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DISSEMINATING RENEWABLE ENERGY DEVICES IN LESOTHO: A CONSULTANCY REPORT

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PREFACE

This report presents the scope of work and activities undertaken by Ms. Erika Morgan, a consultant for Associates in Rural Development, Inc. (ARD), at the Lesotho Renewable Energy Technology (RET) project. Ms. Morgan is a renewable energy media and public education specialist. ARD is the contractor implementing the Lesotho RET project for the U. S. Agency for International Development (AID) and the Ministry of Cooperatives and Rural Development (MINRUDEV) of the government of Lesotho (GOL).

In addition to this consultancy report, Ms. Morgan prepared a Dissemination Plan for the Lesotho Renewable Energy Technology Project, which is available under separate cover from the RET project or ARD. The plan presents an overall approach to the project's dissemination activities, while the consultancy report describes the context for these activities and makes specific recommendations concerning them. Both reports refer to publications produced by the RET project and available at their offices--for example, the stone paola builder's guide and grow-hole user's guide.

Thanks are due the staff of the Lesotho RET project and the ministry's Appropriate Technology Section (ATS) for their ideas and feedback throughout this consultancy. Special thanks go to Dr. Judy Gay, ARD's field supervisor for the RET project. Without her unfailing energy and enthusiasm, only a fraction of the progress in the project's public education work described herein would have been realized.

I. SCOPE OF WORK

Ms. Morgan's consultancy took place over a period of six months. The exact dates of her work in Lesotho were October 12 to 24 and December 3 to 31, 1982, and January 1 to February 4 and February 23 to March 31, 1983. The scope of work for her consultancy was as follows:

1. Review existing education materials and media resources in Lesotho, e.g., Lesotho Distance Teaching Center, Ministry of Education, Thaba Tseka project, etc.

2. Familiarization with RET project activities, in particular the priority technologies, and RET project media and dissemination efforts to date.

3. Develop media and education strategies for the RET project in cooperation with RET staff.

4. Develop and design media--films, pamphlets, slide shows, radio talks and interviews, etc.--with an emphasis on solar and other renewable energy technologies, in cooperation with RET staff.

5. Develop and conduct RET staff training in media methodologies and consumer education programs, related to energy education.

6. Meet with primary and secondary curriculum development specialists and provide concepts for inclusion in school curricula on RETs.

II. ACTIVITIES UNDERTAKEN

A. Non-Formal Education in Lesotho and the RET Project

The first two items in the scope of work relate to Ms. Morgan's familiarization with Lesotho and the resources available for the project's public education work. Some of this information had already been collected by the RET staff, but it was still important for Ms. Morgan to review these resources and the project's ability to utilize them. The next two subsections summarize the information that was gathered during this familiarization process as a way of introducing the project and its context to set the stage for the discussion of project-specific activities and recommendations that follows.

1. Education Materials and Media Resources in Lesotho

Appendix A presents a list of contacts made at the start of the consultancy. The information gained during these meetings about Lesotho's education and media resources fell into three categories:

- formal education,
- the non-formal network, and
- production resources.

To investigate formal education networks, Lesotho's curriculum development and teacher training institutions were considered. The National Curriculum Development Center (NCDC) is responsible for curriculum development, and one section of NCDC is devoted to each major curriculum area--science, math, etc. A panel of representatives from other educational institutions oversees the preparation of syllabi and curriculum units by each NCDC section. (The curriculum development process is more fully described in Sections II.C and III.B.) Curricula developed by NCDC are used by the National Teacher Training College (NTTC) to train both new and present teachers. These two organizations are supplemented by a third, the Instructional Materials Resources Center (IMRC). The three institutions have a complex, interactive relationship, but to simplify, IMRC supports the other two by producing the curricula and supporting materials prepared by NCDC and used by NTTC.

IMRC is housed in a new, well-equipped building. With two darkrooms, two fully furnished sound studios, audio-visual production equipment and a wide range of photographic typesetting and printing capabilities, IMRC is the most complete media production facility in Lesotho. As a support organization within the Ministry of Education, its first clients are NCDC and NTTC,

but as an AID-funded project, it accepts non-ministry work from other AID projects as other commitments allow. IMRC is not yet fully operational, pending the arrival of additional equipment and hiring of its full complement of Basotho staff. In the interim, the RET project should take advantage of IMRC as a source of guidance in materials design, layout and production, and assistance in art work, typesetting and possibly printing.

Exploration of Lesotho's educational resources quickly revealed a strong capability in the area of non-formal education under the leadership of another Ministry of Education organization, the Lesotho Distance Teaching Center (LDTC). Most rural Basotho live in extremely small villages scattered throughout the mountains, often beyond the reach of formal schools. As a result, correspondence teaching programs have been developed to prepare students for their JC (junior certificate) and COSC (Cambridge Overseas School certificate) exams. The LDTC's five organizational sections combine the preparation of correspondence lessons (primarily workbooks) with the publication of literacy materials and develop educational radio programs to support both. (Appendix B lists the LDTC publications that were of help during this consultancy.) Its research and evaluation component tests and modifies materials, and has compiled a wealth of information on their efficacy. Lastly, LDTC also has a service component which makes the resources of this agency available to outside organizations on a contractual basis.

The final element of existing educational and media resources in Lesotho that are available to the RET project encompasses printing and production facilities. In addition to IMRC, LDTC also has extensive printing and production capability, which is accessible through their service component. There are also two larger local printing facilities--the Mazenod Book Center, 15 minutes from Maseru, and Morija Press, some 30 minutes distant, and as church-affiliated presses, they have been responsible for printing generations of educational texts for Lesotho's schools. Both could handle virtually any RET publication requirement, although neither has the IMRC's photographic typesetting capability. Another small commercial printer, Caledon Printers in Maseru, has limited facilities. Lastly, a new commercial printing venture is being set up at the Thaba Khupa Ecumenical Center to supplement the center's training and income-producing activities. With the exception of photographic typesetting, this facility will have a production capability equal to the others and may be able to meet the RET project's needs on a more timely basis because it is new in the area.

2. The RET Project's Media and Dissemination Activities

Ms. Morgan's arrival in Maseru coincided with the project's semiannual meeting of all staff members on October 12 to 15,

1982. This provided her with an immediate opportunity to meet staff from all the RET centers and quickly become familar with their activities. A "Technology Day" at the Khubetsoana workshop was part of the meeting, including demonstrations that involved describing, building and using various RETs. Staff members gave lectures on stone paola construction, solar heating and grow-holes; a stone paola and prototype metal stove were constructed; and grow-holes, metal paolas and food dryers were demonstrated and discussed. Ms. Morgan also visited the RET district centers in Mokhotlong and Malefiloane during her orientation, leaving a trip to the center in Butha Buthe until later in the consultancy.

Familiarization with project activities included the technology development and selection process, which began with the village energy survey conducted by Dr. Gay. This three-month survey of six villages in the Mokhotlong district resulted in the project's focus on technologies aimed at meeting two village needs--reducing the amount of traditional fuel(s) consumed and increasing the year-round availability of food. Once these needs were identified, RET efforts concentrated on the development of simple devices to address these problems.

This consultancy coincided with the development of the RET metal stove by Mr. Glenn Burket and Ms. Margaret Thomas, ARD stove consultants. The first step in this process--the development and testing of a prototype--occurred on October 14, 1982, with the construction of the Model 1, a sheet metal stove with a small recycled barrel for the firebox. Between October and December, feedback from tests of this first model showed that the firebox was difficult to replace and not sufficiently durable. Thus, the Malefiloane workshop built the Model 2 completely of steel. Laboratory tests of this model conducted during December showed ways to further improve both its performance and acceptability to users. In January, 1983, training in building the Model 3 was conducted at the Khubetsoana workshop for metalworkers outside the project. They produced copies of the stove for more extensive laboratory and user tests in the mountains. After any modifications that result from this last round of tests, the RET Model 3 metal stove will be ready for dissemination to consumers and other producers/manufacturers.

Dissemination is the last stage in the RET project's efforts to deliver proven technologies to users. A review of RET dissemination resources showed that personnel are experienced in conducting demonstrations and training programs, there is a full-time staff photographer, and the project has a good supply of media equipment as well as darkroom printing capability. The project has an extensive, and growing, library of black-and-white prints, but less attention has been paid to acquiring an equivalent slide library, an effort which is just now beginning. To date, the literature produced and distributed by the project to describe its activities has consisted of two, short, typed, hand-illustrated, photocopied pamphlets and posters designed to

promote the project at specific events, such as the SADCC energy exhibition in Bulawayo, Zimbabwe in 1982 and World Food Day in Maseru in October, 1981. The 1982 World Food Day fell on October 16, so Ms. Morgan worked with staff members during the first week of her consultancy to prepare new posters for this year's celebration.

The RET staff has been quite active in presenting introductory demonstrations of devices, particularly during 1981. During the latter part of that year, 26 presentations were made to inform the organizations requesting the demonstrations about the project's existence and mandate. There was less emphasis on such demonstrations in 1982, as staff members focused instead on the first steps in preparing technologies for dissemination--the village energy survey, and technology development and testing.

The demonstrations conducted in and around Maseru have varied significantly, depending on the audience and staff member making the presentation. Most often, they have consisted of explaining and showing how to use one or more of the RET devices, sometimes supplemented by an introductory slide presentation. The solar oven was demonstrated frequently in 1981, but problems arose when interested individuals asked where the unit could be purchased--there is no local source to date. The difficulty of demonstrating technologies that are not yet locally available, even for the sole purpose of introducing the concept of renewable energy, contributed to the reduction in the number of demonstrations during 1982. With the completion of user testing on proven RETs, such as the stone paola and retained heat cooker, introductory demonstrations have resumed in Mokhotlong. Dr. Gay keeps a record of all presentations and a photographic catalog of the devices for perusal by office visitors.

The Malefiloane workshop is adjacent to the local clinic and thus, has a ready-made audience for demonstrations, as area mothers and their preschool children visit the clinic weekly. The project has taken advantage of this situation by making presentations on clinic days to build a foundation of demonstration skills and ideas among staff members. In January, 1983, Ms. Morgan gave a short course in planning workshops (see Section II.C) to supplement this practical experience, and since then, RET staff have conducted extremely successful courses in the district for village health workers.

One final area of past and present dissemination efforts by the RET project is its Food-for-Work (FFW) pilot project. The six-month trial phase began in November, 1982 and was conceived as a means of disseminating two cooking-related technologies--stone paolas and grow-holes--to a major user group, schools. The Ministry of Education's School Feeding Program selected schools where RET-trained supervisors oversaw the construction of stone paolas and grow-holes by FFW crews. Ms. Morgan spent one afternoon at the Tsosane school observing construction activity.

Then, by compiling staff data and evaluations of the pilot project, some conclusions were drawn about the usefulness of the FFW project as a dissemination and/or training strategy. (Recommendations concerning the FFW program are presented in Section IV.B.)

B. Public Education Strategies and Tools

1. Media and Education Strategies for the RET Project

Discussions with Dr. Gay, Ms. 'Mamello Khoboko, the RET project's senior technical officer, and Mr. Vuyo Matanda, the staff photographer, focused on the media the project should use to convey its message. Three factors emerged that indicated simple print materials and radio as the media of first choice.

First, the typical settlement pattern in Lesotho is small villages dispersed throughout the mountains. For the village energy survey, Dr. Gay surveyed six villages, four within an eight-kilometer radius of the RET workshop in Malefiloane. The six ranged in size from 21 to 217 households--75 on average. If Lesotho's 1980 de facto population of 1.15 million lived in villages of similar size, there would be roughly one village for every three square kilometers. To reach such a widely dispersed population, non-formal education materials must be inexpensive to produce in quantity and easily distributed--two criteria that favor short, simple, print materials.

The second factor of importance is the literacy rate--at 53 percent, Lesotho has one of the highest literacy rates in southern Africa. In addition, the LDTC has found that approximately 80 percent of illiterate Basotho have someone who reads to them regularly. These two facts indicate that simple print materials are suitable for nearly 90 percent of the population.

Finally, the village energy survey revealed that 44 percent of the households surveyed had radios. This media is particularly appropriate for illiterate Basotho and can penetrate a large enough portion of the population to justify its use with both readers and nonreaders.

The LDTC used a similar media mix--simple print materials and radio programs, targeted by season or in some other way to permit immediate audience identification, plus face-to-face meetings and courses where possible--as the successful pattern in their 1977 Family Planning and 1978 Road Safety campaigns.

The development of educational strategies for the RET project must be directly linked to the project's past activities and overall goals, while simultaneously focusing on realistic

avenues for present and future efforts. The first step was the definition of project goals, relative to the technologies under development--that is, which technologies will be disseminated. Prioritization of all the technology options by readiness and potential impact yielded a list of the "top ten" RETs, which served as the focal point for further staff discussions on dissemination. From these discussions, the list was divided into three categories, based on the desired effects of the project's dissemination efforts. The first group--field-fabricated technologies--can be built by rural villagers who receive some training, using materials and/or equipment that they are likely to have on hand. In the second category--kit-built technologies, the construction of more complex RETs is simplified to the point where they too can be built by individuals with minimal experience and/or equipment. The third category demands a different response from consumers. RETs manufactured by skilled artisans, who use specialized equipment and/or materials, must be purchased by users.

The second level of dissemination planning concentrated on ways to encourage the desired consumer response for specific RETs. For guidance, the project's past dissemination efforts were reviewed.

In December, 1982, training had begun in Malefiloane in response to requests from village women who wanted to build stone paolas. By January, 1983, there was sufficient consumer interest for district staff to begin considering the instruction of trainers to meet the demand, as well as the fact that the previous training had proven successful from the standpoint of the quality of the resulting paolas.

