

Gender as a Factor in Delivering Sustainable Energy

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Abstract: This paper reviews the role of energy in contributing to the solution of a major development objective: moving people out of poverty. Understanding gender issues, especially the crucial role women play in household energy provision, is important in the design and implementation of appropriate energy interventions. The role energy plays in improving women's lives and the role women can play in providing energy services is reviewed. Some indicators of success factors for sustainable energy interventions are identified based on recent field experience.

Keywords: Gender, Sustainable Energy

1. DEVELOPMENT AGENDAS

Development policy, as outlined by donors and international development agencies, is currently about addressing poverty. Poverty is conceived as inadequate levels of food, water, clothing shelter, sanitation, and basic health and education services. People who live in poverty do not have adequate financial resources to pay for these goods and services. This is a rather materialistic conception of poverty, and a more holistic view of poverty might consider a person's sense of wellbeing. "Wellbeing" is conceptually more difficult to define in quantifiable terms and indeed may contain subjective elements. However, people who have a sense of wellbeing may consider that they have an element of control over decisions affecting their lives and that the society in which they live treats them with respect and dignity.

They have a personal sense of worth. Unfortunately, such feelings are not ones that poor people often experience. It is estimated that in 1993 around 13 billion people were living in poverty (defined as consuming less than US\$ 1/day worth of goods and services [1]). Current development thinking aims to move these people out of poverty.

People working in the energy sector recognise the essential role energy services play in delivering the goods and services people require in meeting their daily needs. However, it is interesting to note that, in the list mentioned above, energy is not included. Those who set the development agenda do not

consider energy as a basic need. This means that energy practitioners are required to make a strong case to development practitioners about the need to change that approach.

2. ENERGY AND POVERTY

What do we know about the energy use of people living in poverty? We can state with confidence that biomass is the fuel of poverty. There are an estimated two billion people using biomass as their primary energy carrier [1]. Current conversion technologies result in low quality useful energy, high in smoke and particulates that are recognised as having negative effects on health. In the majority of rural areas, all households will use biomass, and low-income households will spend more time searching for biomass than higher income households. In urban areas, households have to purchase fuel, and low-income households spend a higher proportion of their income on fuels than high-income households. In rural areas, poor households will generally only purchase fuel to provide lighting (candles and kerosene) although there are signs that in certain areas (e.g. Sundabans region of West Bengal in India (Sinha, Personal Communication) they are purchasing biomass fuels.

Poor households use less energy per household than wealthier ones. Less water is boiled for drinking and hygiene purposes and this increases the likelihood of water borne diseases, which in turn reduce the capabilities of poor people to improve their livelihoods by, not only preventing adults from working effectively, but also negatively affecting children's learning. Wealthy households are able to exercise some choice in their energy carriers and many opt for the cleaner and more efficient "modern" energy forms of electricity or gas (LPG or biogas). People see the practical benefits of these modern energy forms: they are cleaner (positive health impacts) and quicker (time saving) in use than traditional forms. The use of these forms of energy also creates a feeling in the user of moving towards being part of a more modern society. Wealthier households also use biomass for certain household tasks but, since they are able to afford a more efficient stove with lower fuel consumption and lower levels of pollution, the

use of biomass is not as problematic as it is for poorer households.

These brief insights into the energy dimension of poverty, leads us to the concept of energy poverty: the absence of choice in access to adequate, affordable, reliable, high quality and environmentally-benign energy services [1].

3. GENDER, POVERTY AND ENERGY

A social analysis of poverty soon reveals that there are distinct gender aspects to poverty: the socially determined roles that men and women play in society (that is their *gender* roles) mean that they encounter poverty in different ways, they experience it differently, and their strategies and opportunities for escape are also different. By extension, the role energy plays in the gender dimension of poverty will also be different for men and women. Understanding what gender analysis is about is important for everyone in the energy sector to help overcome resistance to reaching more sustainable solutions. Understanding the gender dimensions of poverty influences policy making, the solutions that are implemented, and the manner in which the implementation takes place. Get the analysis wrong, for example by ignoring gender differences, and you will only treat part of the problem and the solution will be unsustainable.

Using gender as a factor of analysis in a particular context is not about looking at women alone, nor is it about complaining that women suffer more than men, but rather gender is about reaching a better understanding of how communities work from the perspective of relationships between men and women. The outcomes of gender analysis can then be used for developing solutions with communities themselves, and by taking gender into account achieving more sustainable solutions.

