

- (a) Scarcity of firewood force women to travel long distances to obtain firewood. This is fatiguing to women who on return from collecting the wood would have to do other house hold chores. Such an exercise is also time consuming and leaves less time for the women to perform other duties.
- (b) Where wood is not available locally, hard earned income is used by women to buy firewood or paraffin. Long distances may have to be traveled to obtain either. Also, on arrival at the fuel source the fuel may be out of stock leading to frustrations of having to do without.
- (c) Women in low income households in company towns use the bituminous coal that is supplied free. This coal produces a lot of polluting emissions that can cause health problems mainly to the women and children as they are the ones who spend more time in the kitchen. The emissions also smell badly and in some winter days the entire town can be covered with smog from bituminous coal burning.
- (d) Low income earners who use paraffin wick stoves are exposed to fumes from the stoves which may pose a health hazard. These stoves also produce soot and make things in the house dirty and have a bad smell. The also pose a danger of exploding if misused.
- (e) Low income earners have to make do with single cooker stoves or open fires which can be time consuming. The use of open fires also exposes the women to smoke inhalation and eye irritations which may be of health concern.
- (f) The time taken to iron clothes is long since the iron has to be placed on the stove from time to time for heating or has to be refilled with glowing ambers depending on the make.
- (g) Low income groups are faced with lack of clean water. Where water is available in a dam or pond, it may be shared with domestic animals which makes the water dirty and smell badly. This may be a health hazard. Women may have to travel long distances - a time consuming exercise - to obtain clean water. Women may also have to wait in long ques at springs or rural water supplies to get some water for their families.
- (h) Women in the low income households have no direct access to baking facilities. Their families miss the opportunity to experiment with baking not just flower products but other meals as well.
- (i) In the low income groups, space heating is done with open fires, or coal fires that can emit hazardous fumes. On a number of occasions in Swaziland, people have been reported dead from inhaling carbon monoxide from coal fires.
- (j) Women who use the evenings to do income-generating projects have to struggle in the faint light from candles or paraffin lamps to do their work which can lead to eye problems.
- (k) Water heating is a problem especially in winter mornings where a lot of hot water is required for the family to bath. The women have to wake up very early in the morning and spend literally hours heating water in small pots sequentially for the whole family.
- (l) Perishable foods spoil because of lack of refrigeration, freezing or other preserving techniques employing energy.
- (m) Time lost in fetching water, collecting firewood, cooking on a open fires, cooking on single burner stoves leaves women with less time for other essential activities such as agricultural work, and income-generating activities such as knitting, sowing, mat making, basket weaving etc.

- (n) Day time being taken by time consuming chores, the evening would be the time to do income generating activities as those mentioned in (n) above. With the inadequate lighting from candles and paraffin lamps is difficult or impossible to do such work in the evenings.
- (o) Use of non rechargeable batteries for radios is costly in the long run. Most low income people do not read the paper but depend on the radio for news announcements and entertainment.
- (p) Charging places for lead-acid batteries in some case are fare from homes.
- (q) Using open flames to light up the house from candles and paraffin lamps can lead to fires and burns on children. This can be very stressful to women as in most cases the man blames the woman if such a tragedy strikes.
- (r) Women have to be always careful with paraffin as children can drink it if left carelessly.
- (s) Cooking utensils used on open fires and paraffin stoves get very dirty from soot and take a long time to clean.
- (t) If a member of the family acquires a health problem related to energy or energy related accidents and fume inhalation, women are the ones who tend to spend time in hospitals or home taking care of the unwell member of the family which, leads to loss in time for income-generating activities.
- (t) The time that women spend taking care of household energy needs can leave much less time for them to take care of their own hygiene which can lead to a shorter life expectancy or poor quality of life.

2.2 Middle Income Groups

The middle income group include the households that may afford some of the following : LPG single- or two-cooker stoves, electricity for lighting, two hotplate electric stoves, access to electric irons (at least by borrowing) coal stoves, or wood stoves. In this group it is assumed that (i) clean water is within easy reach even when there is no indoor plumbing or the tap is shared by several households, and (ii) if clean water is not available locally transportation is available to ferry clean water from a distance.

