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Gender Equity and Renewable Energies

Thematic Background Paper

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Disclaimer

This is one of 12 Thematic Background Papers (TBPs) that have been prepared as thematic background for the International Conference for Renewable Energies, Bonn 2004 (renewables 2004). A list of all the papers can be found at the end of this document.

Internationally recognised experts have prepared all the TBPs. Many people have commented on earlier versions of this document. However, the responsibility for the content remains with the authors.

Each TBP focuses on a different aspect of renewable energy and presents policy implications and recommendations. The purpose of the TBPs is twofold, firstly to provide a substantive basis for discussions on the Conference Issue Paper (CIP) and, secondly, to provide some empirical facts and background information for the interested public. In building on the existing wealth of political debate and academic discourse, they point to different options and open questions on how to solve the most important problems in the field of renewable energies.

All the TBPs are published in the conference documents as inputs to the preparation process. They can also be found on the conference website at www.renewables2004.de.



Executive Summary

The aim of this paper is to review existing evidence on the role of renewable energies in bringing gender equity. The paper first explores the evolution of thinking on gender and energy, in particular that practitioners no longer specifically focus on women and stoves (often referred to as “household energy”). Next, the reasons why gender analysis can help those people trying to increase the dissemination of renewable energy technologies are presented. There is a brief description of the gender aspects of household energy, and how different renewable energy technologies can contribute to drudgery reduction and time saving, particularly for women. The role of women in renewable energy is analysed. The paper concludes with an analysis of lessons learnt and recommendations. However, the point has to be stressed that there is now only beginning to emerge information about gender and energy in the South, and there is very little information about the situation in the North. The data that are available are primarily in the form of case studies, mainly related to stoves programmes and rural electricity grid extension. The systematic collection of gender-disaggregated statistical data by energy ministries does not occur and it is very rare to find energy project evaluations that use gender analysis. This means that much of the analysis should be seen as only as indicative, although this does not invalidate the recommendations since many of these are linked to the general situation of women having fewer assets than men.

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1. Renewable Energy and Gender

Energy is not an end in itself but a means of satisfying needs. People do not need “energy” but the services that energy provides in helping to meet needs such as lighting, cooking, space heating or cooling, water pumping, information, and entertainment. Advocates of the use of renewable energy sources for providing energy services highlight the possibilities of providing both large and small amounts of energy with minimal disruption and without long-term damage to the environment. The latter positive characteristic can be used as an argument in renewable energy’s favour compared to fossil fuels and nuclear energy. Since the South¹ is in need of increased energy supplies (or energy services), there is a strong lobby for the contribution that renewable energy can make in meeting that need, particularly in view of the fact that many countries in the South are well endowed with renewable energy resources. In the North, there is also a strong interest in renewable energies for their environmental benefits, particularly in large scale electricity generation. A sizeable industry that produces technologies for the conversion of renewable energy sources into useful forms of energy has now developed in the North. Given our need for energy, it is not unreasonable to see this as an industry with a future and therefore one that offers opportunities for interesting and rewarding² employment. From this brief description, it is possible to identify, for further analysis, three aspects of renewable energy technologies:

- as an enabling medium for economic development.

Much of the attention in the South, as well as in pockets of the North, is related to removing people from poverty. Although energy is recognised as an input for development, what specific role or advantages does renewable energy bring compared to other energy sources?

- for environmental protection and resource conservation.

The goal is to make positive choices based on criteria related to causing minimal damage to the environment. Realising this goal requires an ability to exercise a choice or to influence decision-making.

- as an industry.

The aim of this paper is to explore, within such a framework, the gender dimension of these different aspects of renewable energy: in particular can renewable energies contribute to gender equity so that women and men benefit fairly from access to energy services? The term “gender”, rather than “sex”, is used here deliberately. The term “gender” refers to the socially constructed roles of women and men rather than biologically-determined differences. The gender roles of men and women, with their accompanying responsibilities, constraints, opportunities, and needs, are defined by a particular society. Gender roles are learnt by children as part of their socialisation process. The roles change over time, and vary widely within and across cultures. Men and women play different roles in both Southern and Northern societies, although at first glance the distinct roles in the North may not be as clearly visible as they are in the South.

There also occurs some linguistic laxity within gender and energy circles with the terms “women and energy” being used interchangeably with “gender and energy”. However, we see a difference. While the second includes the first, the first does not necessarily include the second. The reason that a gender perspective on energy production and usage patterns is important is not merely that men and women often use, are impacted on, or benefit from energy services differently, but more importantly because the activities of one



may impact on the opportunities of the other. An energy service may indeed impact on men and women differently, with different social or economic outcomes. For example, men may choose to locate a light outside the house for security reasons (such as protecting livestock from theft) while women may choose to locate the light in the kitchen. An evaluation of the distribution of the benefits of a microhydro scheme in rural Sri Lanka found that, in connected households, men and women had equal (but different) benefits from the energy services provided by electricity (mainly TV and lighting) (Dhanapala (1995) quoted in Barnett (2000)). However, in the unconnected households there was an unequal distribution of benefits. These households benefited by indirect access to TV (by visiting neighbours with sets) and through the possibility of hiring lights for special occasions. Here, the men had greater access to TV because they had greater freedom of movement, particularly at night.³

The paper first explores the evolution of thinking on gender and energy, in particular the fact that practitioners no longer specifically focus on women and stoves (often referred to as “household energy”). Next the reasons why gender analysis can help those people trying to

increase the dissemination of renewable energy technologies are presented. There is a brief description of the gender aspects of household energy and how different renewable energy technologies can contribute to drudgery reduction and time saving, particularly for women. The role of women in renewable energy is analysed. The paper concludes with an analysis of lessons learnt and recommendations. However, the point has to be stressed that it is only now that information about gender and energy in the South is beginning to emerge, and there is very little information about the situation in the North. The data that are available are primarily in the form of case studies, and these are mainly related to stoves programmes and rural electricity grid extension. The systematic collection of gender-disaggregated statistical data by energy ministries does not occur and it is very rare to find energy project evaluations which include gender analysis. This means that much of the analysis has to be taken as indicative, although this does not invalidate the recommendations since many of these are linked to the general situation in which women have fewer assets than men.

2. Evolution of Thinking on Gender and Energy

Early analysis of gender and energy focused primarily on the South since it was assumed that in a Northern context energy was gender neutral.

In the South, initial attention was caught by the heavy burden faced primarily by women and children related to traditional fuel collection and use patterns, including adverse health effects from indoor air pollution, and the opportunity costs to women of missed productive employment due to the heavy burden of time spent in the provision of fuel for household cooking and heating activities. The analysis quickly gained sophistication, broadening to include a clearer understanding of the differentiated energy use patterns of men and women based on the social and economic division of labour as part of gender analysis in the development field. In many countries, it was observed that traditional fuel use and energy-using subsistence activities (“non-productive” activities) were more common among women, while the use of modern, traded fuels and energy services for income earning or productive activities were more concentrated among men. This led to extensive activities focused on women, improved stoves and cooking patterns as a means of liberating women from subsistence activities.

More recently there has begun to emerge a more complex understanding of the relationship between gender and energy. Today’s debate takes as its starting point that both men and women are involved in productive activities requiring energy inputs. While the burden of household energy supplies and services remains largely the responsibility of women, access to modern energy carriers, such as clean fuels and electricity, affects both men and women. What distinguishes the debate is that the availability of energy services affects men and women differently, depending on the energy applications with

which they are most involved. Yet most energy policy debate and legislative frameworks have taken a gender neutral or, many would argue, a gender-blind approach to energy pricing, rural energy policy, and energy technology in the sense that energy policies continue to fail to recognise the differences in the needs and assets of women and men. The removal of subsidies on fossil fuels has broad support for promoting energy efficiency, resource conservation, and environmental protection, as well as from the renewable energy lobby because it levels the playing field. There has been little research on the gender differentiated impacts of energy pricing policies (Cecelski, 1995). However, it is possible to postulate that price increases have not been beneficial for poor households and have resulted in, for example, a downward transition in fuel quality and increases in illegal electricity connections. Typically, a poor urban family in the South spends 20% of its income on fuels (Barnes, 1995)⁴.