When discussing gender, poverty, and energy much of the attention is focused on women. There are good reasons for this. Of the 1.3 billion people who live in poverty, 70% are women. Approximately one-third of the households in rural areas have female heads. Many of these women are more disadvantaged than men in similar circumstances, for example, women's access and control over resources such as land, cash and credit is more limited than men's. Women's technical skills are often less than men's, for example, compared to men, women's reading levels are lower and their experience with hardware is less. This means that when making energy interventions to help people move out of poverty, the ability of women to

respond is more restricted than men and special elements need to be included in projects and programmes to address these gender differences to ensure that anyone who wishes to participate and benefit is not excluded on the grounds of lack of

In terms of household energy, women are usually responsible for energy provision within the household and for tasks that ensure the survival of the family. Women carry a physical and metaphorical burden in energy provision. In rural areas, it can mean spending several hours a day collecting fuelwood loads of 20 kgs or more. In urban areas, it can mean juggling with tight household incomes to buy charcoal or kerosene. Many of these tasks are demanding of both human energy and time, and they affect disproportionately women's health compared to men's. For example, the higher levels of lung and eye diseases suffered by women as compared to men are attributed to the longer hours of exposure to smoke in kitchens [2]. Fuel collection also reduces the time women have available for contributing to other aspects of livelihood strategies. In some scenarios, up to six hours a day are spent on fuel collection.

Women are also responsible for a number of other survival tasks needed to sustain the household, such as water collection and food processing. Again, many of these tasks are demanding of both human energy and time. Energy interventions are available that would do much to reduce the drudgery involved in these daily household activities. For example, the preparation of many staple root crops takes an hour of vigorous pounding, which can be simply substituted by milling. The whole issue of women's time and effort saving (that is, the reduction of drudgery) seems not to receive the attention it deserves. Reducing women's drudgery by providing improved access to energy services for lighting cooking and productive activities should have significant positive effect on women's education, literacy, nutrition, health, economic opportunities and involvement in community affairs which in turn also benefits all family members.

Figure 1 shows the linkages between women's current energy situation as it is embedded in poverty. Energy can be an enabler for moving people out of poverty by increasing disposable income by improving energy efficiency of micro-enterprises or opening up new entrepreneurial opportunities. In other words, sustainable energy is at the heart of the transition out of poverty. In addition, access to modern forms of energy, in part enabled by increased income generating opportunities, contributes to women's sense of wellbeing, a primary objective of development.

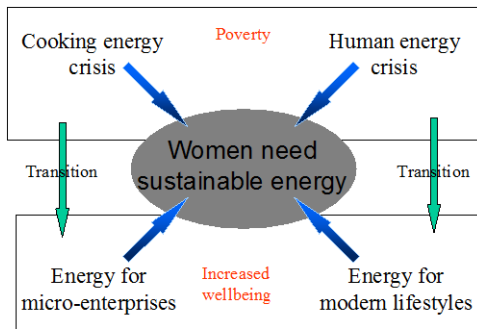


Figure 1: The role of sustainable energy in helping women move out of poverty (adapted from [3])

4. ENERGY SERVICES ENABLING TRANSITION OUT OF POVERTY

4.1 Addressing the Cooking and Human Energy Crises

As was indicated above, women need sustainable energy services that address two crises in their lives: cooking and drudgery. There are a number of choices of modern energy carriers for cooking, each with advantages and disadvantages.

- *Electricity*
Much of the focus in the energy sector is currently on electricity, in part linked to the liberalisation of energy markets and the promotion of solar home systems. Unfortunately, electricity is not the cheapest option for cooking many basic foods, although cooks do appreciate the cleanliness of the energy form. Solar home systems cannot be used for cooking since their output is too low.
- *Solar cookers*
There are many enthusiastic promoters and users of this technology. However, there are still a number of challenges to overcome with this technology including variations in sizing to accommodate the cooking needs of different household sizes. One person's advantage (portability for moving around the household) soon becomes another's disadvantage: easy to steal! The technology requires changes in cooking practices and these can be difficult to achieve and sustain. A major drawback of this technology is that it has often been taken up by enthusiastic well-meaning amateurs, and cookers with poor aesthetic design are produced. While this might work in emergency situations, e.g. refugee camps, when people are asked to part with hard earned cash they do not want to buy something which looks second rate.
- *Biogas*
Cooks who use biogas respond enthusiastically

to its controllability and cleanliness. However, the cost of a digester and the number of animals required to produce sufficient gas for the household's daily cooking needs is usually beyond low-income households. The collection of the water needed as an input adds considerably to women's burden (in other words the savings of metabolic energy/time spent on fuel collection is switched to water collection).

- *Kerosene/LPG*
Poor urban households have greater access to these more modern fuels than rural ones. Although these fossil fuels are not sustainable, they do represent a short to medium term option, and they should not be neglected in any strategy. Cooks like the controllability and cleanliness aspects. There is a need to examine how the stability of kerosene stoves can be improved, while keeping costs down, to reduce accidents from stoves being knocked over while supporting large cooking pots.
- *Improved biomass stoves*
Biomass will remain the fuel option for many households for the foreseeable future. Therefore, there is a need to produce wood and charcoal stoves that are more efficient and pay attention to safety issues (smoke with wood, and carbon monoxide with charcoal). Supply side issues of sustainable biomass also need to be addressed.