In the middle income groups the problems faced by women were found to be as follows:

- (a) For those without electricity ironing can still be a problem as in the low income group.
- (b) Lighting with candles and paraffin can lead to the same problems as discussed in the low income groups.
- (c) Availability of paraffin and LPG can be a problem outside the urban areas, and wood in some rural areas. This can lead to frustrations of having to do without from time to time.
- (d) Energy costs may also take a big fraction of the income earned leading to sacrifice in areas such as nutritional diversity.
- (e) Most of the rental property (usually one or two room) in peri-urban areas with electricity has no appliances and the electricity is used mainly for lighting and ironing. The women in these households have to face the same inconveniences of cooking with paraffin stoves or even open fires and as a result have the same problems as the women in the low income groups.

- (f) Women in this group may also face the same baking limitations if they have to use paraffin stoves, one- or two-cooker LPG stove, or open fires to do their cooking and water heating.
- (g) Electricity power failures common in summer and on windy days can be a problem in both cooking and ironing for women in this group. This necessitates that women in this group provide alternative cooking measures such as paraffin stoves or LPG cookers.
- (h) In addition to the energy related problems the women in these groups may also have gainful employment, starting work at 7:30 a.m. and returning home around 6:00 to 7:00 p.m., and they are expected to perform all the household tasks like they were staying at home all day.

2.3 High Income Groups

The higher income households are those that can afford general household appliances, such as refrigerators, freezers, multi-cooker stoves with ovens, electric irons, clothe washers and dryers, food processors etc. These households can afford to be connected to the electric grid if it is close by or can have enough money to run their appliances on LPG. They also have access to clean water by any possible means.

The energy problems faced by women in this group were found to be as follows:

- (a) Frequent power failures can frustrate the activities of women in this income group. Most women in this income group have gainful employment and value their time considerably.
- (b) Power surges may damage electrical appliances such as refrigerators and equipment like video cassette recorders, television sets and computers, which can be costly.
- (c) Poor choice of appliances by women through the pressure of smooth talking salespeople can lead to poor performance or malfunctioning which can be frustrating and time consuming in returning them to the store or waiting for them to get fixed. For some reason a lot of products bought from furniture shops tend to be difficult to repair when they fail.
- (d) Lack of discipline with electricity or LPG can lead to high energy expenditure, and in the case of electricity, service can be terminated because of arrears.

3. ALLEVIATING WOMEN'S ENERGY RELATED PROBLEMS

3.1 Involving Women in the Formulation of Energy Policies

The findings of the last chapters show that women have more at stake when it comes to household energy needs than men. Therefore in the formulation of national energy policies women and women's energy concerns must never be left out. Policies must not just address the issue of providing energy to the household but must also look at the social and economic impacts of the provision of that energy. In view of the time spent on energy related problems, women lose a lot of productive time during which they can be involved in self improvement and income generating projects. This is a great loss of human productivity. According to the

Ministry of Natural Resources and Energy in the rural areas the women are usually the most active people in community self-help projects. Relieving them from energy problems can lead to the enhancement of the overall development of communities through self-help projects. This is the result desired by donor agencies and the tax payers in donor countries who are the ultimate source of donor funds.

3.2 Regional Networking

Some women problems related to energy can be solved through local and regional networking. Networking can ensure that once a problem is solved in one area the solution obtained can be shared by women's groups in other areas. This can eliminate the need to "reinvent the wheel." Since a solution in one area may not necessarily be valid for another area, the qualities that make it work can be analyzed so that area specific solutions can be developed. Another advantage of women's groups networking is that they can give encouragement and support to each other. It can be encouraging to women in each women's group to know that they are not alone in the problems they face, and that something can be done to solve them. The women's groups can also learn from each other's mistakes and help the persevere even in difficult times.