In rural areas, poor households will generally restrict fuel purchases to lighting uses (candles and kerosene). In Bahia State, Brazil, 11% of distributed electricity goes to illegal connections, and the removal of subsidies from LPG has resulted in a switch to fuelwood (Andrade, 2004). Since women are responsible for household energy, they have to manage these fuel price rises on tight budgets and this will hit poor households the hardest. Energy policy tends to take a supply side approach with a focus on fossil fuels and electricity. Despite the important role biomass plays in meeting the energy needs of both rural and urban households, and many small and informal sector enterprises, this energy source receives scant attention. For example, in Namibia, biomass energy development projects formed 2.8% of the total Ministry of Mines and Energy budget for 2000 while 85% went to grid-extension rural electrification and the balance to renewables, solar home systems,



energy efficiency, and research (Cecelski et al., 2001). The potential of energy technologies to reduce drudgery, freeing time and increasing productivity, and in particular those technologies using renewable energies based on resources abundant in the rural South are well known, but the benefits are not necessarily evenly distributed. For example, solar home systems fit well with meeting men's needs for entertainment but not at all with women's cooking needs. Biogas systems have often not lightened women's work load, and in some cases have increased it, by the need for a daily addition of dung and water which have to be headloaded (Denton, 2002).

By the mid-1990s, the concept of gender and energy had broadened from stoves, time saving, woodlots and biomass fuels, and appropriate technology to one that encompassed a broader range of issues including pricing, transport, and modern energy forms such as electricity (Cecelski, 1995). Energy pricing affects women directly because of their responsibility for household energy provision. Transport has a strong energy linkage with distinct North and South facets. Addressing the transport of agricultural produce and household fuels in the rural South could do much to reduce women's burden. In the North and urban South, women tend to use public transport more than men, so petroleum fuel price increases fall disproportionately on women, particularly those from low income groups. While transport systems based on biomass fuels are increasingly of interest for mass transport systems in the North, outside of the ethanol programme in Brazil this has been a neglected field in the South. Cecelski (1995) pointed out that decentralised renewable energy systems have a good potential for contributing to labour saving and income generation in rural areas but that, if women were to benefit equally with men, two constraints that were a greater barrier to

women than to men had to be addressed: lack of credit, and lack of technical information and knowledge.

This broadening of the gender and energy concept fits with work elsewhere in gender analysis which has shown that women's needs can be classified as practical (for ensuring daily survival), productive (income generation), and strategic (women changing their position in society, in particular to gain greater equality with men, and help them towards empowerment in all its senses). All these activities have an energy dimension: practical (for example, household lights, improved cooking stoves for household use, improved supply of fuelwood, improved technology for ergonomic collection and transportation of fuelwood, and better kitchen design), productive (income generation, for example through improved technologies such as food drying installations and electric sewing-machines, and increased skills and knowledge such as marketing strategies for improved cook stoves), and strategic (for example street lighting allowing women greater freedom of movement after dark). Table 1 gives some examples of how different energy forms can meet the different types of needs. The challenge for renewable energies is how to meet such needs particularly in light of the remark above that women have particular problems with access to credit and technical knowledge. The attention of the commercial sector is usually on those renewable energy technologies which generate electricity. However, many of the activities women are involved in require process heat. Indeed the ENSIGN project which involved eight Asian countries found that, for both the urban and rural entrepreneurs, process heat and motive power for transport were more beneficial to income generation than electric lighting (Ramani, 2002).

Table 1: Examples of Energy Meeting Women’s Needs

Energy Form	Women’s needs and issues		
	Practical needs	Productive needs	Strategic issues
Electricity	<ul style="list-style-type: none"> ▪ pumping of water supplies - reducing the need to haul and carry ▪ mills for grinding ▪ lighting to improve working conditions at home 	<ul style="list-style-type: none"> ▪ increase possibility of activities during evening hours ▪ provide refrigeration for food production and sale ▪ power for specialised enterprises such as hairdressing and internet cafes 	<ul style="list-style-type: none"> ▪ make streets safer allowing participation in other activities (e.g. evening classes and women’s group meetings) ▪ opening horizons through radio, TV and internet
Improved Biomass (supply and conversion technology)	<ul style="list-style-type: none"> ▪ improved health through better stoves ▪ less time and effort in gathering and carrying firewood 	<ul style="list-style-type: none"> ▪ more time for productive activities ▪ lower cost for process heat for income generating activities 	<ul style="list-style-type: none"> ▪ control of natural forests in community forestry management frameworks.
Mechanical	<ul style="list-style-type: none"> ▪ milling and grinding ▪ transport and portering of water and crops 	<ul style="list-style-type: none"> ▪ increases the variety of enterprises 	<ul style="list-style-type: none"> ▪ transport allowing access to commercial and social/political opportunities

Source: Clancy, Skutsch and Batchelor (2003)

Much of the early activity related to gender and energy was at the project level and it was not until the new millennium that the issue began to appear in international policy debates. The ninth meeting of the Commission for Sustainable Development (CSD-9) in 2001 was the first time that intergovernmental dialogue focused specifically on the relationship between energy and multiple development issues. CSD-9 concluded that access to energy services (rather than supplies, fuels, or electricity), in other words the benefits that energy provides, is an essential prerequisite for reducing poverty. The document signed at the end of CSD-9 was also groundbreaking in the sense that it recognises that there are gender and energy issues both in the North and in the South (UN, 2001).

In 2000, world leaders agreed an ambitious set of global targets known as the Millennium Development Goals (MDGs). The MDGs have no specific target on energy. Rather, the relationship between gender and both energy and development is implicit rather than explicit. However, the UK’s Department for International Development (DFID) in its publication “Energy for the Poor” demonstrated the role that energy has in meeting the MDGs (DFID, 2002). Havet (2003) has taken this work further by showing the gender dimensions of energy and the MDGs. While both men and women benefit from access to energy in terms of reducing poverty and hunger through increased food production, employment, and clean water, women and girls are likely to gain additional



benefits due to time saving, particularly in terms of water and fuel collection, and improved health, particularly through the use of cleaner fuels.

While much of the gender and energy discourse has focused on the South due to the acutely manifest importance of energy in women's lives in the South, energy issues in richer countries also have important implications for gender relations, female political participation, and sustainable development. In both cases, the role of women in political life, community organisations, and families points to the important leadership opportunities that can bring about positive change created by using energy as an instrument to achieve multiple objectives linked to social justice, environmental protection, and economic empowerment. In the North, the direct involvement of many women in energy issues came about through political opposition to nuclear power, as in Europe after the Chernobyl disaster. In proposing alternatives to nuclear power, women have begun to actively organise and promote renewable energy. For example, Rainbow Serpent (the Plutonium Free Future Women's Network based in Japan⁵) has campaigned to demand that governments shift their investments and subsidies away from nuclear and fossil fuels towards safe, renewable energy systems (Clancy and Roehr, 2003). Women have complained that when the movement became "professionalised", men took over the strategic positions and so weakened women's opportunities to influence political agendas (Roehr, 2001).

Evidence is now beginning to emerge, based on work carried out in the USA and the European Union (most notably Germany), that there are common policy challenges in the South and the North with respect to the difficulties of engendering the energy policy debate, and domestic legislative and local regulatory frameworks that address gender and

energy issues. Indeed, a recent article by Clancy and Roehr (2003) has reviewed the evidence and considers that there is a distinct gender dimension in the way women's and men's lives in the North are affected by energy use. The gender neutrality of energy in the North, the authors argue, must be contested.

There is no doubt that, over the last twenty years, there has been a considerable development in our understanding of gender and energy issues and how we should, at least in the South, address them. Household energy is no longer seen entirely as a woman's preserve or as synonymous with cooking (Clancy, 2002). A number of researchers have taken a broader definition (see for example Clancy, 1998; Klingshirn, 2000) to encompass all the activities that take place within a household and the linkages to a much wider system of energy supply and demand. In addition, there are significant linkages between household energy and other sectors, for example, agriculture (agricultural residues as fuel sources), health (lung and eye diseases, nutrition), education (children's opportunities for after-school study), and income generation (cottage industries). These linkages also demonstrate that it is not sufficient to consider only women when addressing household energy issues since men also play a significant role in decision-making on household energy. However, why does so much of the discussion in a discourse that calls itself "gender and energy" seem to focus on "women and energy"? Of the 1.3 billion people who live in poverty, 70% are women; and approximately one-third of households in rural areas have female heads. Many of these women are more disadvantaged than men in similar circumstances, for example women's access to 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 they have less experience with hardware. 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 assets. Box

1 gives a case study of a community hydro project in Nepal which used the approach of separate women's and men's groups for ensuring that women were involved and benefited along with the men.

