PD-AAR-147 39532

CLASSIFICATION

PROJECT EVALUATION SUMMARY (PES) – PART I

Report Control Symbol U-447

1. PROJECT TITLE	2. PROJECT NUMBER	3. MISSION/AID/W OFFICE
Botswana Renewable Energy Technology Project	633-0209	USAID/Botswana

4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) 633-85-1

☒ REGULAR EVALUATION ☐ SPECIAL EVALUATION

5. KEY PROJECT IMPLEMENTATION DATES			6. ESTIMATED PROJECT FUNDING ($000)	7. PERIOD COVERED BY EVALUATION
A. First PRO-AG or Equivalent FY 80	B. Final Obligation Expected FY 82	C. Final Input Delivery FY 85	A. Total $4707.3 B. U.S. $3304.0	From (month/yr.) Jan/84 To (month/yr.) Apr/85 Date of Evaluation Review May 1985

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
Decisions		
1. A brief memorandum on the need to continue extension activities, irrespective of what may be necessary to disseminate stoves, should be developed.	BRET	June/July 85
2. Final reports should be grouped around end use categories, and should include discussion on the relative importance of the various technologies relevant to a given end use. The reports should also attempt to give guidance as to the status of information needed for deciding GOB policy, and possible steps that might be taken to develop that information.	BRET	August 85
3. A prelimary TDY by staff of TECHNOSERVE and KENGO, both based in Kenya, should be arranged to evaluate the BRET work on metal stoves, and to develop a plan for future activities. This consultancy would be the first step in deciding GOB strategy for stoves and would evaluate the role of extension activities.	BRET MMRWA USAID/B REDSO/ESA	June/July 85
4. AID/W S&T and WASH should be asked to provide support for the GOB project that will continue the data collection and analysis of the comparative pumping activity.	USAID/B	May 85
Issues		
1. A plan needs to be developed for the disposition of	MMRWA	June 85

(Continued on Attachment A)

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

- ☐ Project Paper
- ☐ Financial Plan
- ☐ Logical Framework
- ☐ Project Agreement
- ☐ Implementation Plan e.g., CPI Network
- ☐ PIO/T
- ☐ PIO/C
- ☐ PIO/P
- ☐ Other (Specify) _____
- ☐ Other (Specify) _____

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

- A. ☒ Continue Project Without Change
- B. ☐ Change Project Design and/or ☐ Change Implementation Plan
- C. ☐ Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

Stafford Baker, USAID/B General Engineering Officer

C. A. Pryor, REDSO/ESA Energy Advisor

12. Mission/AID/W Office Director Approval

Signature: Edward E Butler

Typed Name: Edward Butler, Act. Director

Date: 5/29/85

AID 1330-15 (3-78)

ATTACHMENT A

PROJECT EVALUATION SUMMARY (PES) - PART 1

B. Action Decisions Approved by Mission or AID/W Office Director

Issues (continued) A	B	C
BRET project equipment commodities within the GOB at the end of the project.		
2. Small working groups composed of BRET staff, MMRWA staff and other relevant GOB departments need to convene to plan the takeover of BRET activities under the four mini-projects proposed by the GOB.	MMRWA	June 85

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FINAL EVALUATION

1. Project Title and Number

Botswana Renewable Energy Technology Project, 633-0209

2. Project Description and Development Problem

Botswana faces major problems in the supply of energy for its growing population and economy. Fuel prices increased rapidly due to the OPEC boycott of South Africa (which supplies Botswana's petrol fuel) and more recently due to the rising value of the U.S. dollar in relationship to the country's currency. Energy from domestic coal is costly and available only in limited areas. The price of firewood is rising rapidly, imposing an increasing hardship on the urban and rural poor for whom it is the principal source of fuel for cooking and heating.