The concept of the Village Technology Specialist (VTS)--an individual trained by the RET project, who then builds or instructs others in the construction of a specific device for a fee--is based on a pattern of training trainers that is appropriate for all the field-fabricated and kit-built RETs. Appendix C, the stone paola training sequence, shows how this concept has been applied to the technology with the highest priority. Formal VTS instruction and certification for any individual and the training of others by VTSs comprises the first of five educational strategies proposed by the RET project.

VTS training is suitable for the assembly of kits as well as field-fabricated technologies, and trained VTSs may be able to collect a fee for their services. There are three possible types of entrepreneurial opportunities for individuals--actual RET construction, assembling a device from a kit or gathering the materials to prepare kits. All could, and in some cases must, charge for their services. The VTS's role as an entrepreneur is central to the project paper's original concept of the Village Energy Technician (VET). The entrepreneurial ramifications of VTS training, as well as the construction of RETs for

remuneration, continue to be explored in Malefiloane and, to a lesser extent, Khubetsoana.

The demonstrations held during 1981 and 1982, along with the favorable response they elicited and organizational connections fostered, provide a starting point for the second major educational strategy. Interest in specific RETs and project activities remains high despite the emphasis on technology development during the past year. Undoubtedly, once dissemination begins in earnest, the resulting level of interest will far outstrip the project's capability to handle all inquiries directly. Thus, the next major strategy emphasizes the use of trained multipliers--individuals or organizations who can provide training--as an important means of enlarging the audience that the project can reach. Once the technologies are available and media work has begun, it is imperative that a cadre of VTS-trained multipliers be immediately available to assist the RET project in responding to consumer interest and training requests. This strategy is explored further in the dissemination plan, and recommendations for its implementation are included in Section IV.B.

A third major educational strategy supports and complements the preceding two. A media campaign, featuring a mixture of radio programs and short announcements, newspaper articles and occasional special events at the RET centers, is proposed for implementation beginning July 1, 1983. It is described more fully in the dissemination plan and specific implementation discussion in Section III.B. The campaign's emphasis on each technology would be timed to follow VTS and multiplier training by three to six months. This will ensure that trainers are ready when consumer inquiries are generated by the media coverage.

Training in the field, the use of multipliers and the media campaign, plus the need to establish the RET project's identity, mandate and conceptual framework prior to implementing these activities, were the four educational strategies proposed during the first staff session on dissemination planning, held January 11, 1983. At this session, technologies were prioritized, and goals and strategies for their promotion discussed. The resulting synopsis was then circulated to stimulate further staff discussion and lay the foundation for additional dissemination planning at the bimonthly meeting of the coordinating committee on January 17 and 18.

Feedback from this meeting, as well as additional consensus on the technology groupings and dissemination goals which emerged from discussions of the project's 1983 annual plan, were incorporated in an expanded second draft of the dissemination plan. This draft was submitted to Dr. Gay on March 10, 1983 and then amplified and circulated for additional staff comments on March 18. The substantially revised third and final draft was discussed with the Project Advisory Committee on March 30 and has

been printed under separate cover, Dissemination Plan for the Lesotho Renewable Energy Technology Project, available from ARD.

The plan provides a detailed description of the four educational strategies and a fifth marketing strategy, aimed at fostering more aggressive promotion of technologies that will not be disseminated through training in the field or by multipliers. As a vital prerequisite for any dissemination work, the plan also covers the interrelated timing of the five strategies, laboratory and user testing, training of manufacturers and technology production.

It should be noted that the dissemination plan is subject to refinement by the RET staff, as more becomes known about the project's duration and future resources. Section III of this consultancy report amplifies the plan further by exploring its implications for the project's budget and personnel, and offers additional detail in specific areas. However, those who implement the dissemination plan will have to define its final form. Ultimately, the value of the plan can only be judged in retrospect, in terms of whether its projections and guidance were helpful to RET staff as they assigned priorities, personnel and resources at the start of each successive dissemination activity.

2. Design of Technology-Specific Media

At the start of this consultancy, the project's dissemination skills were largely in the areas of photography and demonstrations, with less experience in the preparation of longer written reports and training courses. At the same time, several RET activities had an immediate need for dissemination materials. All the centers needed introductory materials to establish the project's identity and present relevant underlying concepts. Schools participating in the FFW project required information about the use of grow-holes. The RET centers in Malefiloane and Mokhotlong desired materials on stone paola construction to accompany the training begun in December, 1982, and tools are required for the dissemination work with multipliers (e.g., agriculture and nutrition extension agents and village health workers) to introduce the technologies for which training will be available. In January, 1983, there was an immediate need for materials to introduce the RET project, its technologies and the Khubetsoana workshop to ministry and AID personnel, who attended the facility's official opening on February 11.

The overall emphasis on simple print media was translated into four types of basic tools--posters, fact sheets, photo stories and booklets. The specific items chosen for preparation during this consultancy balanced two objectives:

- meeting as many of the requirements already discussed as possible, and

TOOLS COMPLETED OR UNDERWAY AT END OF CONSULTANCY

Item	Status	Authors/Resource People
Posters		
Introduction to RET	Completed (2 sets of each-- one for Mokhotlong, one for Khubetsoana)	Vuyo, Erika, Malenono
Stone Paola Construction (4-poster set)	"	"
Wonderbox - How to Make & Use (3-poster set)	"	"
Introduction to Food Dryers	"	"
Photo stories		
Introducing the Wonderbox	Story roughed out	Judy Gay, 'Mamello, Malenono, Vuyo, Nkare
Fact sheets		
What is a Wonderbox?	Comments integrated into 2nd draft, ready for translation	Agnes, Bonnie, Alinna, staff
Stone Paola Construction Reminders	English draft done, awaits translation	Koranta, David, Alinna, staff
RET's FFW Project	Used in photocopied English draft, to introduce FFW II	Erika, Judy, Nkare
RET Project Brief	Used in photocopied English draft for February open house	Erika, Judy, staff
Guide to Khubetsoana Displays Khubetsoana Tour	Used in photocopied English draft for February Khubetsoana open house	Erika, Judy, staff
Booklets		
Stone Paola Builder's Guide	Photos identified, translation almost done, ready for layout	Erika, Margaret, Judy, Lerato
Grow-hole User's Guide	Getting photos, 3rd draft almost ready for layout	Sandi, Judy, Erika, staff
Food Dryers User's Guide	Early draft, in first staff review	'Mamello, Gary, staff
Grow-hole Builder's Guide	Rough draft, prepared in December, needs completion and editing	David Wolfe, Gary
Wonderbox User's Guide	Very rough draft of construction and use details	'Mamello, Vuyo, Erika, now with Mukhotlong staff

- giving the RET staff experience with the types of tools they will be most dependent on.

Other types of media, such as films, slide shows and radio programs, will be important in the future, but were not considered priority items for the initial production of dissemination materials. However, radio will be a mainstay of the project's dissemination efforts beginning in mid-1983, so Sections III.B and IV.B provide recommendations for obtaining additional help in the preparation of such materials. The chart on the following page summarizes the tools that were either completed or underway at the end of this consultancy. Four of the fact sheets are reproduced in Appendix D, and two of the booklets--The Growhole Users Guide and Stone Paola Builders Guide (in English and Sesotho)--are available from the RET project.

C. Staff Training

Staff training in dissemination strategies began at the all-staff meeting on October 14, 1982 with an introduction to the terms and overall objectives of public education and audience types. A second presentation on January 11, 1983 covered various dissemination/education strategies and the planning, activities and tools required for each. The third and final session on dissemination planning was held on March 18 and focused on the specific proposals made in the second draft of the dissemination plan.

Two staff training sessions on the development of media tools and activities were conducted. The first, held in Maseru on December 20, 1982, was a half-day seminar on preparing effective written materials, titled "How to do a Good Brochure." It stressed the need to clearly organize material and write in simple, easily understood sentences. Editing and simple graphics were also covered. Four staff members attended the session--Mr. B. Kanetsi, Dr. Gay, Ms. 'Mamello Khoboko and Mr. Matanda.

The second, an all-day training session on January 4, 1983, focused on the planning of effective workshops. Understanding the audience, formulating learning objectives, creating an atmosphere conducive to learning, and incorporating activities to make the audience feel comfortable and involved were emphasized. The underlying aim of this workshop was to provide planning and preparation advice, and teach varied, relaxed presentation to staff members with some demonstration experience. Audience sensitivity and two-way communication techniques were emphasized for those new to teaching. The workshop was attended by six Mokhotlong staff members--Mr. M. Mahooana, Mr. David Palasits, Mr. B. Kligerman, Ms. Agnes Adontsi, Mr. P. Nthontho and Ms. A. Ramoholi.

Considerable one-on-one training in dissemination planning and media preparation was provided throughout this consultancy, primarily in the form of guidance, suggestions and discussions with Dr. Gay. In addition, individual sessions were held with other staff members regarding poster photography; drafting, translating and lettering poster text; drafting and editing longer booklets; and preparing photo stories. However, because of the focus on overall dissemination planning, some aspects of the production of different tools (e.g., the assembly of photo stories for final production and trial-testing of Sesotho fact sheets) did not receive the amount of attention they warrant, particularly in view of their importance to the project's overall dissemination effort. Further information on such topics can be found in the Awareness Plan and Implementation Guide for the Botswana Renewable Energy Technology Project, and the Lesotho RET project has a copy for their use, guidance and testing. The 35 patterns in that report present step-by-step instructions for the development of specific tools (such as photo stories), activities like trial-testing and dissemination tasks, and can supplement the training provided during this consultancy.

D. Curriculum Development

Renewable energy subject matter falls into four curriculum areas--science, agriculture, home economics and development studies. The RET project is fortunate to have teachers on its staff who have experience in two of these areas. Ms. Khoboko has taught home economics at both the high school level and to future home economics teachers during her tenure at NTTC. Mr. John Nicholson was a high school science teacher in Butha Buthe and, based on his experience there with RETs, plans to prepare sample science curriculum ideas during April, 1983. This work will mesh well with the June conference for Peace Corps teachers that has been proposed by project staff in Mokhotlong.

Meeting with curriculum development specialists to suggest the inclusion of renewable energy concepts can be difficult. Exploration of the curriculum development process uncovered three Ministry of Education organizations and a second layer of multi-institutional panels (see Section II.A). This type of panel exists for each major subject area (mathematics, science, development studies, language, agriculture, home economics, etc.) and is typically composed of teachers and representatives from NTTC, IMRC, LDTC and the National University of Lesotho. These panels must approve modifications of any course syllabus and offer guidance in the preparation of teacher's guides for each level at which a subject is taught.

At each instructional level, the focus is on the final examination that students must pass to progress to the next level. Thus, there is a detailed, tightly organized syllabus for each subject. In general, both teachers and students are very

reluctant to depart from the prescribed course of study, as strict adherence to it is the best way to ensure adequate preparation for the all-important JC or COSC examination. However, even when a teacher's guide exists, there seems to be considerable flexibility in the interpretation of a syllabus and preparation of a course in that an energetic teacher has the freedom to improvise lessons so long as the syllabus requirements are met. For this reason, the RET project's curriculum development process will concentrate on enthusiastic teachers and approach the formal educational network only when specific curriculum ideas have proved successful. Then, the outlook for changing a syllabus will be worth the time required to see suggestions through the formal curriculum development and teacher training channels.

Connections have been made with the heads of the NCDC's science and agriculture sections, both of whom have expressed an interest in renewable energy in general and any specific curriculum suggestions that the RET project may formulate. In addition, the project has an established working relationship with the head of the home economics section and of the curriculum development panel for development studies. These contacts should be broadened to include other members of all four panels. With this groundwork, the RET project will be in a better position to suggest tested curriculum ideas to the panels and NCDC sections with the hope of possible further packaging by IMRC. The full sequence of steps in the curriculum development process is described more fully in Section III.B.

III. IMPLICATIONS OF THE DISSEMINATION PLAN

A. Personnel, Output and Budgetary Considerations

During the final phase of this consultancy, the RET project was evaluated for a possible extension of 18 months. The activities detailed in the dissemination plan would comprise a significant portion of the work carried out during such extension, and this section considers the impact of additional funds and/or personnel on these activities. Of the two input variables--personnel and budget, the budgetary limitations are more difficult to assess, given the project's limited production experience. The effects of changes in personnel on the project's output can be predicted, but without some cost data, it is virtually impossible to determine exactly how much a particular production budget can buy.

1. Four Plans for Personnel and Output

The first possibility is that the RET project is not extended beyond December, 1983, such that only ATS staff remain to continue technology development and/or dissemination during 1984. If this occurs, the project should concentrate on finishing the testing and technical development of the top 10 devices, so they will be ready for whatever dissemination efforts the ATS might undertake. In addition, as many booklets and printed materials as possible should be prepared during 1983, before any reduction in staff takes place. Besides the departure of ARD staff, it is likely that there will be little money to permit the project to either hire local staff to supplement the RET's efforts during 1983 or contract out the preparation of dissemination tools. Under this scenario, the following projections can be made:

- The project would begin, but not complete, 10 booklets in 1983--nine for 1983 and one for 1984.

- The project would begin, but not complete, six photo stories--three in 1983 and three of the four that the dissemination plan calls for in 1984.

- The project would conduct VTS training for three technologies (stone paolas, sand/clay stoves and food dryers) during 1983, but none in 1984 because the three remaining Mokhotlong staff members (two ATS personnel and one PCV) could not continue to operate the workshop, maintain contacts with organizations, and provide the training and follow-up now proposed for 1984. The training that could be conducted would be limited to multiplier organizations, who could then offer it to others in the district. Thus, most of the ATS staff's

time in Mokhotlong would be spent identifying and training multipliers, and assisting those organizations in conducting RET training, primarily through follow-up.

- In 1983, the Maseru RET office would prepare and co-produce two radio campaigns, consisting of two programs each for a total of four programs. In 1984, ATS staff would maintain this level of effort. Such media work is the only one of the four aggressive dissemination strategies that could continue relatively unchanged with reduced staff.