Box 1: Encouraging Women and Men's Participation in Community Energy Projects

In 1996, the Rural Energy Development Programme (REDP) in Nepal established male and female community organisations with equal responsibilities to work on the project. The REDP project aims at enhancing rural livelihoods and preserving the environment by supporting the installation of microhydro power systems. Every participating household sends a male member to the male community organisation and a female member to the female community organisation. The segregation of women and men into separate organisations encourages men and women to discuss and analyse the specific problems they face. The community organisations meet every week. By the end of 2000 the total membership was 20,258 women and 19,125 men in 1,021 female and 1,000 male community organisations.

Additionally, the project facilitates capacity building through training in reading and writing, management, and leadership.

The equal opportunities have had a very visible and positive impact in mobilising women and integrating them into mainstream activities. The women in community organisations have a distinct voice in local affairs and self-confidence has increased, as has their capability for independent and collective action.

(Rana-Deuba, 2001).

3. Renewable Energy Enabling Development

Modern forms of energy are considered a necessary (but not the only) input for economic development and the elimination of poverty (Barnett, 1999). There is a particular need to provide substitutes for human energy to remove drudgery and increase wellbeing. This has been one of the gains that increased energy provision through fossil fuels and electricity has brought in the North⁶. In the South, similar improvements in the quality of life are enjoyed by a small percentage of the population, the so-called urban elites, who have sufficient income to purchase modern forms of energy and the appropriate conversion technologies. In development terms, it is the other part of the population – the substantial majority living in rural and urban areas often referred to as “the poor” - that needs assistance towards achieving an improved quality of life and more sustainable livelihoods⁷. This is the context in which renewable energy technologies have to work.

However, development practitioners do not see poverty as purely a problem requiring a technical solution of improved access to particular commodities, such as energy, but as one requiring a much more holistic approach⁸. For example, the UNDP’s World Development Report 2000/1, which took as its theme “Attacking Poverty”, saw successful poverty reduction strategies as encompassing:

1. **Empowerment:** empowering the poor by addressing inequalities which prevent them from influencing policies and interventions which affect their lives, and which also impede overall growth and development (including gender inequalities);
2. **Security:** addressing risk and vulnerability which characterise the realities of the lives of poor people and of poor nations; and

3. **Opportunity:** sustained economic expansion and human development in the medium term⁹.

This will come as a surprise to many energy professionals who tend to focus on the more technical issues of technology selection¹⁰, efficiency, and the management of production and use. If the renewable energy sector wishes to contribute to development, it has to take a more holistic view and a good starting point would be to use gender analysis to gain an understanding of energy needs and the context in which they are operating. Gender analysis is not about looking at women alone, nor is it about complaining that women suffer more than men: rather gender is about reaching a better understanding of how communities work from the perspective of relationships between men and women. Gender interests are not always obvious, and neither are the potential impacts of energy interventions. Sometimes inappropriate interventions are made because they are based on false assumptions. For example, the emphasis in energy planning for the benefit of women has long concentrated on cooking, with firewood collection being seen as the central problem to be tackled. A detailed analysis of women’s workloads often reveals quite different priorities. Box 2 shows the results of a survey in rural Zimbabwe, which found that the most significant energy intervention might be for water collection and market trips since the women’s own metabolic energy costs were higher for these activities than for collecting firewood and cooking. The outcomes of gender analysis can then be used to develop solutions with communities themselves, and by taking gender into account achieve more sustainable solutions (see also Box 1).

Box 2: Women's Time and Physical Energy, not Fuelwood, are the Key Needs

A study by Mehretu and Mutambira (1992) measured the time and energy used by different family members in transport connected with regular household activities. Chiduku Communal Area in eastern Zimbabwe is a resource deficient area with a high population density. There is no electricity, and kerosene, which is used only for lighting, is very expensive.

Seven routine trip-generating household activities were considered:

- Fetching water for domestic consumption (represented as water in the table)
- Doing the family laundry (laundry in the table)
- Collecting firewood (firewood in the table)
- Grazing livestock (Livestock G in the table)
- Watering livestock (Livestock W in the table)
- Visits to local markets (Markets L in the table)
- Visits to regional markets (Markets R in the table)

Activity	<i>Total week's household time (hours)</i>	<i>Female share of time (hours)</i>	<i>Female Contribution (%)</i>	<i>Energy cost (Calories)</i>
Water	10.3	9.3	91	2,495
Laundry	1.3	1.1	89	304
Firewood	4.5	4.1	91	1,068
Livestock G	7.7	3.0	39	1,672
Livestock W	6.9	2.3	39	1,484
Markets L	15.0	9.5	63	3,585
Markets R	0.3	0.2	61	76

An example of the type of unfair distribution of benefits that can unconsciously arise from not using gender analysis concerns the use of household photovoltaic systems for rural electrification. While small amounts of electricity at home in the evening hours may improve the quality of life for some members of the family, including through illumination for reading, and entertainment and communication through radios and televisions, for other members of the family it may simply extend the working day. Generally it is men, and to some extent children, who benefit most from the gains while it is women who usually bear the burden of an extended working day. In many cases the provision of electricity without paying attention to the provision of modern cooking fuels or appliances has resulted in rural electrification increasing the hardship on

women when the working day is prolonged while traditional fuel use patterns remain in place since Solar Home Systems cannot supply the energy needed for cooking. This example highlights how a failure to understand the gender differences in the use of services that electricity provides can result in the failure of the specific energy intervention to improve the lives of women and men in comparable ways. In other words, the intervention results in a lack of gender equity or fairness. It is somewhat unfortunate that gender analysis has not been as extensively applied in the energy sector as it has been in other sectors such as water and agriculture.



Clancy et al. (2003) argue that this can, in part, be attributed to the lack of tools appropriate for the energy sector although work currently underway at the University of Twente (with financial support from ENERGIA) will help fill the gap¹¹. Taking a gender approach in project planning and implementation can benefit both the project management (*project efficiency*) and the intended beneficiaries (*women's welfare, gender equity, or women's empowerment*). In the former, a project manager is responsible for meeting the goals of a project within time and budget. Awareness

that men and women have different perspectives, and needs and constraints, can lead to a better fit of project interventions with the intended beneficiaries and thus create greater management efficiency in terms of delivery (Skutsch, 1998).

Box 3 gives an example of a PV project in Guatemala which found that by taking a gender approach the overall performance of the project improved significantly. Box 4 gives a further example of an energy project which has contributed to women's empowerment.

Box 3: Gender Approach Leads to Greater Project Efficiency: Case Study PV Solar Homes in Guatemala

Fundación Solar, while operating a PV project in Guatemala, found that mostly men attended the training sessions on equipment maintenance, and those women who did attend merely stood by and watched while their husbands got involved in hands-on activities such as changing the batteries. As a consequence, when the PV system needed maintenance, such as topping up the batteries, and the men were not at home, the women did not have the skills or confidence to take the appropriate action which had a negative influence on the long term durability of the system. Fundación Solar saw much better overall system care (and hence project performance) when they took specific action to train the women in system maintenance. This was achieved at home while the men of the household were out. By taking this approach to training, the NGO created an environment in which the women were not afraid to make mistakes or to ask questions.

Wides (1998), quoted in Skutsch (1998)

Box 4: Energy Project Contributes to Women's Empowerment in Kenya

Thirteen women's groups (200 people) have been trained in making stoves in the Rural Stoves West Kenya project, and many have also benefited from business management training. Production is estimated at 11,000 stoves annually; the profit generated by the stoves is comparable to wages in rural areas. As a result, the women potters have gained in status, self-confidence, and financial independence. (ITDG, 1998).