Botswana has major untapped potential for increasing the use of inexpensive renewable energy sources such as sunshine and wind. In addition, there is great potential for increasing the efficiency of fuel wood use. The Botswana Renewable Energy Technology (BRET) project was developed to coordinate research, development and extension of renewable energy technologies for the GOB. The project purposes are: (1) to introduce village renewable energy technologies which are easily reproduced and inexpensive, and (2) to research, develop and put into use renewable energy technologies which can reduce Botswana's dependence on increasingly expensive fossil fuels.

The BRET project is implemented by the Associates in Rural Development (ARD) on direct contract with AID. The ARD staff manage the use of AID project funds and the GOB contribution to project activities under the general guidance of a Project Executive Committee (PEC). The PEC is made up of representatives of the Ministry of Mineral Resources and Water Affairs (MMRWA), the Ministry of Finance and Development Planning (MFDP) and USAID.

3. Purpose of Evaluation

This is the final evaluation of the project, primarily concerned with:

a. Determining how effective the contractor has been in adopting the recommendations of the mid-term evaluation;

b. Reviewing the GOB plans for continuing ongoing project activities beyond the PACD; and

c. Determining if there are any specific short-term activities by AID regional or centrally funded projects that might assist the GOB with completion of ongoing project components.

4. Evaluation Methodology

The final evaluation of the project was originally scheduled to take place in January, 1984. However, because of early implementation delays experienced by the project, the mid-term evaluation was delayed and only completed in February, 1984 and the final evaluation was rescheduled. The purpose of the final evaluation, to review the success of the project and to assist the GOB with decisions on follow-on activities remains the same.

The evaluation team consisted of Mr. C. A. Pryor, Regional Energy Officer with REDSO/ESA, and Mr. Stafford Baker, General Engineering Officer for USAID/Botswana. Mr. Pryor was team leader for the mid-term evaluation and Mr. Baker has been the USAID/Botswana project manager for BRET since June, 1984.

The evaluation team reviewed all relevant project documentation including ARD reports and studies, the final BRET Annual Work Plan, minutes from PEC meetings and the mid-term evaluation. Sites where demonstration, extension and pumping activities are on-going were visited and interviews were conducted with BRET and GOB staff and villagers participating in extension tests.

5. Findings

a. Status of Project Goal, Purpose and Outputs

In summary, it is felt that the contractor will meet or surpass almost all outputs as revised in the mid-term evaluation. Those remaining outputs are problemmatic due to delays in procurement unrelated to contractor performance.

The more serious concerns, as addressed in this evaluation, relate to the lack of progress over the last six months on the part of the GOB and the contractor to resolve the future incorporation of these pilot activities into the GOB program. A pilot project implies an emphasis on follow-up, with or without the original donor. For this reason, it should be evaluated as much as the quality of planning for follow-up activities as on the existence of certain outputs. For this reason, both parties are urged to focus on such planning during the next several months. AID will (in August) prepare an evaluation addendum, to review progress made in developing follow-up plans, as well as the final reports on technologies.

The contractor has conscientiously attempted to follow each of the recommendations identified in the mid-term evaluation, and has reorganized its work so as to complete the revised outputs as presented in the earlier evalution.

The mid-term evaluation emphasized the improvement of the quality of work undertaken by the contrator, through more rigorous use of appropriate methodologies and through increased review of work by peers and other specialists. Much has been

done in this regard, particularly by hiring an experienced engineer to assist in the testing and evaluation of the technical components of the project.

However, there is still some concern over the overall methodology being used; now that the project's major problems have been resolved it is appropriate to evaluate the utility of the methodology developed by the contractor.

The basic concept developed by ARD has considerable merit, however there appears to be a tendency in implementing it to become dominated by the design and testing of pieces of hardware; the linkages between technology, the end use, and the economic and institutional factors that constrict the technology's use may be overshadowed by the hardware. In addition the Technical Economic Social Institutional Environmental (TESIE) "metholology" as outlined in the Annual Plans and the 1984 Annual Report is in fact a listing of various topics to be considered; it is not a methodology per se, and its continued use as such adds little to the reports. It can be paraphrased as an approach that tries to look at all interactive variables, and which feeds back so as to continually improve and upgrade the technology. Most renewable energy projects attempt to do this; their relative success or failure in doing so appears to be as much due to the qualifications and perspectives of the staff as to the existence of a transparent methodology.