- Posters and fact sheets would be completed as time allows and activities require. For the discussion of budgets that follows, it is assumed that seven fact sheets would be completed in 1983. In 1984, they would be reprinted and three new fact sheets developed.

Some activities that will be eliminated or curtailed if the project is not extended include:

- No slide shows will be developed, as the training of manufacturers will be limited to hands-on work with one, or at most two, producer(s) per technology. This is all that the remaining technical staff will be able to handle adequately, but will still ensure a minimal level of production, such that items can be found in some retail outlets. However, because of this reduction in manufacturers' training, preparing slide shows would not be a good investment of time and resources.

- Newspaper articles will only be initiated by someone outside the project, who is covering an RET event or activity.

- Radio programs will be simplified to mainly interviews, the easiest type of program to assemble.

- The number of fact sheets prepared each year will be reduced from the 15 projected in the dissemination plan. Unfortunately, Sesotho fact sheets, which are generally the most needed, will likely be shortchanged, as they take more staff time to produce because of translation.

- Multiplier organizations will get little or no individual attention, which usually results in greater support from such groups. With few such outside resources to draw on, the RET project will be primarily on its own in handling requests for training and information.

- VTS training and certification will be limited to three technologies in 1983, while there is sufficient technical staff to provide follow-up for the units built by non-RET

trainers. No VTS training will be available in 1984, and multiplier training will be more along the lines of demonstrations, rather than instruction in RET construction.

- There will be no workshop in Malefiloane to assemble kits or sell materials.

The second possible course of events is that the project is extended through mid-1985 with the present complement of personnel. It is assumed that there would be no increase in the budget for contracted assistance or local hire and the Malefiloane workshop would continue to exist, although not necessarily in Malefiloane. This and the next two scenarios plan on the continuation of the Khubetsoana workshop as the prime focus for all research, technical development, and the incorporation of testing and dissemination results into media materials. If the project is extended, the top 10 technologies will be disseminated during 1984, and other technologies will undergo research and development for dissemination in 1985. The following activities would occur under this plan:

- The project would conduct three VTS courses in 1983, as described in the dissemination plan. In 1984, two more would be offered, focusing on the assembly of kits designed in 1983. There would be a heavy emphasis on the training and support of multiplier groups.

- In 1984, with most of the dissemination tools already produced and in use, Maseru staff members would devote much of their time to institutionalizing the information from all the VTS courses in the plans and activities of multiplier organizations, particularly at those groups' central headquarters.

- The tools produced would include nine booklets in 1983 and one in 1984, six photo stories in 1983 and three in 1984, and 10 fact sheets in 1983 and five in 1984. Again, all the materials printed in 1983 would be reprinted as needed in 1984, and fact sheets will be prepared as time and resources allow.

- Radio programs in 1983 would be the same as if the project were not extended, but with the continuation of the RET staff in 1984, the number of programs would be increased to one per month or more. In addition, more attention could be paid to program content and some variety in format introduced. Radio announcements would also become a part of the media campaign, although they would still be somewhat fewer than the optimum number of one a week. In 1984, when the focus of technical activity shifts back to the laboratory testing of new

devices, staff members will be able to spend more time on radio work, including interviews.

- In 1983, the preparation of dissemination tools would concentrate on written tools, rather than slide shows for manufacturers' training. In 1984, however, the emphasis would be on the preparation of slide shows and training packages to instruct producers in RET construction. These production training packages--consisting of slide shows and printed materials--plus the technical staff to present them and/or provide necessary support could then be offered to manufacturers. In this way, the employment benefits of RETs and demand for them that will have been generated can be shared with other organizations throughout Lesotho.

- It should be possible to prepare one or two newspaper articles, in both English and Sesotho, for each segment of the media campaign.

- In 1984, the project would also begin to modify previously printed booklets for use by specific multiplier audiences--e.g., for inclusion in the packets that FNCO distributes to all extension workers, as LDTC correspondence teaching materials, etc.

Even if the RET project is extended, there is still some work that will not be completed in 1984 due to gaps in staff expertise and the project's inability to supplement their efforts with local freelance help and/or long-term staff assistance:

- Newspaper coverage will be limited because of the project's limited writing and translating capability.

- Radio programming will also be light in 1983, as staff attention will be focused on print tools. In 1984, this situation will improve, but programs will still be predominately interviews because of staff members' limited experience with other forms of programming.

- The number of fact sheets prepared will be greater than if the project is not extended, but still less than adequate to fully support the topics to be covered.

The third possible outcome assumes that the project is extended for two years, through the end of 1985, and more funds are made available in 1983 for additional staff. Given the current pressures on staff members, the first staff addition should be a full-time coordinator for the FFW project. Because this project can be viewed as a dissemination effort in its training of potential VTSs (see the recommendations in Section IV.B), the new staff member will be involved in dissemination.

The next important, full-time addition to the dissemination team should be a writer/translator, fluent in both English and Sesotho. This staff member would also have primary responsibility for the production of printed materials. If desirable and appropriate, given the individual's background, he/she could serve as Dr. Gay's counterpart.

The third addition to the dissemination team should be a full- or part-time radio/media coordinator. This person should have significant experience in the preparation of radio programs, such that he/she could both assemble programs which are more innovative than interview shows and train other RET staff members to do the same.

In terms of preparing dissemination tools, the project's highest priority should be the continuation of its photographic capability. If it becomes necessary to hire someone with experience equal to the current photographer's, an understudy should be added. This staff member could simultaneously add to the existing library of photographs and assist technical personnel in the collection of slides for the production of technical training packages. It may be possible to hire someone part-time to work on the slide packages, who could then become full-time if need be.

With these additional personnel, the following publications would be produced during the two-year extension:

- nine booklets in 1983, one in 1984 and revised versions of several others, as needed by specific multiplier organizations,
- six photo stories in 1983 and three in 1984, and
- 15 fact sheets in 1983 and 15 in 1984.

Three or more radio programs would be broadcast for each media campaign (one a month) and would include a variety of formats--dramas, interviews and teaching programs. In addition, a full slate of radio announcements would be prepared to heighten general awareness of RET activities, announce the radio programs and advertise the availability of each technology that is being marketed. The media coordinator would ensure that monthly articles in the three papers (in both English and Sesotho) would supplement the radio programs by scheduling them to appear between radio offerings.

The fourth, and final, possible turn of events assumes that the number of RET staff remains constant, but increased funding is available to contract out some work. This scenario is very much like the preceding one in terms of output--rather than hiring a full-time staff person, the project would instead contract the work out to qualified individuals on a part-time,

freelance basis. Dr. Gay would handle most of the supervision of such contracts, and would thus be essentially unavailable for production. (Work that could be contracted out to others is listed in Section III.B.)

2. Three Possible Budgets

At the present time, the RET project has virtually no experience on which to base a meaningful estimate of the financial support that will be required to implement the dissemination plan. No drafts have been completed to the point of layout, and no texts have been printed. Thus, both staff time and printing costs must be estimated without any information about how realistic such estimates might be. At this point too, it is impossible to comment with confidence about the distribution of finished items, because much of the project's distribution system is in the hands of others--multiplier organizations, trained VTSs and outlets that sell stoves or other devices. Whether there will be one or 10 such groups offering information on one or all of the RETs cannot be predicted. An attempt was made to quantify likely variations in cost, given a range of assumptions about the number of publications completed in three of the four basic tools categories--fact sheets, photo stories and booklets.

Five charts were drawn up to develop these estimates, but only one is presented in this report. The others can be found at the RET project's office. The first shows the variation in demand for printed items across time, as the media campaigns for different topics begin and end. Three charts present budgetary estimates for three of the four staff and output scenarios--the fourth possible outcome, an increase in funds for contracting rather than additional staff, is assumed to yield the same outputs as the third, an increase in staff. The final chart, summarizes the estimates for the three scenarios. These estimates are only for printing and non-RET production, thus they are undoubtedly low, perhaps significantly so.

Production Assumptions

Fact sheets can be printed in several sizes, depending on the number of pages of text. Two-page fact sheets, which will comprise the majority of the project's output, will be photocopied on both sides of a sheet of A4-size paper at a cost of approximately six cents per page. Larger, four-page fact sheets can be similarly produced on A3 paper, which is twice the size of A4, presumably at a cost of 12 cents per page. To allow for the frequency of two- versus four-page fact sheets, an average per-page cost of eight cents was used.

Dissemination Outputs and Budgets

	1983 Estimate	1984 Estimate	Total
First Scenario			
1983-prepare 7 fact sheets	4,370		
prepare 6 photo stories	1,864		
prepare 10 booklets	19,620		
	25,854		
1984-prepare 3 fact sheets		2,448	
reprint 7 fact sheets		4,032	
reprint 6 photo stories		1,223	
reprint 10 booklets		21,600	
		29,303	
Total			55,157
Second Scenario			
1983-prepare 10 fact sheets	6,240		
prepare 6 photo stories	1,863		
prepare 9 booklets	17,721		
	25,824		
1984-prepare 5 fact sheets		2,160	
reprint 10 fact sheets		5,760	
prepare 3 photo stories		2,755	
reprint 6 photo stories		3,667	
prepare 1 booklet		2,657	
reprint 9 booklets		19,440	
		36,439	
Total			62,263
Third Scenario			
1983-prepare 15 fact sheets	9,360		
prepare 6 photo stories	1,863		
prepare 9 booklets	17,721		
	28,944		
1984-prepare 15 fact sheets		12,240	
reprint 15 fact sheets		8,640	
prepare 3 photo stories		2,755	
reprint 6 photo stories		3,667	
prepare 1 booklet		2,657	
reprint 9 booklets		19,440	
		49,399	
Total			78,343

It was assumed that booklets will run 16 printed pages on average, given a likely range of 10 to 30 pages. In addition, it was assumed that each booklet will have one drawing per page and the freelance artist will receive R1 per drawing. Further, booklets will have an average of eight halftones (photographs) that can be prepared for R1 apiece, for a total of R8 per booklet. An additional R25 per booklet was included to account for typesetting, layout and/or headlines/lettering. Printing and paper costs were estimated at three cents per page for offset printing, as opposed to photocopying.

Photo stories will also be printed on A4 paper at three cents per page. In this case, one A4 sheet will be folded in half for a photo story of four pages, so if the average story is 12 pages long, it will require three A4 sheets. A photo story will typically have one halftone per page at R1 each, for a total of R12 per story, and another R25 was included for lettering and/or layout.

Distribution

Costs for the RET dissemination effort will vary substantially depending on the distribution of materials. Given that the project intends to aggressively promote RETs, the following estimates are probably low. Nonetheless, it was first assumed that staff members at the five centers will be the major point of distribution for all printed materials. In addition to direct distribution, each center will serve as a backup supplier for multipliers, marketers, other organizations and individuals interested in the technologies. Two different distribution rates were postulated. The higher rate applies while VTS training and media work is underway, and the lower for the rest of the year.

Distribution by marketers and multipliers will also vary with the broadcasting of radio spots on various RETs, but for purposes of this analysis, it was assumed that multipliers and marketing outlets distribute materials at a fixed rate. However, because particular technologies will not be of interest to some marketers, a factor that reduces the number of items distributed by these outlets was introduced. Five marketing outlets were assumed for each technology--the manufacturer, two in Maseru and two in the Mokhotlong district--although obviously, outlets may actually be located in different districts and be wholesalers, storefronts or individual entrepreneurs.

Distribution by multipliers is the most difficult to estimate, as it will vary in terms of the number of individuals involved, and their willingness and opportunity to distribute RET information--their response will be technology-specific. It was assumed that an average of 20 people will distribute RET materials at an average rate of 15 fact sheets and/or five booklets per month. Urban multipliers and enthusiastic

individuals in any area will easily exceed that total. In addition, information on the stone paola may be distributed more quickly than items describing sand/clay stoves, for example.

It was assumed that all the publications completed in 1983 will be reprinted in 1984. The totals for reprinting in 1984 differ depending on whether there is media promotion of that item during 1984 and the fact that estimates were based on 12 months for 1984, as opposed to eight in 1983.

B. Specific Implementation Guidance

1. Contracted Work

The dissemination plan calls for an enormous amount of work, but it repeatedly stresses that the RET project must take advantage of available resources outside the project if a significant portion of the proposed effort is to be realized, given present personnel and budgetary limitations. To maximize the current staff's capability, it is recommended that they divide their time between direct production and cooperation/ supervision of others outside the project who are preparing additional materials. This section lists work that could be contracted out, and some of these possibilities were explored with Dr. Gay. Staff members are encouraged to proceed with such contracting as the budget allows to reduce their overall workload.

One common pitfall of contracting is spending more time supervising the contractor than would be required to do the work in-house. However, if there are no staff members available to work on a given task, getting it done slowly is preferable to putting it aside. In selecting contractors, the staff should keep in mind that time invested at the outset to make sure the contractor understands directions yields two kinds of dividends, in terms of product quality and time saved when hiring the same contractor for additional work. Once a contractor understands and can meet the project's needs/requirements, they should be asked to handle similar tasks so the initial time spent with them pays benefits many times over.

A large portion of the layout, typesetting, halftones, art, printing and final production should be contracted out to one production group. This is a situation where the benefits of working with a single contractor, who becomes fully familiar with the RET style, needs and schedule, will be most apparent. At the end of this consultancy, the new printing and production facility at the Thaba Khupa Ecumenical Center appeared to be the most likely candidate for this work, with backup support in specialized areas provided by IMRC, as necessary.

Slide shows, particularly for training, are relatively low in the dissemination plan's priority ranking. To the extent that such production is undertaken, it should be wholly contracted out under the supervision of the RET photographer and other relevant technical staff. Given their superior darkroom facilities and capabilities, IMRC is the prime candidate for this work.