3.3 Sensitising Energy Suppliers and Appliance Manufactures to Women's Needs

Most energy and appliance suppliers in Swaziland have not approached the delivery of their products in terms of the end user. This is because at first look energy does not seem to have a gender aspect. The general idea is that everyone needs energy in one form or another regardless of gender. As a result, there has been no need to address the energy issue on gender basis.

Women in Swaziland on their own have seen that they need to help themselves concerning their energy needs. Several women's organisations in the country are involved in such activities. These include Women and Development under the Deputy Prime Minister's office who are working on fuel efficient and low cost stoves, and the Home Economics Department under the Ministry of Agriculture and Cooperatives. Women and Development also worked on a Biogas system that was installed in a private home and is functioning. They are also experimenting with solar cookers and solar food dryers. In Nhlanguano, South Swaziland, where they have solar photovoltaic panel powered sawing machines used by women for sawing.

A company that has links with women's groups in New Dawn Engineering in Matsapha. This company manufactures fuel efficient stoves like the *tsotso* stove which was developed in Zimbabwe. This stove employs secondary burning of volatiles from wood which would otherwise be smoke to provide a smokeless fire. It comes in various forms, single-cooker, double cooker, and double cooker with an oven. It can cook whole meals or bake with twigs. Such developments must be encouraged in Swaziland.

The MNRE - Energy Sector has proved to be sensitive to women's energy needs. This Sector has worked with women in energy areas such as development of wood lots for sustainable firewood supply (1992 - present), fuel efficient stoves (1997), manufacture of paper briquettes (1999) and currently developing what they call the Rural Electrification Programme. In this programme the Energy Sector plans to ask Swaziland Electricity Board

(SEB) to provide each rural household that gets hooked up to the electric grid with a two hot plate stove, electric kettle, electric iron and a heater on credit. The idea in this project is to hook as many of the rural women as possible to electricity so as to relieve the pressure on indigenous trees for firewood. Women's groups must lobby to support this programme.

With the UNDP Project Document, Energy and Women: Generating Opportunities for Development the women's problems relating to energy must be addressed. What needs to be done is to sensitize the general population on women's energy needs. This should extend to suppliers of both of energy products and appliances. Women in all social levels have to state their needs. A good supplier of women's energy products is the one who will source for the required product of the right quality and right price, rather than pushing products that are sent by chain-store suppliers. Women should therefore be trained to express their energy needs. Women should also take every opportunity to work closely with the MNRE - Energy Sector for advice and inclusion in policy formulation and pilot project designs.

3.4 Quality Assurance in the Energy Sector

Most women in Swaziland do not have much depth in technical matters. They therefore need to be protected from abuses in energy services. This can be done by a national standards body such as the Swaziland Association of Quality and Standards (SQAS) which at the time is still at its infancy. The standards body can ensure that warranties are honoured, and that products meet written and implied specifications such as power consumption, energy efficiency, durability, robustness etc. The standards body can protect women from unscrupulous manufacturers and also bar out inferior and obsolete products.

4. POSSIBLE PILOT PROJECTS AND ACTIVITIES IN THE ENERGY SECTOR THAT CAN BE BENEFICIAL TO WOMEN

In this chapter the projects and activities suggested by stake holders through individual consultations are described. The pilot projects of interest in this report are those that can be beneficial to women in the energy sector and also provide women with some means of income-generation. Selection of projects to be supported has not yet been done. This will be done after the national consultancy workshop to be conducted on 1 July 1999.

4.1 Briquettes

The paper briquette project was initiated by the MNRE to provide urban areas with an alternative wood source. The MNRE identified the women in the Ministry of Agriculture and Cooperatives - Home Economics Section as one of the most active groups in helping low-income households and chose them to carry out the project. The primary objective of the project was to slow the rate of deforestation in rural areas. The idea was that supplying urban areas with a convenient substitute for firewood that can be purchased from convenience stores, supermarkets, and petrol stations can reduce the demand for firewood in urban areas, and hence reduce the cutting of wood in rural areas to be sold in urban areas. The Home Economics Section trained women in Mbabane (the capital) and Nhlagano (south Swaziland) to pilot the project. The project was successful and the women involved are very enthusiastic as was witnessed in the launching of the paper briquette project held in Mbabane (2 June

1999), where the Ministers of Agriculture and Co-operatives and the Minister of Natural Resources and Energy were present to launch the project. The project also has the side benefits that it is an income generating activity for the women involved and the women can work at home or not far from home.