4. Energy in Poor Households: Women's Burden

In terms of household energy in the South, and in some war ravished rural areas in the North (e.g. Kosovo and Chechnya), women are usually responsible for energy provision within the household and for tasks that ensure the survival of the family. Women should be the direct beneficiaries of any improvements in availability or diversification in choice of energy carrier or conversion technology although, as was shown in Section 3, this should not be taken for granted. Discussions on

household energy tend to focus on women, since they are usually responsible for household energy provision. However, men can be indirect beneficiaries of access to modern energy forms (for example, faster prepared meals). Men can also play an important role because they are very influential in determining the outcomes of any energy intervention, and where and by whom the benefits to the household will be felt.

4.1 The South

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 disproportionately affect 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 (Smith, 1999). Fuel collection also reduces the time women have available for contributing to other aspects of livelihood strategies.

more attention to the promotion of bio-fuels, such as biogas and vegetable oils, as a diesel substitute. 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 a significant positive effect on women's education, literacy, nutrition, health, economic opportunities, and involvement in community affairs which, in turn, will benefit all family members.

Women in the South 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, many using renewable energy, are available that would do much to reduce the drudgery involved in these daily household activities. A number of the tasks would easily be served by diesel engines, for example, the preparation of many staple root crops takes an hour of vigorous pounding, which could be simply replaced by milling. The renewable energy community needs to pay

It is tempting to assume that the urban poor, when compared to the rural poor, benefit from increased access to higher cash incomes which in turn allow them access to more efficient biomass stoves or even to make the transition to modern forms of energy (kerosene, LPG, and electricity). However, there is little evidence to support such an assumption and the evidence that does exist would suggest that the outcomes of the livelihood strategies of poor urban households fail to meet the most basic of needs (CARE 1999). Evidence would suggest that household energy in urban areas primarily remains a woman's responsibility. Poor urban women appear to have swapped the drudgery of fuelwood collection for the stress of juggling tight household budgets to buy fuels.



4.2 The North

Clancy and Roehr (2003) have argued that there are gender and energy issues in Northern households linked to poverty and poor quality housing. In the North, women with low incomes are disproportionately found as heads of households, either as single parent families or, due to their greater longevity than men, living alone at pensionable age. For example, the UK's Office for National Statistics recently released data that showed that 40% of divorcees aged over 65 have such low incomes they are able to qualify for state aid. This compares with 1% of married women and 23% of divorced men. Another report from the UK claims that 25% of single women over 60 are living below the poverty line (Guardian Weekly, 2004). Young children and older people have special requirements for heating in order to reduce their vulnerability to illness. For people on low incomes, heating/cooling

and cooking can be problematic if they have a restricted choice of energy forms: electricity is expensive; and solid fuel produces smoke which has negative health impacts. People on low incomes often live in housing with poor insulation and frequently use second-hand or old equipment with poor energy efficiencies. Also they often have to pay for their electricity and gas using prepayment systems that are charged on a higher unit cost basis than households with monthly billing systems. A worrying trend of energy market liberalisation has been the abandonment of utility programmes to support the purchase of energy efficient equipment. All these factors contribute to the high energy costs of people on low incomes, and these negative effects fall disproportionately on women who have restricted options.

5. Energy for Poor Households: Lightening Women's Burden

Energy can be an enabler for moving people out of poverty by increasing disposable income, by improving energy efficiency of micro-enterprises, or by 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 a sense of wellbeing, a primary

objective of development. However, it is important to match the energy services that people want, in particular a reduction of drudgery and improved cooking, with the form of energy supplied and, at the same time, recognise the particular challenges women face compared to men: a lack of access to credit and limited knowledge about (and hence confidence with) new technologies.

5.1 Addressing cooking and other energy needs

As was indicated above, women in the South need sustainable energy services that address two crises in their lives: cooking and drudgery. There are a number of choices within modern energy carriers for cooking, each with advantages and disadvantages. Renewable energy technologies have to compete either with biomass collected at zero financial cost or with petroleum-based cooking fuels (kerosene and LPG) which have the advantage that they are available through well established commercial distribution channels. Petroleum fuels provide controllable heat which is popular with cooks. However, while many women appreciate the possibility of purchasing kerosene in small quantities that match household cash flows, they are afraid of the potential fire hazards.

- *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. Electricity is not the cheapest option for cooking many basic foods, but cooks do appreciate the cleanliness of the energy form. There are some successful projects, for example in Nepal, involving electricity for cooking based on mini- or microhydro power schemes (Anderson et al., 1999). It should be kept in mind that it is not enough to supply the electricity; there must also be appropriate stoves available and there

is a need to work with cooks to adapt cooking techniques.

Solar home systems cannot be used for cooking since their output is too low. Their strength lies in the provision of good quality light and home entertainment. Although much is made of the 'educational benefits' that TV brings, there are other benefits such as families sharing, for the first time, leisure time together (Massé and Samaranayake, 2003).

There are other household uses of electricity, such as lighting, where electricity is also able to bring significant improvements in daily living. The recent World Bank ENPOGEN study in Sri Lanka, China, and Indonesia found that rural people regarded electricity as a basic necessity of daily life. The most significant benefits ascribed to electricity are that it makes home life more convenient and housework easier (Ramani and Heijndermans, 2003). The study found that, at least in Sri Lanka, the major benefit of electricity is the time that women save. Eighty per cent of the interviewees reported saving between one and two hours through avoided journeys (such as taking batteries to be recharged, and going to the city to buy kerosene, medication, and vaccinations) and on household activities (such as firewood collection, cooking, ironing, boiling water, house cleaning, and chimney cleaning) (Massé and Samaranayake, 2003). It is interesting to note how women made use of their extra "free time". Twenty-nine per cent of

the female household members said that the time they saved was spent on extra housework, while less than 5% reported using it for productive activities.

Interestingly, there would appear to be differences in the way women and men appreciate electricity. An evaluation of the impact of microhydro in Sri Lanka found that men in the area studied saw the benefits of electricity in terms of leisure, quality of life, and education for their children; while women saw electricity as providing the means for reducing their workload, improving health, and reducing expenditure (Dhanapala (1995) quoted in Barnet, 2000).

It is also possible that electricity can contribute to improvements in gender equity with regard to household tasks if the views of one man from an electrified household quoted in the ENPOGEN Sri Lanka study become the norm: *“I am now prepared to do ironing and assist my wife in her work: ironing, boiling of water, cooking”*.

- *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 advantage (portability for moving around the household) easily becomes a 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 such as in refugee camps, when people are asked to part with hard-earned cash they do not want to buy something which looks second rate¹².

Box 5 reports some experiences from Kenya with attempts to introduce solar cookers.

Box 5: Solar Cooking in Kenya

Various attempts have been made to introduce solar cookers in Kenya. However, there have been major problems with the acceptability of this type of cooking. Of the people interviewed in a review survey, 90% found the cooker to be too slow. Fifty-four percent complained that it could not cook favourite dishes, and in many cases the cooker could not cook enough for all the family. In some areas where the solar box cooker is promoted there is a real scarcity of food and people will not experiment with the little food that they have. The cooker was seen as very expensive item by over 53% of the respondents, especially since it can cook only during the day.

(Stephen Gitonga, Intermediate Technology Kenya, quoted in Anderson et al., 1999).

Whilst resistance can often be overcome in the long term with sensitive approaches, there are real possibilities that social resistance will be too strong. The cooking fire is seen in many societies as the social hub of the family, the women of the household are able to socialise with their families in the kitchen while cooking. Based on her fieldwork in South Africa, Green (2001) suggested that solar cookers, since they require cooks to work outside, might even lead to a breakdown of this social web and a reduction of women’s influence in the socialisation of their children.

- *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 a 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 burdens (in other words the metabolic energy/time saved on fuel collection is switched to water collection). There can be gender differences in perceptions of the benefits of biogas. Dutta and her colleagues (1997), in an evaluation of a biogas programme in rural India, found that men and women both valued the time-saving element but for different reasons. The women mainly spoke of time saved in fuelwood collection and cooking (allowing more time to be spent with their families), the men appreciated faster cooking and more timely meals.