This is somewhat ironic, since the ARD methodology was initially designed to avoid analysis that is technology driven. This is not likely to be a problem with many of the areas of work of the project, especially pumping and housing. However, the work on extension is still somewhat ill-defined and unclear because of this problem.

In terms of output of the project, while it is clearly important to generate reports on all technologies evaluated during the project, it should be borne in mind that there are two purposes of these papers:

(1) to summarize the results of all technology work, for use both in Botswana and elsewhere in Africa, and

(2) to assist the GOB and others in Botswana in defining whether anything else should be done, and what the potential impact of a given technology may be.

To be most effective, these reports should be organized around end uses, with a summary of the potential for meeting those particular end use needs. Also included should be discussions of the status of the research, the level of effort necessary to reach a stage which would permit rational planning and the possible array of institutional, economic, marketing or other limiting factors which may curtail the widespread diffusion of the technology.

While the proposed outline for the reports includes many of these considerations, there is some concern that the reports will be too isolated. USAID's Regional Energy Advisor will be available to discuss this in more depth during the next couple of months.

While an effort has been made to improve the extension activities, the COP was concerned over the apparent lack of data collection and analysis at the Shoshong VTF. While it is tempting for the contractor and the Ministry to identify next steps based on ongoing technologies, the existence of two VTFs, and the availability of staff, it is strongly recommended that a detailed assessment of the rural technologies be undertaken during the next three months, with a final decision as to the disposition of the VTFs and the extension staff made by the end of June, 1985.

b. Technical Progress Since the Mid-term Evaluation

i. Pumping

The project's work on comparative testing of pumping systems has continued to evolve at a rapid pace since the mid-term evaluation. Given the late start of the project in focusing on this component and delays in procuring and receiving the imported equipment, the progress to date is admirable. The changes suggested by the mid-term evaluation and earlier by the contractor led to a major alteration of the project, and has thus led to delays in project completion.

The contractor has effected this change in large part by hiring an experienced engineer who has been able to impart to the component the level of technical expertise deemed to be missing in the mid-term evaluation.

However, it is clear that this component cannot be completed on schedule nor can it be completed solely through continued support to local staff; every effort should be made by the Ministry and the contractor to more carefully define the precise activities that need to be undertaken during the next 12 to 15 months, with a budget which distinguishes the support which can be provided by the Ministry and the amount needed from donors.

Every effort should be made to strengthen the dialogue with other groups working in this area, including the Institute of Agricultural Engineers in Zimbabwe and IT Power. AID is presently discussing the organization of a series of activities on pumping throughout Africa, and will keep BRET and the GOB informed. In addition, every effort will be made to encourage a professional discussion on pumping test methodologies. This may entail the funding of site visits by IT Power or other groups so as to foster more joint work on this subject.

One significant output of the project that was not originally planned for has been the development and testing of monitoring equipment for the pumping tests. Designed around the specific needs of the project, this equipment is unique, and can be used by a wide variety of testing programs elsewhere in Africa. While it may not be ideal for short-term engineering design tests, it appears to be ideal for the type of comparative testing undertaken under BRET.

The project should identify the production and testing of this monitoring equipment as a major output in its own right.

ii. Extension and Stores

The extension process allows the tailoring of technology to need, but it does not appear to allow one to judge which approach is more cost effective or reproducible. This is in part the responsibility of the Ministry, but to make these decisions, they need the confidence and the data to make rational decisions. There is little presentation in texts concerning replicability, i.e., potential for project activities to make a difference if they were to be continued during the next two years. A timetable to permit full definition using resources available from KENGO and TECHNOSERVE is suggested. An illustrative timetable for the resolution of the extension progrqam in general and in the dissemination of stoves and wonder boxes in particular is included in Appendix A.

