment of similar funds in different sectors.

Most of the grants were provided to farmers and corporations for forestry/agroforestry activities. An additional block grant was provided to the Forestry Research Centre in Soba, to assist that institution to renovate its nursery, and to undertake research related to problems identified during the implementation of the other forestry grants.

SREP played a key role in reviewing and redirecting the stove programs in Sudan. During Phase I, a rigorous attempt to disseminate the metal stove invented by a senior staff member of the Faculty of Engineering demonstrated the long term weakness of the design, leading to its abandonment in favor of a stove similar to the Kenya Jiko stove. During this period, there was close collaboration (including study tours, technical assistance and participation in training workshops) with the AID-funded Regional Stoves Network, based in Nairobi with KENGO.

A stove testing center was also installed in Soba; this center has now become the country's sole stove testing center, and will be a key element in the World Bank's planned Forestry Resource Conservation project (FRCP).

Initial design and testing was also undertaken on a cotton stalk briquetting process.

In order to improve the qualifications of researchers already assigned to the ERC/RERI, and to bring up new graduates, a joint University of Khartoum/University of New Mexico training program was established (see below), and a wide variety of short term training, as well as in-country and on-the-job training was given.

Overview of Phase II Accomplishments

Technical Assistance:

Two long term staff were provided, including a small enterprize specialist. While important short term technical assistance was provided on stoves, briquetting, water pumping and forestry, the level of activity was reduced due to Section 513.

Training:

Over the course of the project, a significant number of midlevel and senior level SREP staff received short or medium term training outside of Sudan. A substantial portion of all training on agroforestry and stoves was given by KENGO in Kenya.

A Masters program was set up, initially designed in conjunction with the University of New Mexico, to help develop expertise in areas where the RERI was weak (such as forestry). While the overseas program proved to be too expensive, the subsequent development of a forestry program within the University of Khartoum is now playing a major role in providing new trained graduates for the ERC.

Commodities:

The second phase provided two new vehicles as well as a substantial upgrade of the ERC's computer system. While no pumping equipment was procured, seven monitoring systems were bought and staff trained in their use.

4. DONOR CONTRIBUTIONS/ACTIVITIES

The German development assistance agency, GTZ, originally designed the renewable energy program at the Energy Research Council along with USAID, and their support through a Special Energy Project was designed to complement SREP. The primary activity of the GTZ Project was to construct a headquarters building for the ERC. Unfortunately, a variety of delays substantially delayed construction, with the building completion being delayed until the end of May, 1990.

5. LESSONS LEARNED

1. It is possible to development a research organization emphasizing dissemination, outreach and impact. It is unlikely that this could have been organized in a line agency rather than the National Council of Research.
2. The Project would have been more effective if its forestry counterparts (such as a Forestry Research Centre) had been stronger.
3. The strong institutional support provided by the Phase I contractor was not in evidence during implementation by the Phase II contractor. This, coupled with the departure of the Peace Corps volunteers in 1986, affected morale, and the effectiveness of the Dissemination Unit.
4. Projects in countries with available counterpart funds and large numbers of trained technical staff, as is the case with the Sudan, can undertake a variety of activities with relatively minimal external technical assistance.