- *Improved biomass stoves*

Biomass will remain the only 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). A programme promoting fuel efficient stoves in Madagascar is reported as bringing annual fuel savings equivalent to the minimum monthly salary (approximately US\$ 24) to households which adopt the stoves (Bazile, 2002). This level of savings should have a significant impact in low-income households and may be sufficient for households to begin to accumulate assets. Supply side issues of sustainable biomass also need to be addressed. It would not be unreasonable to say that there

has been a certain disillusionment with improved cook stove programmes, and other interventions such as biogas and solar cookers, because they have failed to live up to their expectations. Over the last decade there has been declining support for stoves programmes amongst donors (for example, the scaling back of the GTZ Household Energy Programme) and national governments (for example, the Indian Government's decision to hand over its stoves programme to state governments without financial support from the centre) (Clancy, 2002).

All the energy carriers have their 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. However, it is not only that technologies have to be available to choose from, but also that women can afford to pay for them. The question then becomes what role can energy play in increasing women's purchasing power which, in turn, enables them to buy further energy efficient equipment to meet their needs. Renewable energy technologies have to be able to match these requirements.

5.2 Energy for micro-enterprises

Access to income is a keystone in strategies to move people out of poverty. Women already have income-generating activities, many of which are often run from the household. In most countries in the South women are usually found working in small and medium scale enterprises (SMEs), particularly in the informal sector. The enterprises tend to be concentrated around a relatively narrow range of activities; with relatively low rates of return compared to men's activities (in part because women tend to work in unskilled manual or clerical work and men work in skilled manual or management). Women tend to be concentrated in services, and men in manufacturing. The typical sorts of activities women are involved in include beer brewing, knitting, dressmaking, crocheting, cane work, and retail trading (especially the sale of prepared food). Women's wages in the South range between 50% and 80% of men's wages (ILO (1995) quoted in Masika and Joeke (1996)). Despite the low financial returns, women's SMEs provide crucial sources of household incomes, even in male-headed households.

The role of energy as an input factor in small business sustainability is a particularly under-researched area. What constraining role does energy play in the sustainability of small-scale enterprises? The use of stand-alone renewable energy systems such as biomass, wind, solar, and small-scale hydro is being increasingly promoted in response to the high delivery costs of grid electricity and petroleum energy products to rural areas¹³. Most of the focus in the 1990s was on the provision of electricity, most notably in the form of photovoltaic systems for electric lighting in households, usually for consumptive rather than productive uses (van Campen et al., 2000). There is no doubt that electric light extends the possibility for working in the evening hours but there is quite a debate about whether or not access to electricity adds to the burden of a woman's

working day (see for example, Cecelski (1995); Clancy et al., (2003)). Unfortunately, there are insufficient empirical data on what use is actually made of the lighting to enable a definitive answer, and it would be foolish to prejudge. An interesting study in Namibia showed that women did stay up later than men, not working but socialising (Wamukonya and Davis, 1999). One of the few detailed studies with gender-disaggregated data on rural electrification reported that women in rural Bangladesh felt that while electricity had not brought a real reduction in their workload it had given them greater flexibility (through electric lighting) in the organisation of their work patterns (HDRC, 2002).

Certainly, electric light can benefit small enterprises through greater efficiency and quality of work, better working environments, and a more attractive and secure environment for customers (security is particularly important for women) (Barua, 1998 quoted in Cecelski, 2002). However, there is a need to move beyond the light bulb and promote more productive uses of electricity. Providing households with increased income would help to offset the high up-front costs associated with renewable energy technologies.

Some women's SMEs, such as food processors, use heat and light provided by purchased fuels, such as biomass and kerosene, and tend to be highly fuel intensive such that their viability and costs are affected by energy prices and availability. In others, women's income generation can also involve significant inputs of their own energy, for example, oil seed processing. Electricity or biomass-fuelled diesel engines could potentially contribute to this type of need. Unfortunately, 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

suggest that technological inputs could reduce energy costs. Women entrepreneurs do want technologies that improve their incomes and the viability of their businesses. For example, there are women’s groups in Uganda who use solar dryers for fruit preservation which gives them a better quality product and enables them to export 50 tonnes annually which has significant positive impacts on the income they are able to earn (see Box 6).

Box 6: Energy Projects Increasing Women’s Income Generation Potential

In Uganda, an FAO/UNDP post-harvest programme recommended small-scale solar dryers for long-term storage and eventual household consumption of fruit and vegetables. However rural women's groups were more interested in solar dryers for income generation than for food security. Subsequently, the ‘Fruits of the Nile’ company was formed in 1992 to link rural producers with the market for dried fruit in Europe. Within three years, more than 50 women’s groups had taken up the solar drier technology, and in 1995 the company exported more than 50 tonnes of dried fruit. The original food security concerns are also being addressed: when they are not drying for profit, the women use the solar dryers to preserve vegetables and fruits for home storage and consumption.

(Okalebo & Hankins, 1997)

The women in this example are not motivated by Northern agendas of “greenhouse gas emissions” or “desertification” (although this should not be interpreted as women not caring for the environment).

Given that women’s enterprises have a strong reliance on biomass, the sustainability of this supply needs attention. Unfortunately, biomass production for energy falls between Ministries

(usually Energy and Forestry) and as a consequence gets neglected. In this regard an initiative by GTZ might present an interesting case of best practice. In 1998, GTZ began to implement a project on Biomass Energy Conservation (known as ProBEC¹⁴) in six Southern African countries to support local, national, and regional initiatives aimed at improving the energy situation for poor urban and rural households and small businesses using biomass energy. Initially the programme did not include gender analysis. However, a study in Namibia of a stoves programme to train men and women to build and market improved biomass stoves and a solar cooker found that if gender analysis had been systematically used in the project design there would probably have been a lower dropout rate from the training courses and that the requirements of both men and women, as end-users of the stove, would have been matched which, in turn, would have contributed to a better take-up of the new technologies. The solar stove design would then have taken into account the fact that household stoves are also used for producing food for sale and that the solar stoves normally designed for the household are too small to cook the quantities of food needed for commercial purposes. Adapting to this need would have increased their acceptability (Cecelski et al., 2001).

Starting up a business, or expanding/modernising an old one, needs capital. Women face problems in access to capital not faced by men. Families are often the source of the type of capital needed for business ventures. There may be cultural barriers which deny women access to this source of family funds. The lack of women’s property rights prevents loans from the commercial banks. Some thought therefore has to be given as to how women will acquire the capital to enable them to purchase renewable energy technologies. The usual response is: microcredit. There are a number of examples of successful programmes targeting women, Bangladesh’s Grameen Bank being



the most well-known. However, research is increasingly questioning whether women are able to fully utilise the credit, and what degree of control they retain over the loans once disbursed. For example, Baden et al. (1994) reported a study in Bangladesh of 250 loan histories from some of the leading microcredit agencies that found on average that 20% of loans to women were used by male household members. A worrying aspect is that the larger the size of the loan the greater the likelihood that it will be appropriated by male family members. In general, project-based microcredit systems lend small amounts over short terms. Therefore, they would probably be unable to assist women in becoming energy entrepreneurs or purchasing renewable energy systems or appropriate appliances for their home or enterprise. These would need different levels of finance. One possibility might be to

build on the traditional types of savings groups that women belong to, and encourage women to join together in specific savings groups to enable them to take out loans on a rotating basis to buy energy technologies (Denton, 2002). This might also enable women to build solidarity to prevent, through social control, male appropriation of the loan. As a group, women might have more influence over “community” resources than over money from outside institutions such as an NGO. Given that the lack of information and experience with new technologies is a barrier to women acquiring renewable energy technologies, specialised savings groups would also enable the provision of awareness raising and the training of women about the possibilities and use of renewable energy technologies. Courses could be timed to fit with women’s work patterns.



6. Women in the Energy Sector

Up to this point, the role of sustainable energy 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

6.1 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 focusing on rural areas, offering the potential of good incomes. 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 as a number of stoves programmes would testify (see Box 7).

Women are good candidates to be successful energy entrepreneurs (Batliwala and Reddy, 1996). 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 to addressing this constraint have been established, other barriers exist.

working in partnership with women to develop Renewable Energy Technologies (RETs), will provide technologies that have a sustained use and create a viable market since they match the needs of users who are prepared to invest scarce cash resources to acquire them. Women in the North have also shown active interest in promoting renewable energy; for example, women in Germany established their own cooperative to generate electricity for the grid using wind energy because they were committed to responsible attitudes towards the environment (Delfs, 2000).