iii. Other technologies

The evaluation team was unable to examine in depth the technical results for many of the technologies, especially hot water heaters, photovoltaics, and passive solar housing. Its focus was, by necessity, limited to those areas with a possibility for further financial assistance. Over the next two months, an effort will be made by the Regional Energy Advisor to review this material, and he will prepare an addendum to this evaluation during a future trip which will cover these areas.

c. Financial Summary

	BUDGET	DISBURS. AS OF 3/85	ESTIMATED* ADD.EXPEN. THRU 9/85	TOTALS	BALANCE
ARD Contract	2,507,112	2,063,659	443,412	2,507,071	41
Local Staff	62,000	54,752	28,258	83,010	-21,010
Staff Travel	65,000	39,110	14,569	53,679	11,321
R & D	147,448	133,151	83,141	216,292	-68,844
Local Training	43,600	31,047	20,800	51,847	-8,247
Construction	266,000	124,823	67,391	192,214	73,786
Rent			9,205	9,205	-9,205
Support	163,000	123,824	30,000	153,824	9,176
Other	5,550	510		510	5,040
Inflation	44,290			0	44,290
TOTAL	3,304,000	2,570,876	696,776	3,267,652	36,348

* Based on BRET records

d. Follow-On

The difference in momentum on project activities between that observed during the mid-term evaluation and the present is striking. The apparent level of success speaks well for the renewed confidence and morale of the contractor's staff, as well as the strong support received from the Ministry and other operating agencies.

Given the progress on project activities, the large amount of project commodities and the numbers of skilled and trained staff involved, it is important that the Ministry and the contractor prepare now for the disposition of equipment, reassignment of staff and continuation of worthwhile activities after the end of the BRET project. The evaluation team is concerned that not enough preparation has been done.

Preparation for the end of the project is made difficult by the inability of AID to make firm commitments for follow-on assistance and the desire of the Ministry to review the contractor's final reports. However, many steps that are

independent of AID and the final reports can and should be taken now. The Ministry and the contractor have begun to consider staff reassignments and are updating equipment inventories. In addition to these actions, the evaluation team feels that other departments of the GOB such as DEE and DWA should become involved with the project as soon as possible.

6. Lessons Learned

The detailed lessons learned from this project will be presented in the evaluation addendum, to be prepared by AID towards the end of the project. However, the major points can be summarized as the following:

a. Renewable energy pilot projects should be designed more clearly around end use topics, and should, if possible, be incorporated into larger projects that emphasize that end use, (i.e., agricultural research, housing, etc.).

b. The BRET project was too ambitious and was premised on a series of questionable concepts which made the realization of outputs impossible. While this situation was remedied during the mid-term evaluation, the remaining time was not sufficient to permit the completion of all components.

c. Most damaging has been the interagency conflict in large part generated by the ambiguous division of responsibilities in the original project paper, as well as personality conflicts. This led to significant delays, duplication of work, and lack of cooperation. While this could have been avoided through more sensitivity to management problems in the project paper, in hindsight both USAID and the GOB should have more forcefully tried to change performance and attitudes prior to the evaluation, if necessary by requesting a special evaluation.

d. Pilot projects should be given sufficient time, and donors should be willing to be prepared to fund follow-on. On the other hand, GOB and the contractor should be prepared to redesign a pilot to emphasize stand-alone outputs, if follow-on becomes unlikely.

e. Projects can and should be revised to reflect changing situations, and the results of analysis. This may create delays in completing the full project scope, but these delays should be accommodated in the interest of quality of outputs. No project is perfect in design or stationary; intermittant revisions are important.