Newspaper articles to support all of the media campaigns and special activities planned by the RET project can be contracted out to freelance writers. Ideally, the project will develop a good relationship with one or two independent writers who can be paid for articles when they sell them. LDTC also has the capability to prepare and place newspaper articles. However, their workload may impede the responsiveness to the timing of campaigns, radio programs and events that the project would require.

All of the booklets that the project prepares could be tailored to meet the needs of specific multiplier groups, who would then reprint and distribute these materials at their own expense. It is proposed that LDTC revise booklets for the Food and Nutrition Coordinating Office's (FNCO) packets for extension agents. Two benefits could result from such an arrangement--RET publications would be distributed to an important multiplier audience in a form best suited for their use, while at the same time, LDTC might use much of the information in their own distance teaching materials.

Once curriculum ideas have been developed, tested and shared with NCDC, further packaging of them should be contracted out to IMRC. Because the RET project is not a Ministry of Education project, it is not a prime contractor for IMRC, but NCDC is. Thus, this sort of contracted work should be handled through NCDC, using their funds if possible.

The most beneficial relationship the project could arrange with LDTC would take advantage of their extensive experience in testing for at least 11 photo stories and possibly other printed items, as the schedules of both groups allow. The project should assess LDTC's willingness to undertake such work as far in advance as possible of when the project anticipates needing the tested materials, in order to minimize the chances that LDTC would delay the RET production schedule.

2. Media Campaigns

Media campaigns, including radio announcements, interviews and other programs in concert with newspaper coverage and special events, are the RET project's major tool for sharing information with the national audience. Yet, because of more urgent needs for specific technical and consumer information, the emphasis during this consultancy was on the development of publications

and other printed tools. This section provides guidance on the development of media campaigns, beginning with the steps required to locate needed background information and ending with a variety of ideas for program topics.

The first step should be to meet with information officers from MINRUDEV and other ministries that might have radio time the program could use--agriculture, health and education. Find out the exact times and length of their regularly scheduled programs. Introduce the six RET media topics and ask if they would be interested in co-producing radio programs on any of them. Inquire about the equipment they have for the production of radio shows, where they do their recording and whom the project would work with to produce programs.

Next, a decision should be made, probably at a meeting of the coordinating committee, about the number of programs and announcements to prepare for the first campaign in order to both generate awareness and provide adequate information on the subject. One radio program per month for each three-month campaign is recommended. Weekly radio announcements and newspaper coverage during the rest of the campaign should provide sufficient continuity for most readers/listeners.

A list of the titles and tentative dates of radio programs in the campaign should be drawn up. Then, the ministries should be approached to confirm their commitments of air time, the subjects and schedule.

The radio announcements that will be needed should be identified. One or two announcements should precede each program and any event associated with the campaign--e.g., a demonstration at Khubetsoana, training class for multiplier audiences or sale of related materials. In addition, two different kinds of general awareness announcements should be planned. The first, aired at the very beginning of the campaign, should just introduce the energy concept central to the campaign--saving fuel, increasing food supplies--and relate that concept to the campaign's topic and programming. The second type of general awareness announcement should focus on the specific device and its use, and should mention the RET radio programs, activities and/or publications that are available on request.

An overall media schedule for the campaign should be compiled, including radio announcements and programs, events and newspaper articles. This schedule should be confirmed for each campaign prior to the start of the preceding campaign--e.g., by July 1, 1983 for a campaign starting January 1, 1984. This much advance notice is needed so that all the staff members involved can divide their time between implementing one campaign and preparing for the next.

A team of content and production/process staff members should be assigned to each campaign to decide on the format of the radio programs (drama, interview, instruction), prepare a tentative outline of the information they will cover and handle the newspaper articles needed. People from outside the project who are willing to participate in a program or have tape-recorded interviews that can form part of a program should be identified. The more non-RET individuals that can be included in a discussion of their experiences with a device, the more credibility a program will have for its primary audience--rural listeners. How-to pattern number 30 in the Awareness Plan and Implementation Guide for the Botswana Renewable Energy Technology Project outlines the steps involved in assembling a radio program and provides ideas for program topics.

Newspaper articles should be written as short drafts that can be used by any one of the three newspapers. All articles should be translated so the paper can choose the English or Sesotho text, depending on its readership. A mailing list should be maintained of newspaper writers who should receive a copy of every article. For some papers, such mailings will result in their use of the story. With others, staff members may have to speak directly with the writers/reporters and/or invite them to an event at Khubetsoana or to conduct an interview with someone who is participating in a radio program.

As often as possible throughout the campaign, both newspaper stories and radio broadcasts should tell people how to get more information. Whenever possible, they should be referred to a group or individual outside the RET project. For example, if people are directed to their village health worker(s), the source of information is very close to them and easier to reach than someone in Maseru or Mokhotlong. As villagers express interest to fieldworkers, the project will probably get requests from the latter for additional training. By using the media campaigns to reinforce the training of people in the field, the project will further institutionalize its information about RETs.

Some ideas for radio programs for the campaign's first segment, an introduction to RETs, include:

- to initiate the media campaign, interviews with RET staff members, MINRUDEV personnel and others outside the project about the project's purpose and activities--the wonder-box and stone paola could be introduced in a general way as examples of technologies that the project has developed;

- an introduction to retained heat cookers, including an explanation of how to make and use them, and interviews with LAC home economists who have experience with them or at a Khubetsoana cooking day to get comments from people

who are seeing how they work and learning to use them; and

- a drama about energy-related problems that villagers face.

Some possible programs for the campaign's second segment, energy-efficient housing, are:

- passive solar design and its application in Lesotho;
- interviews with architects now making use of solar energy--the designs they have created for Lesotho and how have they worked;
- how home-owners can make their dwellings more energy-efficient--warmer in winter and cooler in summer; and
- pay a radio visit to a solar home owned by someone who did not think it would work (e.g., Mr. Seeta Mokose) and let them describe how their thoughts about solar energy have changed.

Suggested programs for the the campaign's third segment on food dryers include:

- an introduction to the basic concepts of food drying and different types of dryers;
- using a food dryer--interviews with home economists, perhaps taped during a demonstration at Khubetsoana;
- using dried food, including old recipes that use dried food in a new way and an interview with a cooking class;
- learning to make food dryers--information about VTS training and the locations of courses being offered, and an interview with a VTS trainee about how they have used the information gained from the course; and
- food dryer kits--their availability and the skills required for assembly, along with an interview with a VTS trainer/builder, while perhaps following someone through the construction steps involved as they put one together.

Possible programs for the campaign's fourth segment on grow-holes are:

- introduction to grow-holes and their use--interview Ben and an enthusiastic grow-hole user, perhaps someone from one of the schools who received a grow-hole as part of the FFW project;

- obtaining a grow-hole--the availability of kits and skills required for assembly; and

- using a grow-hole--major differences between a grow-hole and a garden, obtaining more information about grow-hole use and times for upcoming question-and-answer sessions on grow-holes at the five RET centers.

Program suggestions for the media campaign's fifth segment, cooking and heating options, include:

- introduction to the concept of saving fuel during cooking and what such savings can mean for a family--a radio drama could be a very effective way of presenting this information;

- introduction to the various ways of conserving cooking and heating fuel along with their similarities and differences--deciding which one to use and an interview with RET staff about the features of different stoves, their costs, ways to use them, etc.;

- the stone paola--its appearance, construction and capabilities as well as an interview with a VTS-trained builder and information about the joala-brewing paola and other adaptations;

- sand/clay stoves--how they differ from other stoves, making or buying them and cooking on them, along with interviews of users;

- manufactured stoves--the metal stove and metal paolas--their differences and the advantages of each, where to purchase them, and the message that there is a stove for every budget and area (i.e., lowlands and mountains); and

- the solar oven--the many ways to use this device (as an oven, water heater and to can foods) and interviews with people using a number of solar ovens at Khubetsoana, each cooking something different (this could be done at a cooking day, if the program was set up well in advance).

Some program topics for the campaign's sixth segment on solar water heaters are:

- solar water heaters and how they work--how people can use them, no matter what kind of house they have, and a taped interview at Khubetsoana with Mr. Nkare Thelejane on the various types; and

- learning to make simple solar water heaters--the VTS training available and course locations as well as how to obtain additional information.

3. Curriculum Development

Curriculum development is usually a lengthy process because activities and/or lessons must be tried in the classroom at least once, and preferably twice, before being put into widespread use. With advance preparation, the project should be able to include RET curriculum suggestions in the Peace Corps' June teachers conference. At the initiation of the RET project's Peace Corps staff, the Peace Corps office in Lesotho agreed to provide logistical support for a five-day teacher workshop to be held in Maseru during June, 1983. A total of 25 Peace Corps teachers will be invited and each encouraged to bring a Masotho fellow teacher. The conference will have three parts--income-producing activities for schools, RETs with an emphasis on what schools can do and renewable energy curriculum suggestions. While the project's volunteers will be involved in the latter two portions of the program, the recommendations in this section focus on just the third part.

Mr. Nicholson is planning to spend April, 1983 developing curriculum ideas, based on his experience at Butha Buthe High School. After discussing with him where RET information could be incorporated into the existing JC syllabus, a list of suggested lesson topics was drawn up (see Appendix E). Also included in Appendix E is a simple form that can be used to record lesson ideas. This standardization is recommended so that Mr. Nicholson's lesson suggestions will be comparable to those developed during the June conference. Ms. Khoboko might also be willing to prepare some curriculum/lesson ideas for home economics classes. The ideas proposed by Mr. Nicholson, Ms. Khoboko and any other interested individuals could serve as the starting point for a brainstorming session at the June conference on RET curriculum possibilities.

It is recommended that the curriculum development portion of the conference be divided into two parts. In the first, Mr. Nicholson, Ms. Khoboko (if appropriate) and other teachers with experience in presenting renewable energy concepts and/or devices in the classroom will discuss what they have done, whether it succeeded or failed and why. The sample lessons assembled by Mr. Nicholson during April could be used as handouts or models for this session. In the second session, teachers will be divided into small brainstorming groups according to their subject. Each teacher will be expected to develop a classroom lesson for one of the topics listed in Appendix E and describe it on a curriculum ideas sheet.

At the end of the second session, the project will collect all the curriculum ideas sheets and photocopy them, so the teachers will have a complete set of the ideas developed for their subject at the conference to use in their classes during the next term. As teachers try the individual curriculum suggestions, they should comment on the back of the ideas sheet

about what succeeds or fails and any suggestions they have for modifying the proposed lesson. Forms with comments should be returned to the project after the term ends in December, 1983.

Prior to the June conference, project staff should make the acquaintance of members of the curriculum development panels for each subject and request their thoughts/suggestions for the first part of the curriculum development session. As completed curriculum ideas sheets are returned to the project in January, 1984, the comments should be compiled and lessons modified as necessary before showing them to the panels and NCDC curriculum development sections. If any of the activities are received enthusiastically by the panels, the project should explore with NCDC the possibility of contracting the final packaging of "A Teacher's Guide To Renewable Energies in Lesotho" to IMRC through NCDC.

IV. RECOMMENDATIONS

A. Preparing for Dissemination

Clarifying the Project's Role

All of the RET project's dissemination plans are predicated on the sale of technologies or portions of them to interested individuals. With the stone paola, for example, steel rods and welded grates (or perhaps the two as a unit) are sold to facilitate construction in villages. By supplying these items, the project provides a service and makes it easier for residents to acquire the technology being promoted. For manufactured technologies, however, this sort of sale and resale is a vital prerequisite for dissemination. Even a minimal amount of promotion requires that display units be available to retailers who take orders for the device. In more aggressive dissemination efforts, the RET project could place quantities of items in stores for immediate resale, thus circumventing a frequent barrier to consumer purchase--the delays imposed by ordering and shipping. For still more aggressive promotion, the project could sell units to dealers or individual entrepreneurs, who set their own prices and pocket the resulting income. In any case, the project must bear at least some of the manufacturing costs, which are then recovered as units are sold. At present, however, the project's ability to legally purchase and resell items is unclear at best.

It is recommended that a high priority be placed on obtaining approval for an arm of the RET project, independent of government and donor funding, to operate as a wholesaler of devices and/or materials. With this type of capability, it may be possible for the project to finance much of its workshop operations, while ensuring that the manufacturing of RETs remains in the hands of local artisans/businesses. This issue must be resolved before devices can be made available through dealers--an important prerequisite for media promotion.

Production Sources for Manufactured RETs

While the project has approached several organizations and/or workshops to produce individual or small numbers of devices, none of these relationships appear to have been formalized to the extent required for a reliable supply chain. It is important that supply links include formal commitments from the sources as well as the RET project, or the project risks promoting an item for which there is no reliable supplier. Confirmation of these sources must go beyond simple training to fully informing the manufacturer about the cost, employment and workload implications of the commitment--if media promotion

results in orders for five to 10 metal stoves from 25 to 35 different locations, can the supplier handle such production? If orders cannot be filled, the RET project will get negative feedback from consumers, so it is incumbent on the project to confirm and formalize supply relationships to the greatest extent possible.

Building a Library of Materials Sources

The BRET awareness plan and implementation guide includes a how-to pattern for the compilation of suppliers lists. The project is just now beginning to expand its supply sources through training, but it is recommended that a card file be set up to keep track of this information. Such a file can be easily updated and/or rearranged as categories of suppliers grow or change. The initial information in the file should include the names of manufacturers mentioned in the preceding subsection, and publishing the names of these sources may focus the suppliers' attention on their implied commitment to fill future orders. The file should also contain information about where various materials (for food dryer or grow-hole covers, for example) can be obtained outside Maseru. The intention is to encourage people to use local suppliers, thereby stimulating more retailers to carry and promote needed materials.