Each energy carrier has its enthusiastic supporters and detractors. However, solutions for moving people out of poverty should not focus on arguments by technocrats about which technology is best for an end-user, but should be about enabling women to choose which option meets their needs and fits their circumstances.

4.2 Energy for Micro-enterprises

Access to income is a keystone in strategies to move people out of poverty. Women already have income-generating activities. In most countries, the majority of small and medium scale enterprises (SMEs) are owned and operated by women, with women making up the majority of the work force. The enterprises tend to be concentrated around a relatively narrow range of activities, with relatively low rates of return compared to men's activities: beer brewing, knitting, dress making, crocheting, cane work and retail trading (especially the sale of prepared food). Despite the low financial returns, women's SMEs provide crucial sources of household incomes, even in male-headed households.

Women's SMEs use heat and light provided by purchased fuels such as biomass and kerosene. However, the role of energy in the sustainability of women's SMEs is not well understood. In food processing SMEs, it has been estimated that energy costs are 20 to 25% of the total inputs, which would indicate that technological inputs could possibly reduce energy costs. Women entrepreneurs do want technologies that improve their incomes and the viability of their businesses. For example, women's groups in Uganda use solar dryers for fruit preservation, this gives them a better quality product and enables them to export 50,000 tons annually.

5. WOMEN'S ROLE IN RENEWABLE ENERGY TECHNOLOGIES

Up to this point, the role of sustainable energy in terms has been considered from the perspective of its contribution towards moving women and their families out of poverty. It is regrettable that women have only been seen, particularly by developers of technology, as passive users and consumers of renewable energy. Women have a lot of accumulated knowledge and experience gained from using technologies with a clear set of criteria on what meets their needs. Perhaps these are not expressed in the formal language of science and engineering, but this is no reason to ignore women. Drawing on women's experiences, and working in partnership with women to develop Renewable Energy Technologies (RETs), will provide technologies that have a sustained use.

Figure 2 summarises other ways in which women have an active role to play in RETs.

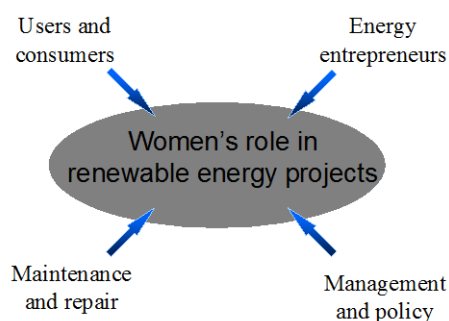


Figure 2 Women's role in renewable energy projects (taken from [3])

5.1 Women as Energy Entrepreneurs

The liberalisation of energy markets is opening up new opportunities for the provision of energy services. Renewable Energy Service Companies (RESCOs) are springing up, many of which are

focusing on rural areas, offering the potential of good incomes [4]. Women should not be excluded from these opportunities – particularly when based on prejudices that women are not interested in technical matters. Women are already energy entrepreneurs, for example in West Africa supplying charcoal to urban markets.

Women are good candidates to be successful energy entrepreneurs [5]. Women who live in rural areas know local circumstances and understand local needs. A woman may be able to sell more effectively to other women, and access to potential female clients is not hindered by social constraints.

While the financial barriers to women's entrepreneurship are well documented and a number of different approaches for addressing this constraint have been established, other barriers exist. Schemes designed to assist entrepreneurs to set up businesses supplying and servicing RETs can unwittingly discriminate against women. A project in Zambia, to establish solar home system installation and maintenance, provided training for interested entrepreneurs. One of the selection criteria was that the entrepreneur must have knowledge of electricity and electrical systems [4]. This criterion ruled out most women. The project offered no supplementary training, and overlooked the possibility that a woman, despite not having technical skills, could successfully own and run a business (as so many already do) by employing people with the required technical skills. Many of the so-called "captains of industry" probably do not have a detailed scientific understanding of the products and processes of their business: they know how to produce an economic product, with a satisfied work force and customers, while complying with local customs and regulations. Therefore, there can be no logical reason why women, with some appropriate training, cannot fill the role of energy entrepreneur just as adequately as men. Box 1 gives some details about a women's energy entrepreneur project in rural Bangladesh which shows with appropriate attention to where women need help to establish themselves as entrepreneurs success follows.

5.2 Maintenance and Repairs

In the early 1980s, many attempts were made to introduce RETs in rural areas. A substantial number soon fell into disuse because there was a lack of conveniently located maintenance and repair facilities. At the same time, similar experiences were occurring in the water sector following the introduction of hand pumps. However, the energy sector does not seem to have found the same solution as the water sector for curing this problem. The water sector switched from using men to using women for carrying out maintenance and repairs.