Box 7: Upesi Stove Project in Kenya

The Upesi project was initiated in 1995 to promote the adoption of more efficient stoves in rural areas of Western Kenya. Its goal was to improve living and working conditions of women in rural households by enabling a significant and increasing number of women and families to benefit from fuel-saving wood-burning stoves. The project has cooperated with women's groups and involved them in design and field-testing of the stove. The women have been trained in producing, distributing, and installing the stoves. Additionally, their marketing skills have also been improved. Thus, their ability to earn their own income from stove-related activities has increased. Over 16,000 stoves have been installed, providing significant poverty alleviation. The benefits to men and women in the project areas include improved health and time savings for users of the energy efficient stoves, as well as relief from pressures caused by fuelwood shortage. (Khatami-Njenga, 2001)

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 (Munyeme, 1999). 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 only employing people with the required technical skills. Many of the

so-called “captains of industry” probably do not have a detailed scientific understanding of their business products and processes: they know how to produce an economic product, with a satisfied workforce 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 8 gives some details of a women’s energy entrepreneur project for solar PV home lighting systems and solar lamps in rural Bangladesh, and indicates where women need help to establish themselves as entrepreneurs.

Box 8: Battery-Operated Lamps Produced by Rural Women in Bangladesh

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 and aims to improve the lighting and indoor air quality of rural households by replacing the traditional kerosene lamps with modern fluorescent battery-powered 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 a market of 20,000 households and grid extension within the next 20 years highly unlikely.

The lamp business represents an important opportunity for the women to earn a relatively good wage. If a woman constructs and sells two lamps a day she earns the wages equivalent to a skilled labourer, a significant opportunity which both benefits 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 importance of 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 of electronic components, and a 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 out of 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; and providing a service the community wants. (Khan H, 2001)

This project also has a possible best practice model for selling renewable energy technologies in rural communities. The women energy entrepreneurs have set up co-operatives which allow them to pool resources and offer microcredit to purchasers of the lamps that the co-operatives produce (Khan, 2001).

Box 9, which gives details of a community-owned microhydro system involving village women in the Western Solomons, goes a step further by showing that using such an approach

can also have the advantage of improving women's standing and confidence in society. A change also appreciated by their menfolk. As well as women being entrepreneurs, renewable energy companies can also use women as operation and maintenance technicians at the local level. The water sector long ago began to train women in the operation and maintenance of hand pumps. Women have proved to be more effective in regular and preventative maintenance than men (Cecelski, 2000).

Box 9: Community-owned Microhydro System by Village Women in the Western Solomons

The women in Bulelavata, a small, remote village in the Western Solomons accessible only by sea, used to live a subsistence lifestyle typical of women in tens of thousands of other villages across the Pacific Islands. Then, in 1998, the community chose to begin the process of establishing an energy-for-development project. In 2001, the community-owned microhydro system, funded by the Australian International Greenhouse Partnerships, Caritas, and the Provincial Government, was officially opened by the Provincial Premier. The system produces 24kw and has 1.5 km of high voltage transmission line enabling the community to sell power to the Provincial Secondary School.

For the women of Bulelavata the energy project has had some significant and profound impacts ranging from the practical, quantifiable advantages of lighting and community income to qualitative outcomes such as solidarity and empowerment. The project design of the Bulelavata community microhydro scheme used a women's participatory action agenda, exploiting "action learning" (or learning-by-doing). They had the decided advantage of a context where a relevant project was happening in their lives, one in which workshops could be grounded. The facets encompassed project policy support, female project management, female role modelling at varying levels, specific women's awareness and training workshops (although community ones were also held in which women participated), visits by women to other villages, management committee positions for women, a new village institution for women, technical team leadership by women, and logistical project support teams being given equal status to technical project teams. This affirmative agenda was designed to encourage and facilitate active and meaningful opportunities for participation by the village women, and operated within existing Melanesian cultural and village religious mores while at the same time challenging the boundaries of perceived gender roles through the medium of the new technology.

The Bulelavata village men say that the electricity project has changed their women; that they are now more confident and outspoken and participate more in community development activities. The men think this is a good outcome in terms of the whole project, and rate it second only (by general consensus) to the community's understanding of "planning for tomorrow". (Donnella Bryce and Chin Ching Soo, 2004)



6.2 Women working in the renewable energy sector

There are no statistics giving gender disaggregated data for the renewable energy industry, but the figures for the energy sector in the North as a whole are depressing. In Germany, the share of female technical staff in the energy industry is around six per cent, in decision-making positions four per cent, and in the top-management less than one per cent (Hoppenstedt-Analyse, 2000). Women in the energy industry work mainly in administration, sales, finance, catering, and personnel. There are also no gender-disaggregated data on women in the South's participation in the renewable energy sector, although it would appear that women are not significantly involved as employees in the formal sector. This lack of women's involvement is somewhat surprising. Feminists have seen renewable energy as providing an ideal working environment for women (Rübsamen, 1994). Men and women share a common pool of human character traits, some of which can be characterised as "female" and some as "male". Traditional "female" qualities include cooperative, nurturing, supportive, non-violent, and sensual; whereas traditional "male" qualities include competitiveness, individuality, assertiveness, leadership, and intellectuality. Women tend to exhibit predominantly female characteristics and men predominantly male characteristics. Renewable energy is associated with positive outcomes for the environment and is not destructive of the ecology (hence non-violent). In the 1970s and 1980s renewable energy was strongly associated with small scale, decentralised production systems run by small companies, often working on a cooperative basis: the type of working environment that should appeal to "female" qualities of being cooperative and supportive. Women involved in renewable energies have the perception that the ratio of women to men involved in the renewable energy industry has declined since the 1980s (Roehr, 2001). Roehr (2001) reports of

complaints by women that when the "green" movement became "professionalised" men took over the strategic positions, and so weakened women's opportunities. Renewable energy systems have, in the North, become the domain of large companies looking to generate electricity for large, centralised systems. So why are women not making headway in a field that might at first sight appeal to them? There is a lack of empirical evidence to answer this question. Some researchers have suggested that the energy sector has a highly masculine image which deters women (Clancy et al., 2001). There are perceptions that the type of work involves heavy labour and this is regarded as a significant barrier to female participation. However, in recent years, automation has reduced the need for significant inputs of muscular labour. Women are certainly interested in technical subjects, for example environmental technology, but seemingly not in courses involving energy. Is it because women miss the ecological and social dimensions in energy courses?

Does it matter if women are not employed in the renewable energy industry? Social justice arguments of fairness or equality would imply that all women and men have the right to the equal enjoyment of socially-valued goods, opportunities, resources, and rewards; and equal participation in decision-making about those goods (Clancy and Roehr, 2003). Energy is a commodity which both provides services and offers job opportunities. Therefore, women and men should, based on equality principles, have equal opportunities not only to make use of energy but also be able to participate in all aspects related to energy, including employment. Women should be able to choose whether or not to work in the renewable energy sector and not be excluded by artificial barriers. From an economic perspective, can the renewable energy industry miss out on the pool of female talent?

7. Green Energy: A Woman's Natural Choice?

Are there gender differences in preferences for energy sources? There are very limited published statistical data, and what there are mainly relate to the North. Public perceptions about energy have mainly been studied on a large scale in relation to nuclear energy. The key outcome of all such research, whether in Germany, Scandinavia, or the USA, is that women reject nuclear fusion more strongly than men (Longstreth et al., 1989; Federal Environment Agency (UBA), 2002; Puranen, 2000). At the heart of such rejection lies a greater risk awareness and health prevention aspirations for current and future generations. The logical conclusion, that women have a greater preference for the less environmentally threatening renewable energies, cannot however be confirmed. The few and relatively old studies on this subject (Farhar et al., 1980; Longstreth et al., 1989) show no significant difference between women and men as regards their attitudes to renewables in general or to individual technologies such as solar energy, wind, or water power.

In a study conducted for the European Commission, a number of female and male energy professionals were surveyed on priorities for energy research. The majority of respondents considered that there were no differences between men and women in their priorities (Clancy et al., 2001). Those who did see differences agreed with the hypothesis that women favour soft energy paths. Women scientists within the European Union, interviewed as part of the study by Clancy et

al. (2001), did hold a strong preference for research in renewable energy and energy conservation. They also believed that social issues should be integrated into energy research.