The Appropriate Level of Staff Effort for Dissemination

Much of the dissemination planning has been based on the fact that ARD's contract to provide technical assistance to the RET project will end as of December 31, 1983 and, the resulting need to decentralize and institutionalize as much of the information that has been accumulated as possible before then. This has implied a full-scale shift to dissemination, which seems reasonable given the December, 1983 date, and parts of this effort have already been undertaken, in that formulation of the dissemination plan involved the discussion of new responsibilities and realignment of technology testing to support the preparation of dissemination tools. Once a decision concerning the project's future has been made, the staff should formalize the percentage of effort to be spent on dissemination versus continuing technology development.

Clarifying and Assigning Dissemination Responsibilities

Once the project's future has been decided, it will be easier to assess how realistic the dissemination plan is, given available resources. At that point, dissemination responsibilities should be formally divided among as many staff members as possible. The development of dissemination tools usually requires a team approach, and with the RET staff's

division in terms of technical and fieldwork, such an approach is virtually mandatory. It is recommended that a dissemination team be formed to parallel the technical team, with Dr. Gay and Ms. Khoboko for the former, and Mr. Gary Klein (ARD's laboratory supervisor) and Mr. Thelejane, the latter. The dissemination team would fill an important role relative to coordination and communications, while also setting project-wide dissemination priorities, which cannot effectively be left to the discretion of individual RET centers. It is important that the overall RET project team begin to function more as a unit. Even though intermediate objectives may differ between Maseru and Mokhotlong, particularly given the amount of work the project is facing during the next six months, all the RET centers should share a common goal and long-term objectives. This can be facilitated by first identifying the appropriate level of staff effort and second, the channels through which communications should flow to direct that effort.

After general dissemination responsibilities have been formalized, the division of staff time between technical and dissemination work should be clarified. Both types of activities are steps in the technology development process, but it is sometimes difficult to separate them precisely. Nonetheless, staff whose primary responsibility is dissemination should be formally identified as part of that team--Vuyo, Malenono and Bonnie should form the foundation of the dissemination team, with Alinna and Puseletsa included to the extent that their other responsibilities allow. Ideally, center coordinators, such as Mahooana and Mr. Nicholson, should divide their time equally between technical and dissemination activities. Even after the dissemination team has been created, its composition may vary depending on the specific activities going on at any given time. In addition to the staff members listed above, other part-time assistants should be hired as the workload requires and resources allow.

Dissemination Outside Maseru and Mokhotlong

The project needs to decide how to respond to training requests from outside the two localities where it now works. Because of the need to institutionalize RET information and greatly expand the project's ability to respond to public interest, the dissemination plan relies heavily on multipliers. At present, most multipliers are in the Mokhotlong district, although some who have attended VTS courses come from different districts, having learned about the RET effort even though they live outside the project's immediate loci of emphasis.

This group of outside multipliers, which will certainly grow as dissemination activities increase, can be either a problem or a resource, depending on the project's stance on dissemination in other districts. Several policies are possible:

- outside multipliers could attend training courses in Mokhotlong, at the expense of their own organizations, and would then be encouraged to train others in their areas;

- the RET project can refer outside inquiries to the nearest trained person/organization, who will then make independent arrangements with the referral;

- the project can send trained individuals from Mokhotlong or Maseru to provided the requested training; and/or

- the project can handle outside training requests by sending RET staff as trainers.

Obviously, each option has implications for the project's dissemination workload, logistics budget and institutional spinoffs. Regardless, a policy decision should be reached and implemented as soon as possible, definitely before the start of media work on July 1, 1983.

B. Following Up on Dissemination Strategies

A Dissemination Committee

The purpose of this committee would be to facilitate the project's efforts in specific areas by regularly bringing together staff members and individuals who can offer both guidance and access to resources. Membership on the committee should be balanced among the various ministries that have radio time the project would like to use (MINRUDEV, agriculture, health and education), ministries whose field staffs the project will probably rely on heavily (health and agriculture) and organizations which can offer guidance and possible assistance in the preparation of materials (LDTC and IMRC).

VTS Training for Stone Paolas

As mentioned in the dissemination plan, one advantage of the VTS training and certification proposal is the value it accords the information being transmitted in the public's eyes. This advantage could be lost in the case of the stone paola, where training has been introduced as a one-day, no-cost, no-commitment opportunity. While this approach was necessary to determine the extent of village interest in the technology, if stone paola training continues to be offered on such an informal basis, it may be devalued in the eyes of villagers, who add it to their conceptual list of "things someone else wants us to do." This could cause an early loss of interest in one of the project's

most promising technologies. Therefore, it is strongly recommended that the project begin certification of stone paola trainers as soon as possible. The requirements for the first VTSs can certainly be applied flexibly--if an individual has become proficient in fewer than the five required steps and has been conducting satisfactory training sessions, the project could award a certificate "early" for exceptional progress. The project should start and maintain a record of individuals who are being trained, and systematically keep track of each person's progress through the five steps as well as the trainer who can attest to that progress.

Awarding VTS Certificates

Inherent in the VTS proposal is the idea that once trained, VTSs will seek out others to whom they can offer their skills in training or building RETs for reimbursement, if they so choose. This concept implies that VTSs will capitalize on their new skills by at least talking about RETs, even if they do not aggressively sell their services. The RET project should take advantage of this informal salesmanship by rewarding the VTS-equivalents who have already been trained. This group includes all those in Malefiloane and Mokhotlong who have received training in stone paola construction, two individuals in Butha Buthe for food dryers, three others who have been trained in both stone paolas and grow-holes, and 15 FFW women for stone paolas, if not other technologies as well. It is recommended that each center plan and announce an awards ceremony to recognize these "graduates," and a similar event should be held for every group of VTS graduates. In addition to recognizing the first group to earn VTS certification, this type of acknowledgment will increase the overall level of interest in all the training offered by the RET project.

Additional VTS Training in 1983

Regardless of the final decision on extension of the RET project, at least two technologies will be ready for VTS training in 1983--stone paolas and food dryers. Pending favorable results from the tests of earthen stoves, this technology may also be ready. The decision to implement VTS training for technologies other than the stone paola means that the training sequence required for each must be specified and the start of training announced to village and multiplier audiences. If the project is extended, VTS training for other field-fabricated and kit-built technologies can be offered in 1984. If not, it is vital that the project's current information on various RETs be disseminated as aggressively as possible.

Prioritizing and Limiting Multiplier Audiences

As more people learn about RETs, pressures will build both within and outside the project to share information with an ever-growing list of organizations. In some ways, such interest is the highest praise the project could receive, but at the same time, it poses a threat to the RET project's ability to attain even the deliberately limited goals it has set. The effective utilization of multiplier audiences to distribute information for the RET project will require a concentrated effort of months, if not years, to ensure the informed support of everyone in another organization. Only then can the multiplier group really continue the work begun by the RET project. It is therefore recommended that the project prioritize its list of multiplier audiences and work with no more than three at a time. For example, only after all the village health workers in Mokhotlong have been contacted, trained and involved in further training and/or the distribution of literature should the RET staff decide whether to pursue another multiplier group on the priority list or expand its training of village health workers to areas outside the Mokhotlong district.

Supplementing the Effort with Multiplier Groups in Mokhotlong

The amount of time required to reach the point described in the preceding section, where a multiplier group in Mokhotlong has fully institutionalized the project's information about RETs, can be greatly shortened by a complementary effort in Maseru. Prior contact with personnel at the supervisory level in various ministries can help ensure their positive response when fieldworkers request RET training. It is recommended that someone on the Maseru dissemination team (perhaps Ms. Khoboko) be responsible for initiating and maintaining contact with the Maseru representatives of priority multiplier groups. Should time and resources permit, a simple project newsletter could be prepared, and all these organizational contacts, as well as individual multiplier VTSs, should be included on the mailing list.

Handling Requests for Further Information

The project should indicate how to obtain additional information in every publication, at all demonstrations, on most radio announcements (except those intended to heighten general awareness) and in every radio program. The wording for these information referrals should be consistent--e.g., "For more information about renewable energy technologies, contact...". It is recommended that the RET project refer information requests to at least one multiplier group that has representatives who are accessible to rural people (for example, "..., contact your clinic, a village health worker or your VDC."). Project staff

should decide how to word these information referrals before radio work begins in July, 1983. At a minimum, the MINRUDEV's DRDOs and ACDO can be given as sources for additional information, if there are no other multipliers in a particular instance. This will ensure that information requests come through the correct organization. In addition, other ministry personnel will, at the very least, get an idea of what the RET project is doing and may take an interest in seeing that RET information goes back out to the field.

Modifying the FFW Project to Train VTSs

Although originally conceived as a user testing and public dissemination effort, the FFW project could yield its greatest benefits as a training mechanism. Spending six weeks with the same trainees has proven to demand too much time of the RET project's management in return for dissemination results that are as yet unknown. In three-week sessions, however, FFW crews could receive condensed training similar to VTS training in stone paolas and grow-holes. The five steps in the stone paola training sequence could theoretically be viewed as one concentrated week of training, and instruction in grow-hole construction and use could be expected to take at least two weeks. At the same time, by introducing the notion of final certification and its implied potential for income production to FFW crews, the crews might show more initiative in constructing the devices after the training is completed. Future sessions of RET FFW training should be postponed until:

- funds are available to hire a full-time, FFW project manager to join the RET staff--with this additional supervision (compared to half-time for Mr. Thelejane), additional FFW supervisors and crews might be added;
- printed instructional materials are available to show primary and secondary teachers and cooks how to use and maintain RETs properly and, for teachers, how to employ the device(s) as curriculum supplements; and
- the RET project has the money required to send a supervisor and crew to any interested school anywhere in the country.

At that point, the school feeding program should be asked to identify interested schools that meet two criteria:

- they have active cooking and gardening programs, and
- one or more teachers are interested in including RETs in their curriculum.

This dual requirement should increase the chances that the RETs will not only be used, but also explained to the students, with the help of curriculum materials from the project.

In the meantime, the three FFW supervisors can be of enormous value to the RET project in conducting training courses for multiplier organizations. This offer to multipliers should be contingent upon the group providing tools and materials at the construction site.

C. Developing Dissemination Tools

Contracting Out Work

The materials listed in the dissemination plan are probably more than the present RET staff could produce in two full years, even if they had no other responsibilities. Thus, it is clear that contracting out some portions of the work associated with the dissemination effort is both necessary and desirable. The first step should be to to identify both internal and external means of supplementing the project's dissemination effort, keeping in mind that anything which other organizations contribute to is more likely to be used later in their own programs.

It is recommended that the RET project examine two approaches to contracting out work. The first is to contract out large chunks of work or separate projects, to the extent allowed by the project's financial limitations and taking into consideration the list of priorities given in Section III.B. The second is to hire in as much part-time help as possible. The second option requires more supervision by RET staff members, but gives the project greater control over the product's final form. It is much easier to monitor the work of a free-lancer who is directly under RET supervision than keep track of the progress of a contract being carried out by another institution.

Thus, it is further recommended that the project advertise for people who are available to do various kinds of free-lance work--writing, illustrating, translating, graphics and layout. For each type of work, the RET project should have a file with several names and work samples from each individual. Before being included in the file, each person should be interviewed and clearly informed that their ability to meet deadlines, fulfill commitments and communicate with project staff will influence the continuation of their relationship with the RET project as much as their professional skills.

Photography

Two of the four basic types of dissemination tools require photographs. Thus, any reduction or elimination of the project's photographic capability would seriously hamper the development of all the printed materials needed to support the dissemination effort. If it appears that the departure of the present staff photographer is imminent, an "understudy" should be hired on a part-time basis for training, who can then fill the position as soon as it becomes vacant.

Translation

The use of part-time translators has proven to be a bottleneck in the preparation of printed dissemination materials. This problem could be alleviated by locating and using more translators, but the addition of a full-time Sesotho writer who is also capable of translation is a preferable solution.

Radio

Radio is the second most important medium in the project's dissemination effort, but is the one the RET staff has the least experience with to date. Thus, it is recommended that the project take advantage of the current availability of Ms. Sandi Jacobson, who not only has experience in radio, but also with the project and RETs. Radio work is scheduled to begin July 1, 1983, and during the preceding three months, considerable background work will be necessary to identify ministry contacts, determine radio programming schedules, prepare simple radio announcements and develop programs for the first media campaign. It is further recommended that either Ms. Khoboko or Ms. Malenono Lenono understudy with the contractor hired to handle the project's radio work, and that the project purchase a high-quality portable tape recorder to facilitate their training.

The RET Project Theme

Discussion of an appropriate descriptive Sesotho theme for the project began in October, 1982, and the theme currently in use was adopted until a better one was proposed. In spite of several subsequent discussions, no more suitable theme has emerged, and soon a permanent theme must be settled on for consistency in all the project's printed dissemination materials and radio work. Therefore, it is suggested that the current theme--"Basebetsi ba paballo ea matla"--be permanently adopted.

Developing Materials in Sesotho

Not only is translation a lengthy and difficult process, but it is sometimes virtually impossible to accurately reflect the exact sense of the original text in a translation. Thus, it is recommended that translation be avoided whenever possible by preparing first drafts in Sesotho. Patterns in the Awareness Plan and Implementation Guide for the Botswana Renewable Energy Technology Project suggest ways of accomplishing this end. Tape recordings of short paragraphs can be helpful in ensuring that written copy is correct. However, recording lengthy descriptions should be avoided as their transcription is prohibitively tedious and one loses the advantage of simultaneous two-way translation and editing, which occurs when a technical person and Sesotho speaker write text together.

Rotating the "Lead" Responsibility for Dissemination Tools

The concept of "lead" responsibility may be new to many of the RET staff who will be working on the project's dissemination materials. Still, with practice in the steps of each pattern, at first under the guidance of another staff member who has the "lead," everyone on the project's staff should gain increased familiarity with the preparation of each type of tool and, in time, be able to take the lead in the development of dissemination materials. The goal is to train as many staff members as possible to take the lead and be able to see the preparation of dissemination tools through to completion independently.