7. Recommendations

The GOB should rapidly develop a timetable that will allow for the timely disposition of project assets. While substantive decisions may not be possible at this time for each technology/end use area, it is possible to sketch out a series of decisions over the next five months that will permit some

reasonable decisions to be made prior to the end of the PACD. Specific recommendations are:

a. That the Ministry meet with BRET staff to discuss the GOB commitment to following up the activities of BRET, irrespective of the inclusion of any or all present staff in such activities, and outline a detailed timetable to be used in closing out the BRET project, and in implementing future activities.

b. That BRET and the GOB begin immediately to organize and convene small working groups composed of BRET staff, MMWRA staff, and other relevant agencies to plan the four approved mini-projects, with a particular emphasis on the disposition of all BRET commodities.

c. That follow-on for stove activities be distinguished from the institutional decision concerning the continuation of an extension staff. BRET should prepare a brief memorandum on the need to continue present extension activities, irrespective of what may be necessary to disseminate stoves.

d. That BRET reports be grouped around end use categories, and that the reports should include discussion on the relative importance of the various technologies relevant to a given end use. The reports should also attempt to give guidance as to the status of information needed for deciding GOB policy, and possible steps that might be taken to develop that information.

e. A preliminary TDY by staff of TECHNOSERVE and KENGO, both based in Kenya, should be arranged to evaluate the BRET work on metal stoves, and to develop a plan for future activities. This consultancy would be the first step in deciding GOB strategy for stoves, and would evaluate the role of extension activities.

APPENDIX A

Illustrative timetable for the conclusion of the BRET project.

April 25	Preparation and transmittal of formal requests for assistance on the continuation of pumping comparisons from the AID Mission to AID/Washington (USAID).
	Completion of Final Evaluation (USAID/GOB).
May 1	Provision to GOB and USAID of detailed procurement list, showing present status and relevant agency (BRET).
	Informal briefing of TECHNOSERVE and KENGO on status of stove program, development of draft SOW (REDSO).
	Organization of informal working groups on follow-up on the four approved MMRWA mini-projects, including MMRWA, BRET staff and relevant ministries and other groups (GOB, BRET)
May 7	Informal discussions with AID/Washington (ARD)
May 15	Revision of Project Memoranda, identifying other ministries to be consulted.
May 21	Initiate discussions with DEE, MLGL, DWA, and other agencies concerning disposition of commodities.
June 1	Completion of detailed draft disposition of commodities memorandum.
June 7	Agreement of SOW for TECHNOSERVE-KENGO TDY, and preparation of necessary purchase order or PIO/C (USAID/REDSO).
	Status of pumping extension discussed during visit of REDSO Chief Engineer.
June 15	Completion of draft memorandum of understanding between DWA and MMRWA on pumping (GOB).
	Visit of Regional Energy Advisor, and review of status of mini-project working groups.
	Visit by stove consultant; preparation in conjunction with the AID Regional Energy Advisor of a discussion paper on future GOB stove activities, and next steps needed to improve the information base.
July 1	Formal notification prepared on the status of the final disposition of all commodities, and sent to USAID (GOB).

	Review by GOB/BRET working group on stoves of REDSO/consultant discussion paper; if practicable, decision on short-term future of extension activities (BRET/GOB).
July 15	Preparation of discussion paper on possible further assistance needed from the AID/KENGO regional stove project (BRET/GOB).
August 1	Review of stove discussion paper, and preparation of a memorandum of understanding between the KENGO project and the GOB.
	Visit by Keith Openshaw or Mike Bess of AID's regional project, Energy Initiatives for Africa, to discuss what services the EIA project can offer to assist in follow-up. SOW for visit to be prepared by REDSO, for review by GOB.

11.

EXECUTIVE SUMMARY

1. Project Title and Number

Botswana Renewable Energy Technology Project, 633-0209

2. Project Description and Development Problem

Botswana faces major problems in the supply of energy for its growing population and economy. Imported petrol fuel prices have increased rapidly in recent years and energy from domestic coal is costly and available only in limited areas. The price of firewood is rising rapidly, imposing an increasing hardship on the urban and rural poor for whom it is the principal source of fuel for cooking and heating.

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The BRET project is implemented by the Associates in Rural Development (ARD) on direct contract with AID. The ARD staff manage the use of AID project funds and the GOB contribution to project activities under the general guidance of a Project Executive Committee (PEC). The PEC is made up of representatives of the Ministry of Mineral Resources and Water Affairs (MMRWA), the Ministry of Finance and Development Planning (MFDP) and USAID.