Do women make conscious choices to be green and opt for suppliers who provide and promote the expansion of electricity generated from renewable energy? There is a lack of data to give a definitive answer to this question. According to some investment advisers, women appear to make up only between 10% and 20% of the investors (on a per capita basis) in green energy power plants (mainly from wind energy) in Europe (Weller, 2003). A possible explanation may lie in the difference in earnings between women and men – on average women in EU countries earn 80% of what men earn – so fewer women than men have surplus funds for stock market investment. Often the financial regulations designed to stimulate investment favour those with high incomes. For example, in Germany, only investors with annual incomes over €55,000 are able to benefit from tax reductions due to losses on investments (*Verlustabschreibung*). There are fewer women than men in that income bracket. However, there are other avenues open to women to invest in green (renewable) energy such as investing in setting up their own companies (see Box 10). Unfortunately, these types of initiative are the exception rather than the rule.

Box 10: Windfang: Women Making Energy for Themselves

A company (*Windfang*), owned by 200 women working on co-operative principles, operates a 450 kW wind turbine which is feeding into the national grid to the north of Hamburg in Germany. The company grew out of an initiative by three women who had grown disillusioned with the unsupportive male-dominated working environment they had encountered in the energy sector. Although most of the founding members were technically oriented, the group is now multidisciplinary and has members of all ages, from students to women professionals, and from a broad range of disciplines such as theatre and economics. Of importance to most of the members is the peer support gained from working within a group of women. Some of the women do not work in the company but have provided finance for the company and have the self-gratification from pragmatically working towards a cleaner environment. In addition, the way in which decision-making is carried out within the company was an important principle. The women opted for a democratic structure which allows all members to elect the steering committee and board, while major decisions are taken at a general assembly. One of *Windfang's* objectives is to increase the work experience of women in energy projects and thus improve their chances of a good job in the energy sector. Having gained confidence while working in a supportive environment, several of the founding members have now moved on to set up their own businesses or have found jobs in the renewable energy industry. (Delfs, 2000)

8. Lessons Learnt to Date: Implications for Policy

Renewable energy can play an important role in increasing access to modern energy services, which frees woman's time from domestic tasks, permits home study and reading, enables access to educational media and communications in schools and at home, mitigates the impacts of indoor air pollution on women, allows access to better medical facilities for maternal care including refrigeration and sterilization, and permits income generation activities. All these activities contribute to improving gender equity. By taking a gender approach, renewable energy suppliers can increase their potential client base and the sustainability in the use of their technologies. However, this cannot take place in a vacuum and needs a supporting environment. This section looks at some of the elements of that environment.

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 such an engendered policy is through creating awareness in policymakers. This can be achieved through advocacy activities at all levels. A good example of this type of initiative is the regional meeting in Africa organised by the South African Ministry for Minerals and Energy supported by the US Department of Energy, Winrock International, and the World Bank Energy Sector Management Assistance Program in 2000. The meeting, which was linked to the Pan-African Energy Ministers Conference, asked Ministers to explore ways of using policy to empower and promote safer and healthier technologies for women, and resulted in the Durban declaration which committed Ministers to these objectives (US Department of Energy, 2000).



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. They also have to have knowledge about renewable energy technologies, the benefits they bring and also their limitations¹⁵. Training and networking can play a valuable role here. An example of best practice in training women in renewable energy technologies is the programme by UNEP for training women leaders on the uptake of renewable energy technology (ACRE, 2001). Training on gender analysis for the energy sector is available through a manual developed by the University of Twente and supported by ENERGIA¹⁶.

ENERGIA plays an important role in networking, both in sharing knowledge and experiences, and in advocacy on gender and energy. However, in terms of networking for women working in the renewable energy sector, there is no comparable professional association to those found in the other energy sectors, such as WIN which is for women working in the nuclear industry¹⁷. The International Solar Energy Society (ISES) had, for a number of years, a Women's Energy Interest Group. This Group was established in 1995 at an international meeting of ISES by women and men from the South and North, and discussed issues related to energy worldwide. Part of the reason for its creation was the perception that the supply of energy is an overly male-dominated field, with low female input. It was felt, in the context of the North, that there was very little awareness of the impact of fuel choices on women's lives,

mainly due to the remoteness of the energy mix decision. The group acted as a discussion forum on a variety of topics and received strong support from the Board (all male at the time). It was found useful by younger women who wanted to know about sustainable energy options and made them aware of the complexity of energy decisions worldwide. The Group has now ceased to function. This has been attributed not to a lack of interest or need but to a lack of a critical mass of women with time to keep the momentum going (Clancy et al., 2001). The renewable energy industry could demonstrate its commitment to gender equity in the industry by supporting the establishment of a professional organisation for women in renewable energy.

There is a need for more gender-disaggregated data in the energy sector, not only quantitative data about energy use but also qualitative data about the sort of choices women and men want to make about the energy sources they would like to see used. Decision making should be transparent and reflect equally men's and women's preferences. The provision of gender disaggregated data could be achieved relatively easily, at least within Europe. The European Commission surveys biennially European citizens on their attitudes to a key range of policy issues including energy. At present, the data are not published on a gender-disaggregated basis. A simple adjustment could provide a wealth of information about how men and women, within the European Union, view energy policy and choices (Clancy and Roehr, 2003).

All too often, the starting point for an intervention to remove people from poverty is the promotion of a particular technology, including energy ones, without reference to context. However, communities throughout the South differ in many ways, so solutions are more likely to be sustainable if one begins 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, it is essential to include them in the design, implementation, and evaluation of energy projects. Gender analysis can play an important role in ensuring project sustainability and better marketing opportunities while at the same time promoting gender equity.

Reaching the MDGs cannot be achieved without energy inputs, and renewable energy has an important role to play here in benefiting both women and men. However, women can potentially benefit more than men from increased energy inputs through reducing drudgery and saving time. If renewable energy is to contribute to these benefits it has to match the form of energy that end-users want. There is an overemphasis on the technologies which generate electricity given that the major uses of energy, both in the household and small enterprises, are for process heat.

The project in Bangladesh referred to in Box 8 shows that energy projects must have some aspect of income generation for them to be taken up with enthusiasm and have 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 including demand projections. Women entrepreneurs tend to be more risk-averse than men. This means that they need more support to adopt new technologies or to set-up businesses. The nature of the support has to match the reality of women's lives: their assets and the control over those assets, as well as their work patterns. 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 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 the levels women could meet, repayment schedules were too short, and collateral requirements did not match women's resources (Sengendo, 2001). An example of best practice in microcredit is the ENSIGN project (see Box 11) of the Asia/Pacific Development Centre and UNDP, which combines microcredit loans for energy services with corresponding income-generating activities for the poor, including women. The services are co-financed by a revolving fund and national financing institutions, such as the Self-Employed Women's Association (SEWA) Bank in India. An average growth of 124% in income was found in the participating households.

Evidence has been presented that energy is not gender-neutral in the North but gender-blind. There is a lack of empirical evidence from which broad conclusions can be drawn. There is concern, both from social justice and economic perspectives, of a loss of quality human resources, that women are not gaining access to the renewable energy sector for technical employment. This lack of women's involvement would also seem to be the case in the South where women's contact with renewable energies tends to be as passive beneficiaries. An example of best practice in encouraging women into renewable energy as technical experts is the ENEQO project¹⁸ within the electricity industry in Europe which aims to advance equal opportunities by promoting the positive benefits employing women brings to the working environment (Clancy et al., 2001).

Box 11: Financing Energy Services and Income-Generating Opportunities for the Poor (ENSIGN)

The ENSIGN project was implemented in eight countries in Asia in a UNDP-financed project by the Asia-Pacific Development Centre. Energy-linked micro-enterprise portfolios were developed through microcredit banks and institutions in each country. In urban areas, connecting to the grid and more-efficient appliances were the most important. In rural areas, however, renewable energy, coal briquettes, and diesel fuels were preferred. In both rural and urban contexts, process heat and motive power were more crucial to income-generation than lighting. The ENSIGN Revolving Fund provided 36 per cent of total loan funds, national financing institutions 50 per cent, and borrowers' equity 14 per cent. Interest rates were 15 to 20 per cent, somewhat below market rates, with repayment periods of 2 to 6 years. Both individuals and communities were financed, and the average increase in income was 124 per cent (higher for the community projects).