APPENDIX A

Contacts

Mr. Jim Anderson, Senior Project Advisor, Food and Nutrition Coordinating Office, December 22, 1982

Mr. Dean Bernius, AID Project Officer, December 7, 1982

Mr. Greg Davenport, Research and Evaluation Section, Institute for Extramural Studies, December 15, 1982

Mr. Theo Derex, Service Agency, LDTC, December 21, 1982

Dr. Andrew Horne, Professor of English and Theatre, National University of Lesotho - Roma, December 15, 1982

Mr. Orville Joyner, Senior Instructional Materials Design Advisor, IMRC, December 22, 1982

Mr. Teboho Kitleli, Chief Information Officer, Ministry of Agriculture, December 14, 1982

Mr. Mohloni Lesenya, Head of Programmes, Radio Lesotho, December 14, 1982

Mr. Gerard Mathot, Director of In-Service Teacher Training, NTTC, January 7, 1983

Ms. Lisemelo Moholi, Head, Health and Physical Education Section, NCDC, December 20, 1982

Ms. Francina Moloi, Head, Community and Leadership Development Section, Institute for Extramural Studies, December 15, 1982

Mr. Martin Monyau, Public Relations Officer, Information and Broadcasting, MINRUDEV, December 9, 1982

Ms. Mosae, Projects Officer, MINRUDEV, December 9, 1982

Mr. Morapeli Motaung, Director, Radio Lesotho, December 14, 1982

Mr. Paude Murphy, former Director, LDTC, December 11, 1982

Mr. Nkhelooane, Head, Agriculture Section and School Feeding Program, NCDC, December 20, 1982

Mr. Bob Nothstein, Senior Project Advisor, Food and Nutrition Coordinating Office, December 22, 1982

Ms. Betty Perrault, Program Advisor, Lesotho Opportunities Industries Council, December 14, 1982

Ms. Phomolo, Head, Science Section, NCDC, December 20, 1982

Mr. Putsoa, Community Development Director, MINRUDEV, December 9, 1982

Mr. M. Salae, Deputy Permanent Secretary, MINRUDEV, December 9, 1982

Ms. Lois Sebatane, Research and Evaluation, Institute for Extramural Studies, December 15, 1982

Mr. Tsoa, Director, Agricultural Information Service, Ministry of Agriculture, December 14, 1982

APPENDIX B

LDTC Publications Consulted

Evaluation of a Training Course for Village Distribution Agents (VDPAs) of the Thaba Bosiu Rural Development Project, February, 1977

Learning from a Booklet, an experiment with individuals and groups in Lesotho

Lesotho Family Planning Volunteers Training Course, February, 1978

Listenership to Radio Lesotho and the Potential for Open Educational Broadcasting, 1979

Literacy and Numeracy for Life, the use of distance teaching methods to help rural Basotho improve their literacy and numeracy skills, 1979

Non-Formal Education for Development in Lesotho, report on the workshop for writing instructional materials for non-formal education, February, 1980

A Report on a Workshop: Radio Production for Non-Formal Education, 1980

Road Safety Campaign, 1978

Seminar on Non-Formal Education for Development in Lesotho, October 15-19, 1979

A Test on the Best Way to Present a Correspondence Lesson, October, 1976

Understanding Print, a survey in rural Lesotho of people's ability to understand text and illustrations, 1976

The Use of Photostrips in Family Planning Education, February, 1978

APPENDIX C

Stone Paola Training Sequence

TO: Mokhotlong/Malefiloane (David Palassits)

FROM: Erika Morgan

SUBJECT: Stone Paola Training

During my last visit to Malefiloane, you, Koranta and I discussed the training of others to both build and teach construction of the stone paola. I promised to put together my notes and share them with you, as a record/summary of that meeting. The training sequence that emerged from that meeting has served as the first example of the broader "Train the Trainer" dissemination concept that forms one of the central strategies in the draft dissemination plan now being discussed project-wide. As such you have seen the compilation of my notes in the form of the chart used to illustrate the Village Technology Specialist. Nonetheless, to "close the loop", and fulfill my committment to write up the notes, here is a typed version:

STONE PAOLA TRAINING SEQUENCE

BUILDERS	TRAINERS
(prerequisite)	
observe construction as part of a group of more than 5 people	observe construction as part of a group of more than 5 people
STEP ONE -- LEARNING While HELPING	
Participate in construction under an RET certified trainer, in groups of less than 5	same as for builder, plus an additional ½ day instruction in how to train
STEP TWO -- SUPERVISION	
Build a paola, either at a workshop or at home, that passes RET follow-up, or under RET supervision/help	conduct a training session, primarily on own, with RET supervision able to answer questions or help out in case of big problem.
STEP THREE -- TEST	
Build a paola entirely by themselves, that passes final technical review	build one without any help, in a group session without any guidance; one that passes final inspection
STEP FOUR -- PROVISIONAL APPROVAL	
Provisional approval untill 3 paolas has been built satisfactorily	provisional approval until 3 courses have resulted in satisfactory paolas
STEP FIVE -- CERTIFICATE	
now has RET's blessing to build more units and charge for services	may now train more builders or trainers

APPENDIX D

Sample Fact Sheets

WHAT IS A WONDERBOX?

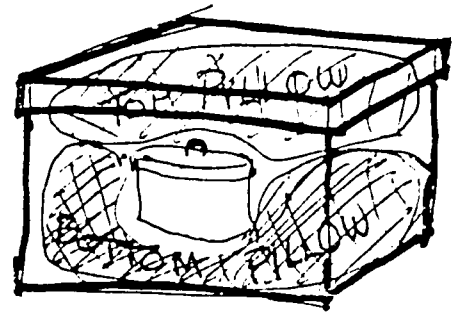
People use different kinds of fuel to cook their food. Some people cook with dung, wood, parrafin or straw. Because there is not a lot of fuel available, you pay a lot of money for it. Or you spend much time collecting it. A wonderbox can help you save fuel, which means spending less money or less time collecting it.

A wonderbox is a cooking device which is used to finish cooking food that has already been boiled. The wonderbox can also be used to keep food warm instead of keeping food over the fire. It is easy to make and can be assembled from materials that are found around your house. A wonderbox is simply a box or basket filled with chaff, straw, cloth, paper, wool or feathers. You put your pot of boiling food into this box or basket, and completely cover the lid of the pot. The chaff or straw keeps heat in the pot, and this heat helps the food finish cooking. A wonderbox can be used with three-legged pots or with saucepans.

ADVANTAGES OF USING A WONDERBOX

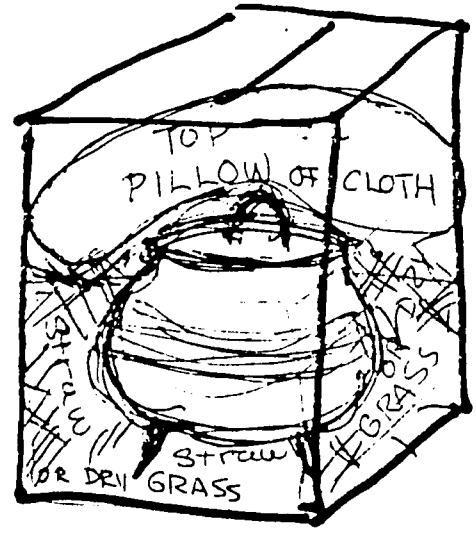
#The wonderbox saves fuel
#The wonderbox saves time you would spend collecting fuel.
#You do not need to stir or watch the food while it is in the wonderbox, because the food cannot burn or boil over.
#The wonderbox is safe. Because it uses no fire, there is no risk of burning yourself or your children.
#A wonderbox is inexpensive to make.
#Because the food is cooking slowly, it will retain a lot of its nutritional value. It will also stay warm for a long time.
#If something is already cold, the wonderbox can keep it cold for many hours.

HOW TO MAKE A WONDERBOX -- A wonderbox is very easy to make. Find a box or basket big enough to fit completely around the largest pot or saucepan you normally use. Make sure this pot has a lid that fits well. To see if the box or basket is big enough, put your pot inside. If there is enough space to put your open hand between the box and the pot on all sides as well as below and above, the box or basket is probably big enough.

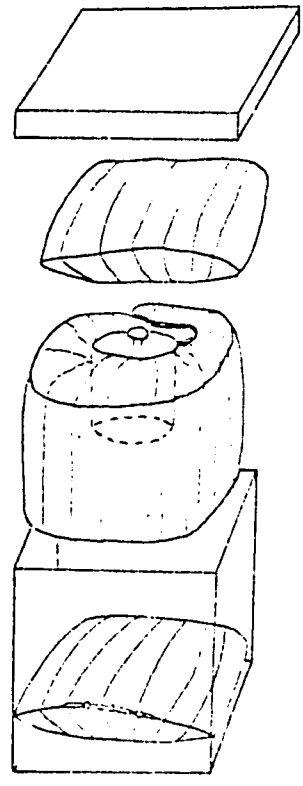


Next find some hay, straw, chaff, paper, cloth, or wool. These go inside the box or basket, to cover the bottom and sides. These materials are called insulation, and they keep your food warm. The insulation should fit all around the pot, but not too tightly. It is best if the insulation makes a thick, airy layer that touches the pot all around.

Now you need a cover filled with insulation. This goes on top of the closed pot. Make or use a pillowcase, and fill it with insulation for the cover. Make the pillow as thick as the width of your palm.



HOW DOES A WONDERBOX WORK? -- Bring the food to a boil on any stove, primus or open fire. After the food boils, leave it on a fire a short time longer. Then put the pot into the wonderbox and cover it. Because the pot has been over a fire, the bottom, sides and the food inside the pot are all very hot. Insulation around the pot keeps this heat inside the food. Insulation around the pot works the same way your blanket or jacket works in winter. Your blanket keeps heat inside you, and cold air out. Insulation in the wonderbox keeps heat inside the pot, and helps the food finish cooking. It is important not to take the pillow off the top of the pot, or the lid off the pot while it is in the wonderbox. If you do take the top off, heat will get out and the food will not cook.



COOKING IN THE WONDERBOX -- When you prepare food for the wonderbox, you need less water. This is because wonderbox cooking keeps water in the food. When you cook meat or chicken in the wonderbox, slice the meat into thin pieces. The smaller the pieces, the faster the food will cook.

As you are getting food ready for the wonderbox, you must also prepare thw wonderbox. Make sure there is space in the center of the insulation to fit your pot. Adjust the insulation so that it will touch the pot all around, without leaving any gaps. After your food has boiled for a short time, put a lid on your pot. Put the pot into the wonderbox and cover it immediately with a pillow. This should be done as quickly as possible, so that heat from the pot does not escape. Also make sure that the pillow on top of the pot fits tightly, to hold heat inside the pot.

RECIPES -- Remember a few important points when cooking in your wonderbox:
#Use less water when preparing your food than you usually use.
#Use less spices (curry, salt) when preparing your food.
#Make sure your pot is at least half full when you use the wonderbox.
If the pot is less than half full, use a smaller pot.
#After the food has boiled, leave it over the fire for a short time.

Rice -- Start with a little less than two times as much water as rice. Let the rice boil for tare minutes. Put the pot into the wonderbox for 20 minutes. If the rice is not cooked after you take it out put it back on the fire for a short time, and remember to increase the boiling time and the wonderbox time the next time you cook rice.

Papa -- Bring the water to a boil and add phofo. Stir the phofo one time and let it sit over the fire for a short time. Put the pot into the wonderbox for about 30 minutes. Cook it longer if needed.

Bread -- Measure one cup of water. Mix the yeast in the water, add sugar and let it rise. Mix the water with three cups of phofo. Mix well. Let the mixture rise, then steam the bread. After the water has boiled for 20 mi nutes put the bread into the wonderbox for one and one half to two hours. Remember to use one cup of water for every three cups of phofo.

Samp -- Soak the samp overnight, then cook it, using less water than you usually do. Let the samp boil for 30 minutes, then put it in the wonderbox for one and a half hours.

RET PROJECT BRIEF

The Renewable Energy Technology Project (RET) was begun in 1981 as a joint effort of the Government of Lesotho and the US Agency For International Development. It is housed in the Ministry of Coops and Rural Development and currently has other facilities in Khubetsoana, Malefilcane and Mokhotlong. The project has several objectives:

1) to develop and introduce renewable energy technologies that help rural villagers conserve scarce fuel;

2) to develop and introduce renewable energy technologies that help rural villagers to increase the year-round availability of food;

3) to develop and leave fully operational an Appropriate Technology Section within the Ministry of Coops and Rural Development to carry on this effort past the expiration of USAID funding.

The first years of this project have focussed upon putting an organizational structure in place, identifying and assessing the energy needs of a rural audience and identifying and developing prototype technologies that address those needs. The second half of the three-year RET project has stressed user testing the technologies, the setting up of production methods and widespread introduction of the technologies to the public. This project brief will introduce the RET project by looking at several aspects of the project:

A. Technology Development Process
B. RET's Centers of Activity
C. Candidate Technologies
D. Other Projects
E. Future Directions

A. TECHNOLOGY DEVELOPMENT PROCESS

1. Needs Assesment -- The mountain district of Mokhotlong provides a rural audience with clear need to conserve fuel, and the village of Malefiloane was chosen as home for the project's first technology development workshop.

   To understand more about the energy needs of the district, an extensive energy needs assessment was conducted in March-June 1982. Five enumerators spent a week in each of 6 villages in the district. The questions asked focussed on a wide range of energy information that would help the project better understand the ways villagers use the energy now available to them. Thus assessment led RET to focus on two primary village needs that can be addressed by renewable sources of energy. Energy is used in great amounts to prepare food, heat water and heat homes. By reducing the amount of fuel consumed in these tasks RET can make a direct improvement in the lives of villagers who must collect or otherwise pay for fuel. Similarly, during some seasons of the year the availability of food is a major village concern; at all times its cost is a difficulty. Increasing the year-round availability of food was therefore identified as the second major project emphasis.