This project, however, has run out of funds. The number of women that were reached at the pilot stage is small. There is no such project in the Manzini region (central Swaziland), the most populous region in the country. Now that the project has proven successful, with additional funds the Ministry of Agric. and Co-op-Home Economics Section and the MNRE-Energy Section would like to extend the project throughout the country. This project can therefore be one of those considered for funding as it meets the basic criteria of (a) women and energy, (b) income generation for women, and (c) sustainable development. The project has a good chance of major success as its proponents are women.

4.2 Solar Still

In some parts of Swaziland like Sigcaweni, the water from bore holes is salty. For the water to be useful it requires desalination. In other places clean water is not available since available water in dams and ponds is shared with livestock which contaminate the water. A solar still can be useful in such areas.

Traditionally, in Swaziland fetching water is the responsibility women. Women with solar stills fetch locally available contaminated or salty water and then purify the water by employing a solar still. The solar still does not need constant monitoring while working, and has no moving parts that can require regular maintenance. The overall benefit is that women can save time, avoid fatigue from traveling long distances. With the time saved they can embark on other household duties, agricultural activities or income-generating activities.

The Department of Physics and Electronic Engineering is currently pursuing a study on solar stills. These stills are to be used to distill water using solar energy. The water is evaporated by heat from the sun and then condensed and collected. On evaporation only the water vapour leaves the reservoir while other substances and bacteria remains in the reservoir. This project is currently funded by UNISWA at a very limited budget. This project if successful will need funding so that the technology can be transferred to women's groups.

4.3 Solar Dryers

Most fresh produce in rural areas is abundant in summer and very scarce or not available in winter. Without preservation techniques the food spoil leading to a poor diet during the winter months. Another problem is that there is lack of refrigeration, and if a beast is slaughtered for whatever reason the meat has to be used up in a short time to avoid spoiling. Solar dryers can be used to prevent produce and meat from spoiling. Solar dryers can be used to preserve foods by drying products such as vegetables, fruits and meat.

Women and Development under the Deputy prime Minister's office are involved in the development of solar dryers. This is a women driven project under the support of the Government of Swaziland and stands a high chance of success with other women in communities throughout the country. It can also turn out to be an income generation activity as surplus fresh produce can be dried and sold during the winter months, the time of scarcity.

4.4 Fuel Efficient Stoves

One way to reduce the pressure on indigenous forest and to reduce the problems women face in obtaining fuel is to use fuel efficient stoves. Women and Development, Home Economics and Lutheran Development Service are involved in the production of cheap and fuel efficient wood stoves. Some of the stoves are made from oil drums which and they cost around E250.00 compared to commercial imported coal stoves that cost over E2,000.00. They can therefore be afforded by the low income households. These stoves are very good in winter as they have proven to be excellent space heaters. They provide for multi-utensil cooking and also have an oven. A chimney can be installed for indoor use to avoid fumes.

Funding for further research and development is required on these stoves to help improve their durability as they are made from thin steel. Their operation characteristics have been proven successful. Success of these stoves in terms of affordability, performance, and durability can help the women involved to generate income by producing and selling these stoves.

4.5 Wood Lots

The wood lot initiated by the Ministry of Natural Resources and Energy at Luve in 1992-94 has reached maturity. The trees are now ready for harvesting for firewood. The maturity age for these trees is seven to nine years depending on climate conditions in the area. Now the ministry wants to train the community on how to harvest these trees in a sustainable manner. Funding is required to extend this project to other areas as it has been demonstrated that it can work.

4.6 Biogas

Women and Development have experimented with biogas digesters. One was installed in an individual's home and is said to be functioning well. Others were initiated in communities but were not successful due to the sparsity of the homesteads with cattle in the areas targeted. Since the successful use of biogas has been proven, with additional funding, Women and Development can direct their efforts at communities where women are involved in pig farming. In these communities the source of the biogas digester materials can be readily obtained. The gas obtained can be used to power other activities in the pig farm to reduce energy costs and thereby generating higher income from the farm. Funds for further research are needed for feasibility studies in this area.