Myriad activities were financed including garment making, embroidery, felt and leather goods manufacturing, copper welding, utensil manufacturing, baking, cold storage, rubber stamp making, beauty salons, grain grinding, threshing, fish drying and powdering, soybean processing, rice husk cook stove, spice drying, beedi (flavored handmade cigarettes) wrapping, cinnamon peeling, and rice processing.

Following are some lessons from the ENSIGN project:

- Although this was not planned, the vast majority of borrowers were women, who proved enterprising, innovative, and creditworthy. Significant benefits for women, in addition to income impacts, were time savings and enhanced self-confidence from improved ability to support household income and greater control over self-generated finances.
- There is a need to account for the transaction costs of intermediaries. There is a need for a "Business Facilitator", possibly an NGO, in future replication efforts.
- Borrowers for ENSIGN-type loans are not usually the poorest of the poor; however, such people are often employed as labour in the pilot projects.

(Ramani 2002)

9. Recommendations and Requirements

There is an urgent need to improve the availability of gender-disaggregated data and research results on gender relationships in the renewable energy sector in both the South and the North. This calls for targeted gender research that focuses on gender relations in the energy sector, and which contributes to providing evidence and data to either support or disprove the postulated differences and similarities between the sexes. There is also a need to provide gender-disaggregated data on energy needs and the impacts of renewable energy on women's and men's lives. The

existing evidence is at the level of case studies and so can only be regarded as indicative, and in some instances speculative. A considerable amount of energy policy is made on the basis of assumptions rather than on microlevel evidence on the benefits of access to energy services by the poor. An example of a typical myth is "electric lighting improves educational performance and life chances, particularly for women". The truth is that we simply do not know whether electricity really leads to greater educational success (Clancy et al., 2003).

a) *Appropriate research projects*

- In what way and to what extent are women involved in the supply of electricity produced from renewable energy? Research results are needed that provide evidence on the numbers of, and the amounts invested by, women and men who are involved in the production of renewable energy and on the use of green electricity and its prerequisites or obstacles (see Weller 2003).
- Which processes and structures have led to women becoming under-represented in the renewable sector despite the initial positive start? How can structures be changed, and what needs to be done so that equitable participation is possible?
- A study of the impacts on the gender relationships of financial management instruments such as energy/eco-tax or grants for solar systems could, for example, show that instruments perceived as gender neutral often have a hidden discriminatory effect and are thus unlikely to fully achieve their intended goal – namely the expansion of renewable energy.

b) *Data collection*

- In principle, all research projects involving the collection of personal data should evaluate these data according to gender and make the results available. With relatively little effort, this could improve the catastrophically poor availability of data in the medium term.
- Additionally, the renewable energy sector should provide employment data on a gender-disaggregated basis, and the energy supplier associations that exist in most industrialised countries should categorise their data on employees in the energy industry according to sector and gender.

- Finally, associations that promote renewable energy and the renewable energy industry could easily categorise their data on member structures according to gender and thus contribute to solving the problem of the limited availability of data.

c) *Empowerment*

Stakeholder involvement requires that women play an equal role in determining needs and appropriate technologies to address them. In other words, women need to be empowered with knowledge, confidence, and physical resources to enable them to make that contribution effective. The following actions would help in achieving this:

- Integrate energy access through renewable energy technologies and finance for income-generation in a holistic approach to improve the social and economic status of women. This would consist of offering a bundle of services to enable women to access improved energy, while at the same time enhancing women's entrepreneurial and technical skills, self-respect, and self-confidence.
- Specifically address poor women's development needs for labour-saving, for timesaving, for improved health, for security, and for income in rural renewable energy projects and technology research.
- Prioritise the cooking energy crisis and women's health in developing countries. Any energy assistance aimed at improving women's access to energy must include cooking, for example through donor support to stoves programmes.
- Educate people (particularly women) about the benefits of renewable energy, and its potential for improving quality of life, by providing appropriate materials and training courses.



- Increase awareness both of the issues and the solutions in the area of gender equity and renewable energy among women and their organisations (in South and North) by supporting networking.
- Increase awareness both of the issues and solutions in the area of gender equity and renewable energy among policymakers and decision-takers through international, regional, and national meetings.
- Provide technical, catalytic, moral, financial, and political support to efforts to promote joint South-South and North-South initiatives between renewable energy sector and development sector professionals, organisations, and projects, including both women and men, through capacity building, workshops, electronic communications, advocacy, research, and networking at the local, national, regional, and international levels.
- Promote the exchange of experiences and lessons learnt on how to effectively address gender equity and renewable energy (South-South; South-North; North-North).
- Adapt and apply specific, proven "best practice" development sector approaches to overcome institutional factors such as women's lack of access to credit, extension, training, and employment in the renewable energy sector (which are also barriers to energy access by the poor generally) to ensure that energy will be a means to development rather than an end.
- Provide strong support to women's organisations that play an advocacy and advisory role on gender and energy issues.
- Continue renewable energy programmes to increase access to energy services that would equitably benefit women and men.
- Improve the sustainability of renewable energy technology use by including gender tools at all stages in the planning cycle.
- Support capacity building and partnerships of women and men involved in renewable energy so as to enable the development of a critical mass of women and men with the capabilities to change the policies, programmes, and practices that affect women and their energy choices.
- The renewable energy industry should demonstrate a commitment to gender equity in the industry by supporting the establishment of a professional organisation for women in renewable energy.



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Endnotes

- ¹ The terms “North” and “South”, first popularised by the Brandt Report (1980), as used in this paper are not meant in a geographical sense. There is no simple or agreed, unambiguous term to describe or attempt to classify the complex reality of groups of countries which differ in degrees over a range of characteristics, from climate to culture. The terms “North” and “South” have the advantage that they are value free, as say compared to “developed” and “developing”. The terms should be seen as convenient shorthand but keeping in mind that the groups referred to are not homogeneous entities even in terms of energy demand, supply and use.
- ² Not only financial rewards but also, for the more idealistically minded, social and political rewards based on principles related to respect for the environment.
- ³ The role of TV in women’s empowerment should not be underestimated. For example, in Tunisia, watching television enabled women to become more aware of political events and to have a greater knowledge of world events than their husbands. Through this knowledge, they have gained confidence to speak out and take up leadership roles (Chaieb and Ounalli, 2001).
- ⁴ Interestingly, the same percentage (20%) of income spent on energy is used in the UK to classify households as living in fuel poverty (Clancy and Roehr, 2003).
- ⁵ <http://www.econippon.org/en/orgs/pff/pff.html>
- ⁶ Although some might argue that new forms of drudgery and new health concerns have appeared with computerisation.
- ⁷ Using a Northern measure of poverty, that is defining poverty purely in economic terms as consuming less than US\$1 per day in goods and services, it is estimated that the number of people living in poverty was around 1.2 billion in 1993, which is around one-fifth of the world’s population (World Bank, 2001). There is little evidence to suggest that this figure has decreased significantly since.
- ⁸ In fact, many development practitioners do not recognise energy poverty (defined by Reddy (2000) as the absence of choice in access to adequate, affordable, reliable, high quality and environmentally-benign energy services) as a concept.
- ⁹ Quoted in Cecelski, 2002.
- ¹⁰ It has to be acknowledged that this includes advocating the benefits of renewable energy technologies over fossil and nuclear fuels without reference to context.
- ¹¹ “The Gender Face of Energy: A Training Manual”, Skutsch, M., Clancy J.S., and Leeuw H (forthcoming 2004), Technology and Development Group, University of Twente, on behalf of ENERGIA.
- ¹² This applies to any technology.
- ¹³ See, for example, the Village Power Conferences:
<http://www.rsvp.nrel.gov/vpconference/vpconference.html>; Turkenburg, 2000.
- ¹⁴ <http://www.probec.org>
- ¹⁵ There are a lot of disappointed solar home owners who discover they cannot use their electric irons.
- ¹⁶ An early version of the manual can be downloaded from the ENERGIA website www.energia.org. A revised version is expected to be published by the end of 2004.
- ¹⁷ <http://www.win-global.org>
- ¹⁸ <http://www1.sydskraft.se/eneqo/home.htm>



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