2. Prototype Development -- Ideas for renewable energy devices to address these needs may come from any sources. Often a traditional device or practice provides a starting point for improvement. Often either commercial enterprises or other organizations have tried to fill the need. Many times RET staff has been able to modify renewable energy devices used elsewhere to suit Lesotho circumstances. In every instance the first

step is the construction of a prototype, one that fits the technical, social and economic criteria at hand. What the device costs, how it is used, how closely it conforms to the practises and preferences of the people who will use it; RET must take all these into consideration as it selects or develops new renewable energy devices.

3. Technical Testing -- Each prototype device must show a substantial enery savings over the device or practice it is replacing, or it must make satisfactory use of a new form of energy such as the sun to do the job usually done by dung fuels. In the first step of refining the technology it is tested under controlled circumstances and modified as necessary to ensure that the use of its fuel is as efficient as possible or, in the case of solar appliances, that it performs its role in as little time as possible. Technical testing also considers the materials used to make the prototype and may result in simpler or less expensive ways to build the item. Devices that complete this testing and prove themselves efficient and cheap for rural buyers are the ones RET seeks. These "winners" move through the rest of the steps.

4. User Testing -- In addition to its cost and efficiency, the new device must also be durable in actual use, and must be suited to the way in which its owner will put it to work. A limited number of devices are provided to people who agree to test them in their homes. From these people RET gathers information about the devices: did it save fuel? did they like it? what would they like to change about it? Did it need any repairs? These questions help RET decide whether any more modifications are necessary in the design.

5. Production and Training -- Once a device has satisfactorily passed through all of the previous steps and has proven itself, it is necessary to ensure that the device will be available to people who want it. After user testing, RET staff can begin training other builders to copy the final design. Devices that reach this stage can be grouped into two types: those that can be built by a person for their own use (those that can be built without specialized skills or equipment) and those that most people will buy (those that must be built in a shop or factory). For both groups RET develops training courses and identifies sources of materials. For the easily built items, training courses are set up for the general public. For the manufactured items RET identifies and trains fabricators who will in turn sell the item to the public.

6. Dissemination -- The final stage of the process is spreading the item as widely as possible. This cannot be done until all of the previous steps have been completed and all of the items are available through normal channels. Once that has been completed, the dissemination effort builds demand for the device and/or training. Through RET's dissemination steps, the public is introduced to the technologies and told how to build or buy them for their own use. Because RET has concentrated its first efforts in the Mokhotlong district, most training and dissemination has begun there. Once courses and information have been successfully introduced in a limited area, dissemination will progress to larger areas using proven courses and printed materials. A variety of extension type audiences will also be utilized to assist in spreading RET information to the general public.

B. FOUR CENTERS OF ACTIVITY

RET has activities primarily in two regions, the rural and mountainous Mokhotlong district, and in the urban vicinity of Maseru. The range of technical and administrative activities required by the project has also meant that specialization of activities has occured within those regions. The result has been two centers in each region, one dealing primarily with technology development and testing, and the other with administration and dissemination. The main project headquarters in Maseru combines responsibility for overall project administration with dissemination activities and coordination with the many external organizations with which the project has regular contact.

1. Malefiloane workshop -- The RET workshop in Malefiloane is located next to the rural clinic and co-op store that serve the community and surrounding villages. The workshop has tools and equipment to fabricate most of the technologies the project explored, but has concetrated its attention primarily on the production and testing of different cooking devices. The Malefiloane clinic has weekly clinics for pre-school mothers, and, because of their location on the same site, RET staff has been able to take advantage of this "captive" audience to gain invaluable feedback on the technologies. The workshop has also begun user testing in villages around Malefiloane, primarily on the stone paolas that have been built in several villages at the request of their residents. User feedback is also being obtained in several villages on both metal and lorena stoves.

2. Mokhotlong RET -- RET's center in Mokhotlong town takes advantage of its location at the center of the district to reach organizational audiences that regularly come in from outlying areas of the region. Village health workers, nutrition, communal gardens and agricultural workers, and other government extension workers have been the focus of active dissemination efforts from this office. Through these extension networks, in addition to direct work with interested villagers, Mokhotlong RET is ensuring that word of the technologies reaches appropriate audiences throughout the district.

3. Khubetsoana workshop -- The workshop just north of Maseru shares prototype development and technology testing with Malefiloane. Growholes, stone paolas, food dryers and a variety of stoves have been tested here. Training activities will increase in importance for this center as technologies that have proven themselves technically will require production training to ensure their availability to the general public.

4. Maseru project headquarters -- Located in Bonhomme House on Leabua Highway in Maseru, the headquarters for the project combines administrative responsibilities with supporting work in the other project areas. Maseru has primary responsibility for interaction with the Ministry of Coops and Rural Development and USAID, and for overall coordination with other external organizations in the areas of both production and dissemination.

C. CANDIDATE TECHNOLOGIES

All of the following technologies or devices have been closely examined by the RET project and are considered excellent candidates for widespread dissemination. Not all, however, are ready for dissemination at present,

user testing and production training are in some cases still underway. The technologies fall roughly into 3 categories, depending on how the unit is made.

1. User built technologies --Technologies have the most impact when they are cheap, effective and easily built. Where possible RET has designed technologies that can be built by the users themselves. There are 5 devices in this category:

   - stone paolas -- large, stationary mud and stone devices that are used for cooking outdoors

   - retained heat cookers -- these are also called wonderboxes, and they are insulated boxes that save fuel by holding heat in the cooking pot, after the food inside has boiled.

   - food dryers -- there are several simple devices that can help dry food

   - sand/clay stoves -- simple stoves made of clay and sand, and easy to build for little cost.

   - simple solar water heaters -- made of blackened tins with a clear cover.

2. Kit Built technologies --These devices are not hard to build, but they may require materials or tools that most village people do not have. RET has designed kits as a way to provide people the materials they need, and to make the devices as easy as possible to make. There are two technologies in this category:

   - food dryers -- some food dryers are larger, or made of metal, and are easier to build with kits.

   - growholes -- these are devices for growing food in early spring and winter, made of mud and stone, with a clear cover

3. Manufactured technologies --To make these devices requires special tra ining or special equipment. In most cases RET will teach metal workers how to make these items, and people will be able to buy them from stores:

   - metal stoves -- stove of welded steel, for either two-legged pots or sauce pans.

   - metal paolas -- an inexpensive sheet metal paola designed to save fuel

   - energy-efficient housing -- a variety of passive solar design ideas and ways to make your house more energy-efficient.

   - solar ovens -- sheet metal reflectors that direct sunlight into a glass-covered, blackened box, useful as an oven or a solar water heater

D. OTHER PROJECTS

1. Research technologies -- In addition to the technologies on which RET has undertaken work, there are others the project has explored for their possible institutional significance. On all of these subjects RET maintains information in its library and is happy to share technical information with others in the country doing or contemplating work in the field:

   --- bio-gas
   --- microhydro electricity
   --- photovoltaics
   --- manufactured solar water heaters

2. Technologies for schools -- As RET completes development work on more of these technologies, the project's emphasis shifts from testing to training and dissemination. In a partnership with the School Feeding Program and Food for Work, RET has undertaken a six-month pilot project to train FFW workers. The project has provided 12 stone paolas and three grow-holes to five schools during its first six-week session, and plans are underway to begin a second session in February.

E. FUTURE DIRECTIONS

The second half of the project will find increasing emphasis placed on training, production and dissemination activities. Training will continue for producers of both technologies that can be built in the field and those that can be built in a workshop. Dissemination activities, in the form of village workshops, courses and publications for special audiences will continue, and more effort will be put into spreading information about the project, first in Mokhotlong district and then to the remainder of the country.

In addition, in the second and third years of RET, administrative control of the project will switch to the staff of the Appropriate Technology Section who have been with the project since the beginning. The transfer to ATS may subtly change the focus of the project in one way -- the mandate of the Appropriate Technology Section may be broader than that of a project confined to Renewable Energy Technologies. This may result in exploration of a wider range of simple devices for production and sale, and solutions proposed in succeeding years that go beyond the scope of energy needs to directly address many of the other pressing problems that face rural people.

RET
LESOTHO

GUIDE TO

KHBETSOANA DISPLAYS

Ministry of Co-ops and Rural Development -- Appropriate Technology Section

Renewable Energy Technology Project

1: MAIN WORKSHOP -- Technology Development

ATS/RET may work to improve a device that already exists, or it may design a new one to meet the needs of rural people. In either case, it is important to find the simpliest and most inexpensive way to make it. Much of that work is done here, or at a similar ATS/RET workshop in Malefiloane.

2: STOVE TEST SHED -- Technology Testing

When ATS/RET introduces a new device to its rural audience, that device must perform well, and be an improvement over old ways. To ensure that it is, RET tests each new device completely. Much of that testing is done here, and much more is done in villages, with people who use the device.

3: SAND/CLAY STOVES

These two stoves are made from a mixture of sand and clay that is pounded into hardness. The two holes in the top of the stoves are cooking holes. Inside the first hole you can see the firebox and grate. The chimney removes the smoke. These stoves are not hard to make, and sand and clay is not costly. Because these stoves are easy to make and they save fuel, ATS/RET is teaching people to make them.

4: WONDERBOXES

Wonderboxes are also called retained Heat Cookers, or Hayboxes. They are also used to save fuel when cooking. Once a covered pot has been boiling, it is placed inside a Wonderbox. The heat inside the pot and in the fuel will cook the food without using any more fuel. The secret to a wonderbox lies in making sure that there is enough insulation around the pot. Hay, stryofoam beads, shredded newspaper and wheat chaff all work well.

5: BRICK AND COMMERCIAL STOVES

In the centre of the stove shed you will see several other kinds of stoves. Several of these have been purchased by RET. The ones of brick and metal have been made here. All of these stoves have been tested to see how much fuel they use. If their fuel savings is high, RET may teach people how to make these models as well.

6: METAL STOVES

This stove has been developed, built and tested by the RET project. It saves almost one-half of the fuel used by a traditional fire. It can be used with either three-legged pots or sauce pans. It cooks quickly and efficiently and, with its chimney, keeps smoke out of the house.

7: METAL PAOLAS

These metal paolas are similar to traditional metal paolas, but they save fuel. They control the amount of air that can get to the fire, and direct this heat right to the pot. This stops the fire from burning too fast and using more fuel than is needed.

8: STONE PAOLAS

This simple device is also based on the traditional paola. Mud, stone, and clay are the main materials. Only a small amount of metal is necessary. Look at the air holes at the base of the stone paola, and the fuel holes that are located higher up on the outside. All of these holes are filled with moveable tins to control the amount of air that gets to the fire. The inside of the stone paola is smeared with a mixture of sand and clay, to help it last through the fire without cracking.

9: SOLAR OVENS

Lesotho has one of the best climates in the world for using energy from the sun -- each year has about 300 days with at least 6 hours of sunshine. The reflectors on a solar oven point this energy from the sun into an insulated box. The glass on the front of the box lets the sun's energy in, but does not let heat out as easily. Foods can be baked or boiled in a solar oven without using any fuel at all.

#10: GROWHOLES

A growhole is also built of mud and stone, and it has a transparent cover to hold in the sun's heat. It must point to the north to use the sun's energy all year long. It is this energy that keeps the plants warm inside the growhole during the early months of spring and during the cold winter. The growhole helps provide healthy seedlings that can be planted outside when most people are planting their seeds.

#11: FOOD DRYERS

These devices are simple food dryers. Vegetables, fruits and greens that have been cut into small pieces can be quickly dried in any of these dryers. Once dried, the food will last a very long time without spoiling.

#12: PHOTOVOLTAICS

This photovoltaic panel uses the sun's energy to make electricity. RET uses this panel to run its radio for communication with other project centers, but the electricity can also be used for other purposes, such as lighting or refrigeration.

13: SOLAR WATER HEATERS

Heating water with the sun can be done very simply. Food tins, painted black and covered with glass or clear plastic make a very simple solar water heater. Other small solar water heaters can be purchased. All of these heaters work in the same way -- energy from the sun is captured by the black surface in the heater, which then passes heat to the water inside. These small heaters share many features with the larger and more expensive solar water heaters seen on many rooftops in Maseru but they are less expensive.

#14: PASSIVE SOLAR DESIGN

The watchman's house at Khubetsoana is also an example of renewable energy at work. This small building was designed to use the sun's heat to provide warmth during the winter. The large windows face north--in the winter sun will come in the windows to heat up the inside of the house. The sun will also heat up the black masonry and glass wall between the windows. This wall is a solar collector. It will hold heat until the nightime, when that heat is needed to keep the house warm. In summer, the large overhang on the roof helps the house keep cool.

KHUBETSOANA TOUR

Welcome to RET's Khubetsoana workshop. Khubetsoana serves as a development and testing center for the Renewable Energy Technology Project and the Appropriate Technology Section of the Ministry of Coops and Rural Development. RET was begun in 1981 as a joint effort of the Government of Lesotho and the U.S. Agency For International Development. Its goal is the development of simple technologies that use renewable sources of energy to respond to two basic needs of Lesotho's rural people:

1) reducing the requirement for traditional fuels
2) increasing the year-round availability of food

During your visit to the Khubetsoana workshop you will be able to inspect the devices RET is developing and get a better idea of the way in which they are used.

This tour is organized into a series of stations. Each station is marked with a number and describes a point of interest at the Khubetsoana workshop. Many of the stations show examples of the different devices, and in some cases the devices are being used. To follow the tour, go to each station and read the description of it that is given in this brochure. Please ask any questions that you may have -- RET staff members are available to answer them. At the end of each description given here you will find directions to help you find the next station in the sequence. Or, you may feel free to go to any of the stations that interest you. Above all, enjoy your visit. Thank you for coming.