4.7 Portable Stoves

In the urban areas food vendors, almost exclusively women, are found in every corner. These women usually prepare the meals at home and transport them to towns to be served during lunch hours between 11:00 a.m. and 2:30 p.m. In most cases the food is prepared the day before. The preparation of food the day before which may not be properly stored and transportation in overloaded buses in dusty roads can lead to contamination. The development of stoves that can be used to prepare meals on the spot can be beneficial to women. First their customers can benefit from freshly cooked food. Secondly regardless of whether the food is

prepared at home or on the spot of sale, women have to leave home early in the morning when buses are still readily available to return late in the afternoon. With convenient portable stoves the women use the evenings attend to other household chores instead of cooking meals for the following day. Funding on the development of portable convenient stoves can be of benefit to women food vendors.

4.8 Workshops

One of the activities that can help women in sustainable development and income generation is to hold workshops. Workshops can make women to be aware of what is out there for them, what to expect from product and service providers, how other women are helping themselves, and how they can get assistance for their energy related income-generating activities. Funding for such workshops can be of benefit to women.

4.9 Training in quality awareness and technical ideas

Women also need to get training to develop more skills. These skills could be technical, financial management, business administration, marketing, customer service, quality awareness etc. These skills can enable women to run their income generating projects successfully. The training must be "hands on" oriented to benefit women at every educational level. Funding is required to develop and offer such training programmes.

4.10 Continuous Participatory Assessment of Women's Energy Needs

Funding will be required to constantly do studies to verify in detail the needs of women in energy social level. This can enable organisations and institutions to involved in helping women in the energy sector to know the exact problems facing women. Armed with this information, they can design solutions that can bets meet the needs of the women concerned.

5. FUTURE WORK

Due to the time constraints the national consultation exercise is not complete. The national consultation done to produce this report has been through individual consultation with stake holders. A workshop is being organised for Thursday 1 July, 1999 where all stake holders will be invited to participate. A final report with an executive summary will then be produced after that workshop. The final report will also give a priority list of the projects for which funding will be requested and final conclusions.

6. CONCLUSION

The energy related problems faced by women in the households vary widely and mainly depends on the location of the household and economic status. The problems can be categorized as related to (a) supply and reliability of supply, (b) cost, (c) convenience of energy source and appliances, (d) safety and health, and (e) time spent getting the energy

source and in its use. A lot of these problems can be solved using the local technology base, women's organisations, donor agencies, government departments, networking with regional women's self-help groups and research and development organisations in the field of energy and sustainable development. In Swaziland, the UNDP project Women and Energy came at an opportune time when the Government of Swaziland is also encouraging women in self-development as evidenced by the efforts of the Ministry of Agriculture and Co-operatives - Home Economics, Ministry of Natural Resources and Energy - Energy Section, Deputy Prime Minister's Office - Women and Development. The ministries that are important that must be drawn into the project are the Ministry of Health and Ministry of Education.

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7. Fuel-Efficient Stoves, MNRE - Biomass Team (1997)

ANNEX 1: LIST OF INTERVIEWED ORGANISATIONS

1. Ministry of Agriculture - Home Economics
2. Ministry of Natural Resources and Energy - Energy Section
3. Deputy Prime Minister's Office - Women and Development
4. Lutheran Development Services
5. Easigas
6. Swazi Oxygen
7. New Dawn Engineering
8. University of Swaziland - Department of Physics and Electronic Engineering
9. Netherlands Energy Research Foundation - ECN
10. Individuals

ANNEX 2: LIST OF ORGANISATIONS STILL TO BE INTERVIEWED

1. Swaziland Electricity Board
2. Ministry of health
3. Ministry of Education
4. Council of Churches
5. Caritas
6. Yonge Nawe
7. British Petroleum
7. More individuals