Box 1**Battery-Operated Lamps Produced by Rural Women in Bangladesh [6]**

A project, funded by the World Bank Energy Sector Management Programme (ESMAP), has been running on the remote island of Char Montaz in the south of Bangladesh since 1999 which aims to improve the lighting and indoor air quality of rural households by replacing the traditional kerosene lamps with modern fluorescent battery-operated lamps. The fluorescent lamps are produced and marketed by a women's micro-enterprise and, so far, about one thousand households are using these lamps. The long term potential is good with grid extension within the next 20 years highly remote and a market of 20,000 households.

The lamp business represents an important opportunity for the women to earn a relatively good wage. If a woman is able to construct and sell two lamps a day, she is able to earn the equivalent wage of a skilled labourer, a significant opportunity which benefits both her family and improves her social status.

The remote community also benefits from the lamps, which have a high efficiency and low energy consumption. The advantage over kerosene lamps is the reduced risk of fire, as well as the elimination of smoke and other emissions with their negative health impacts.

The project from the start has recognised the knowledge of rural women about local conditions and has used major inputs by rural women in the design of the energy service mechanisms. Recognising that women had gaps in their knowledge about electronic components and lack of skills with the tools needed to work with the components, the project gave appropriate training to ensure that reliable lamps were produced. Training was also given in accounting and bookkeeping. Male family members have also been encouraged to act as advisers to the women, especially on marketing, sales and operating battery charging services, a new activity that has developed from the original project.

What are the indicators of success for the project? Taking gender issues into account: using women's existing knowledge in the project design; providing compensatory training for gaps in technical and business knowledge; gaining male family members support; providing income generating opportunities; providing a service the community wants.

Household water provision is women's responsibility –and therefore they have a bigger stake in ensuring that a service that potentially reduces their workload keeps functioning.

Household energy provision is also women's responsibility and by extension of the argument, women also have a major interest in ensuring that energy services also keep working. In addition, women who gain new skills tend to stay in rural areas and use these skills, whereas men often migrate to urban areas.

5.3 Implementation and Policy

Policy can create an enabling environment that ensures access to more sustainable energy services. There is a need for more gender-sensitive energy policies that equally address women's and men's energy needs. One way of ensuring this engendered policy is through creating awareness in policy makers. More women as decision makers in the energy sector would be helpful, but men also have a role to play, and they need to be more gender sensitive. The same arguments apply at the implementation level. A critical mass of women is needed in the energy sector to ensure that issues are raised in a concerted and consistent fashion. This critical mass of women and gender-sensitive men is also needed so that people trying to overcome institutional resistance to gender and energy issues do not feel isolated and threatened and so lose heart.

5.4 Lessons learnt to date

Experience of women's involvement in energy projects is beginning to emerge (see for example, www.energia.org and [7]) and there are some encouraging signs of contributions to reducing women's poverty but also there are indications that there are still important lessons not being taken on board by the energy sector about gender issues.

All too often, the starting point for an intervention to remove people from poverty is the promotion of a particular technology. However, communities throughout the South differ in many ways, so sustainable solutions are more likely by beginning with a needs assessment. Drawing on local knowledge about customs and practices, for example harvesting, can be crucial in identifying energy demand. Remembering women's key role in household energy provision is essential for including them in design, implementation and evaluation of energy projects.

The project in Bangladesh reported on earlier shows that energy projects must have some aspect of income generation for them to be taken up with enthusiasm and any hope of sustainability. The prospects for income generation have to be well mapped out in advance to ensure long-term financial viability. The women from Char Montaz prepared a detailed marketing plan that analysed target locations and customers with demand projections. Much has been written about the need

for micro-financing and credit schemes, especially for women and there exist many innovative schemes. However, projects aimed at enabling women's access to technologies can still go wrong if they do not also take into account the reality of women's lives. A project in Uganda which set out to encourage women entrepreneurs to purchase solar systems by offering credit through a women's bank failed to reach the target group because interest rates were set well above levels women could meet, repayment schedules were too short and collateral requirements did not match women's resources [7].

6. CONCLUSIONS

This paper has shown the important role energy has in contributing to removing people from poverty. The importance of taking gender issues into account when making energy interventions has been demonstrated. In particular, understanding women's role in household energy provision shows challenges for those working with renewable energy technologies in delivering sustainable services that meet women's, and hence their families, needs. A case has been argued for taking into account women's weaker position relative to men in terms of skills and resources when planning energy projects. By carefully addressing these issues in project design, women can be empowered to play an important role in being providers as well as users of energy services. In this respect, the energy sector can learn much from the water sector in the provision of sustainable services.

7. REFERENCES

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