STATION NO. 1 MAIN WORKSHOP: Technology Development

A major focus of the RET project is the development of new, simple devices that use renewable sources of energy. Many of the devices that RET has developed in this workshop are improvements on items that are already in use. The metal paolas and food dryers are examples of this. Other devices have been designed by RET staff. The growholes, steel stoves stone paolas and mud-and-clay stoves are examples of this. In either case, whether improving a device that already exists or designing a new one, RET works to find the simplest and most inexpensive way to make the improved device. Much of that work is done here, in the main workshop, and at a similar workshop in Malefiloane in the district of Mokhotlong.

As you stand in the large door of the workshop you will see the electricity generator and welding equipment. Items like the metal stoves are made here. At the back end of the building you will see the tools and materials used in carpentry; covers for the growholes, wooden food dryers may be made here.

From the front door of the main workshop, walk down the path at your right, to the second building on the site.

STATION NO. 2 STOVE TEST SHED: Technology Testing

When RET introduces a new device to its rural audiences it must perform well.

Even when items are being introduced only to see what people think, it is important that the new device be an improvement over previous practices. To ensure that it is, RET tests prototypes of each new device, and does much of that testing here. Along the south wall of the inside of this building you see an array of metal paolas. Several different designs have been tested -- those with one large hole, with many small holes, with fewer

holes, those round or square. The tools for running those tests are all visibe at this station.

Station No. 3 is located at your right, on the west inside wall of this building.

STATION NO. 3 LORENA STOVES

Here you see two stoves made from Lorena mix. Lorena is a mixture of sand and clay that is pounded into the hardness necessary to make these stoves. The holes in front of the stoves are where the fuel is added. Metal dampers that slide over these holes allow the cook to control the amount of air that reaches the fire. That helps the fire burn either faster or slower, as the cooks wishes, and helps save much of the fuel that is used. The two holes in the top of the stove are cooking holes. Inside the first hole you can see the firebox and grate. Inside the second hole, at the back of the stove, you can see ridges made of mud. These are to direct the heat from the firebox up to the second pot. An ash drawer is under the first hole -- this allows ashes to be removed and also helps control the amount of air reaching the fire. The chimney removes the smoke making healthier indoor cooking possible.

Lorena stoves are not difficult to make. Mud and clay is not costly. Because they are simple to make and they save fuel, these stoves are an option RET is introducing.

The next station is again on your right, along the north wall of the building.

STATION NO. 4 WONDERBOXES

Wonderboxes are also called Retained Heat Cookers, or Hayboxes. They are also used to save fuel when cooking food. Once a covered pot has been heated to boiling on the stove, it is placed inside a Wonderbox. Thick pillows of insulation are placed all around the pot. The heat inside the pot and in the food will cook the food without using any additional fuel.

Wonderboxes may be made from many materials. These pillows are stuffed with stryofoam beads, the best insulator. Wonderboxes are called Hayboxes when the pillows are filled with hay. Shredded newspaper can also be used, and wheat chaff works very well. The secret lies in making sure that there is enough insulation around the pot. You can make a wonderbox yourself, using materials that you have at home.

The next station is at the door of the shed -- as you exit, turn around and observe the stoves in the centre of the shed.

STATION NO. 5 BRICK AND COMMERCIAL STOVES

In the centre of the stove shed you will see several other kinds of stoves. Several of these have been purchased by the RET project. The ones made of brick and metal have been made here. All of these stoves have been tested to see how much fuel they use. If their fuel savings is high, RET may include some of these models in their training and dissemination efforts.

For now, however, the metal stove that has been the focus of RET's major efforts is shown outside, at the next station.

Go outside the stove shed and turn to the left, to face the building's north wall.

STATION NO. 6 METAL STOVES

This stove has been developed, built and tested by the RET project, both here and Malefiloane. It is now beginning tests outside the project, to see how it is liked by the people who will use it. It saves almost ½ of the fuel used by a traditional fire. It can be used with either three-legged pots or sauce pans. It cooks quickly and efficiently and, with its chimney, keeps smoke out of the house. RET has begun training other metal workers in the country to make this stove. If reports on it continue to be favourable, more training and information on it will be offered to people in the Mokhotlong district and throughout the country.

The next station is located behind you, along the fence.

STATION NO. 7 METAL PAOLAS

Inside the stove testing shed, you saw the varieties of metal paols that were tested. Here are some of the winning models. These metal paolas are similar to the traditional metal paola and the model we have refined is based on one developed by the Rural Technology Unit at Thaba-Tseka. These paolas save fuel because they control the amount of air that can get into the fire and direct the heat to the pot very well. This stops the fire from burning too quickly and using more fuel than is necessary. These paolas do not use a chimney and therefore do not keep smoke out of the house, but they cost less than the metal stoves. RET will be working to train sheet metal workers to make these paolas so that they are more widely available throughout the country.

STATION NO. 8 STONE PAOLAS

The design for this simple device was developed by RET staff, and it is also based on the traditional paola. Mud, stone and clay are the primary materials; the small amount of metal that is necessary is usually available for about M3. Here you see a number of paolas: notice where the air holes are placed around the base of the paola. Fuel holes are located higher on the outside. All of these holes are filled with moveable tins to control the amount of air that gets to the fire. Look inside the paolas to see the metal grate at the very bottom and the rods that hold the pot in place. The inside of the paola is smeared with lorena, a mixture of sand and clay, to ensure that it will withstand the heat of the fire without cracking.

Stone paolas are very simple to make. RET has been training villagers in Malefiloane and Mokhotlong to make them and has provided paolas to several schools through the Food For Work project. The stone paola was originally designed for the large pots used by schools or for brewing. We have found, however, that they can be made for any size three-legged pot, and it is proving very popular among village women for their own use.

For the next station walk to the end of the row of stone paolas and along the side of the gardens nearest the fence.

STATION NO. 9 SOLAR OVENS

Solar ovens like this one have been made and tested at Thaba-Tseka for several years. Lesotho has one of the best climates in the world for solar energy use -- an average of 300 days a year with at least 6 hours of sunshine. The reflectors on the solar oven direct the sun's rays into an insulated box. The black surfaces inside the oven absorb the sun's rays which are thus changed to energy. The double layer of glass assures that the sun can enter but the heat cannot easily escape. Foods requiring long slow cooking can be baked or boiled in a sloar oven without using any fuel at all. A solar oven must be turned regularly so that it always faces the sun. Cooking with a solar oven is different from cooking with fire. Thus many people may find it strange or hard to use. More research and teaching is needed before this unusual way of cooking will be accepted. The RET Project will be working on improving solar ovens because they could save a lot of fuel if a good design is developed and accepted by ordinary people.

STATION NO. 10 GROWHOLES AND GARDENS

All of the devices you have seen so far have been designed for the first of RET's two main goals: to decrease the amount of fuel used. The second main objective is to increase the year-round availability of food. These gardens were begun with seedlings from the technology shown at the next station, the growhole.

A growhole is a small solar greenhouse built of inexpensive mud and stone. The growhole faces to the north to use the sun to grow food all year long. It is energy from the sun that keeps the plants inside warm during the cold fall and winter months. In the spring, too, the growhole provides a warm place to plant seedlings early, before the ground outside is completely free of frost.

The growhole at the east end of this row is not finished. It shows the back wall of the growhole and the wires that are built into the foundation to hold down the cover. The rest of the growholes have wooden and fiber-glass covers, and have been used throughout the summer. With regular watering and careful opening of the cover, the growhole will also keep plants more moist in summer than they would be in an outside garden exposed to the hot, dry winds of summer.

A growhole is not difficult to make but it does require tools and previous experience with carpentry. RET has trained 18 people in growhole construction and provided three growholes to the Khubetsoana Primary School through the FFW project. RET is now working on ways to make growhole covers. Feel free to examine them if you wish. Just in front of those growholes you will also see the next station.

STATION NO. 11 FOOD PRESERVATION

At this station you will find several different devices. All of them are useful for storing food so that it can be available throughout the year. Most of the devices are simple food dryers. Vegetables, fruits and greens that have been cut into small pieces can be quickly dried in any one of these dryers. Once dried, the fruit will last a very long time without spoiling.

The dryers you see here vary in cost. Inexpensive types are the cabbage bag dryer and cardboard box dryer The larger wooden or metal dryers require more expensive tools and materials to make, but they will last a lot longer and can dry larger quantities of food at a time.

The last item at this station is the solar oven, and here it is used to heat foods for canning. The solar oven is a versatile technology -- you will see it at another station to come.

STATION NO. 12 PHOTOVOLTAICS

At this end of the main workshop you will see a photovoltaic panel. This thechnology uses the sun's energy to produce electricity. The RET project will be using these panels to run its radios for communication with other project centers, but the electricity can also be used for other purposes. The smaller photovoltaic panel is also running a small radio -- block out the sun with your hand over the small panel to see what happens.

From here, walk around the large water tank at the end of the workshop. Near the watchman's house you will find the next station.

STATION NO. 13 SOLAR WATER HEATERS

Using energy from the sun to heat water can be done very simply. Food tins, painted black and covered with glass or clear plastic make a very simple solar water heater. Other small solar water heaters are purchased. All of these heaters work the same way -- energy from the sun is captured by the black surface in the heater. This black surface gets hot and passes the heat to the water inside. All of these heaters are batch heaters because they heat a quantity of water at a time. They share many features with the larger and more expensive solar water heaters seen on many rooftops in Maseru but they are less expensive.

STATION NO. 14 PASSIVE SOLAR DESIGN

The last station is the watchman's house, near the gate. This small building was designed to use the sun's heat to provide warmth during the winter. The large windows face north -- in the winter sun will come in the windows to heat the inside of the building. The sun will also heat up the black masonry and glass wall between the windows. This wall is also a solar collector. It will hold heat until the nightime, when that heat is needed to keep the house warm. In the summer, when the sun must be kept out of the house, the large overhang on the roof ensures that no sun reaches the inside. This helps the house keep cool during the hottest part of the summer. Extra windows on the north, a large overhang and the special solar wall -- these are simple features that can be added to any building to help it stay warmer in the winter and cooler in summer. These are the principles of passive solar design, and RET has been working with architects and individuals to help them include these and other passive solar measures into as many buildings as possible. Blueprints for 3 solar houses are posted on the walls inside the watchman's house.

This is the end of the tour of Khubetsoana workshop. We hope you have found the technologies interesting and have learned something about the ways fuel conservation and renewable sources of energy like the sun can play a part in your life. If you have any questions, please ask any RET staff member for help. We hope you have enjoyed your visit, and again, we thank you for coming.

Renewable Energy Technology Project
Appropriate Technology Section

Ministry of Coops and Rural Development

25 January, 1983

APPENDIX E

Curriculum Suggestions

Inclusion of RET Concepts in the JC Syllabus

SYLLABUS TOPIC	RET CONCEPT/EXAMPLE
Integrated Science	
introductory exercises in observation and recording	introduce idea that things need energy to grow and move
energy and particles--introducing ideas on energy and conservation	examine locally familiar energy forms and applications, not just purchased forms
ecological study--species interaction, sun as source of all energy, food chains, adaptation	demonstrate through observation of school's grow-hole
electricity--an electron, idea of atomic particles moving	solar cells
natural resources--sun as energy source, solar heaters	introduce and build simple solar water heaters, as lab exercise have solar collector "race" to see which gets hottest
maintaining life and health--importance of food groups in balanced diet	discuss balancing diet year-round, how to grow greens in winter, importance of drying and storing food
heat and electricity in everyday life--conduction, convection and radiation, heat transfer, insulation, conversion of energy into different forms	demonstrate with simple solar devices that do useful work, show different types of insulation around collectors, discuss collector that "lost" race
domestic use of electricity	domestic uses of solar energy, in all its forms
Development Studies	
living together--a study of communities	include exercise to examine how much energy a community uses
using resources--introduces conservation of resources, both natural and human	introduce through energy conservation in cooking and building, how renewable resources and simple, small technologies create jobs

producing and spending--introduces four basic needs: food, water, shelter and clothing	introduce fifth basic need--energy--the ability to do work, cook food, etc., and how it can be produced at home
producing more--introduces idea of consumer goods	introduce "conserver" goods that create jobs, foster local skills and bring money directly into village economy, rather than to outside businesses
raising and using revenues--sources of household income	skills that can be used to make items for sale or provide services to others, such as making RETs
solving problems--introduces population growth and standard of living	how to improve standard of living without increasing pressure on natural resources, for example, using RETs to save fuel
<u>Agriculture</u>	
conservation	discuss small-scale soil enrichment (composting) for home gardens and characteristics/needs of healthy soil, demonstrate with grow-hole and in fields
plant environment--introduces germination conditions, weeds, pests and diseases	demonstrate with grow-hole
commercial vegetable production	introduce starting seeds in grow-hole and implications of older, healthy seedlings for field planting
<u>Building Construction</u>	
site inspection	proper orientation of building and whether this will be sufficient to heat it
materials	insulation, window placement

Domestic Science

cookery--food storage	food dryers, canning with stone paola or solar oven to reduce fuel consumption
cooking on different devices--gas and electric stoves	fuel-saving traditional devices--metal paolas and stoves, and retained heat cookers
making bread	use of retained heat cooker
choosing a stove	consideration of fuel use in making decision, introduce all cooking devices that save fuel

CURRICULUM IDEAS SHEET (ideas side)

CLASS/SUBJECT:

TOPIC:

LEVEL:

Time this lesson requires:

Materials required:

Lesson objectives:

Outline of Lesson:
(attach other pages as needed)

CURRICULUM IDEAS SHEET (comments side)

Please mark your comments on this page and return the form to:
(attach other pages as needed) RET, Ministry of Coops & Rural Dev., Box 686, Maseru

This lesson was tried by: Date tried:
School:
Teacher:
Class:

How would you modify this lesson?

THANK YOU FOR YOUR HELP!