3. Purpose of Evaluation

This final evaluation of the project is primarily concerned with:

a. Determining how effective the contractor has been in adopting the recommendations of the mid-term evaluation;

b. Reviewing the GOB plans for continuing ongoing project activities beyond the PACD; and

c. Determining if there are any specific short-term activities by AID regional or centrally funded projects that might assist the GOB with completion of ongoing project components.

4. Evaluation Methodology

The final evaluation of the project was originally scheduled to take place in January 1984. However, because of early implementation delays experienced by the project, the mid-term evaluation was delayed and only completed in February 1984 and the final evaluation was rescheduled. The purpose of the final evaluation, to review the success of the project and to assist the GOB with decisions on follow-on activities, remains the same.

The evaluation team consisted of Mr. C.A. Pryor, Regional Energy Officer with REDSO/E&SA, and Mr. Stafford Baker, General Engineering Officer for USAID/Botswana. Mr. Pryor was team leader for the mid-term evaluation and Mr. Baker has been the USAID/Botswana project manager for BRET since June 1984.

The evaluation team reviewed all relevant project documentation including ARD reports and studies, the final BRET Annual Work Plan, minutes from PEC meetings and the mid-term evaluation. Sites where demonstration, extension and pumping activities are on-going were visited and interviews were conducted with BRET and GOB staff and villagers participating in extension tests.

5. Findings

a. There may be no satisfactory village level renewable energy technologies applicable to Botswana.

During the past year, project research and development work demonstrated significant fuel wood savings available from metal cook stove, "wonder box" (retained hear cooker), batch solar water heater and mud stove designs. Further work on the mud stove was terminated because of durability, quality control and utilization issues. Traditional cooking and washing habits have inhibitied extension of the wonder box and solar water heater. While there appears to be widespread interest in the metal stove, problems with production, marketing and affordability are unresolved and may be insurmountable.

b. A number of renewable energy options may be economically competitive with diesel fuel for water pumping in rural areas.

A comprehensive pumping comparison program is underway with performance and cost data being collected on wind, photo-voltaic, biogas, animal traction, human traction, diesel and electric pumping systems. At least one or two more years of data collection and analysis are required before definite conclusions on the economic feasibiltiy of various pumping options can be made.

6. Lessons Learned

a. Renewable energy pilot projects should be designed more clearly around end use topics, and should, if possible, be incorporated into larger projects that emphasize that end use, (i.e. agricultural research, housing, etc.).

b. The BRET project was too ambitious and was premised on a series of questionable concepts which made the realization of outputs impossible. While this situation was remedied during the mid-term evaluation, the remaining time was not sufficient to permit the completion of all components.

c. Projects can and should be revised to reflect changing situations and the results of analysis. This may create delays in completing the full project scope, but these delays should be accomodated in the interest of quality of outputs.

7. Recommendations

a. BRET staff should prepare a memorandum on the need for MMRWA to continue an extension program. The extension program should be considered independent of decisions on the feasibility of specific renewable technologies.

b. BRET final reports should be grouped around end use categories, and should include discussion on the relative importance of the various technologies relevant to a given end use. The reports should also attempt to give guidance as to the status of information needed for deciding GOB policy, and possible steps that might be taken to develop that information.

c. A preliminary TDY by staff of TECHNOSERVE and KENGO, both based in Kenya, should be arranged to evaluate the BRET metal stoves, and to develop a plan for future activities. The consultancy would be a first step in deciding GOB strategy for stoves and would evaluate the role of extension.

d. AID/W S&T and WASH should be asked to provide support for the GOB project that will continue the data collection and analysis of the comparative pumping program.

e. MMRWA should plan for the disposition of BRET equipment and commodities at the end of the project.

f. Small working groups composed of BRET staff, MMRWA staff and other relevant GOB departments should convene to plan the takeover of BRET activities under the four GOB mini-projects proposed by MMRWA.