

# **GENERATING OPPORTUNITIES**

**CASE STUDIES ON ENERGY AND WOMEN**

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**UNITED NATIONS DEVELOPMENT PROGRAMME SUSTAINABLE ENERGY**

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## FOREWORD

Energy plays a critical role in poverty reduction. Patterns of energy generation, distribution and utilization directly affect opportunities for income generation, the situation of women, environmental protection and national development. Energy services are an essential engine for growth to enable developing countries to overcome poverty and the conditions of poverty. Yet, worldwide, two billion people rely on traditional fuels including wood, dung and agricultural residues to meet their daily heating and cooking needs. Despite advances in the last ten years in extending electricity services in developing countries, electricity supplies to support household, agricultural and industrial activities remain beyond reach for two billion people.

The availability of energy services has a distinct impact on the lives of poor people and women, in particular. This is most critically felt in rural areas, where women shoulder the responsibility for fuel collection, household cooking and family subsistence activities. Electricity is essential for water pumping, illumination, food processing, microenterprise development and the provision of social services, including education and health. When it is not available, the lives of women and men are impacted in distinct ways. Both women and men face obstacles to overcoming conditions of poverty related to the lack of opportunities for income generation due to energy services unavailability. In the case of women, many of these linkages have remained unaddressed by national development policies, energy planning processes and development assistance efforts.

UNDP has made a commitment to address energy issues because of the multiple linkages to development bottlenecks, as well as opportunities presented by innovative approaches to energy service delivery. These linkages have been discussed and analysed extensively in previous UNDP publications including *Energy After Rio: Prospects and Challenges* (1997) and *World Energy Assessment: Energy and the Challenge of Sustainability* (2000). These argue that current approaches to energy are unsustainable in economic, social and environmental terms and that major changes are needed in energy systems worldwide. Among these changes are the need for more efficient use of energy, increased use of renewable energy sources and expanded access to and use of modern clean energy technologies in developing countries. To underpin these changes, governance mechanisms and energy policy frameworks are needed to support new approaches linking energy and poverty reduction objectives. Energy must be seen as an active ingredient for sustainable human development.

This publication, *Generating Opportunities: Case Studies on Energy and Women*, is one concrete contribution to addressing these linkages, especially the relationship between energy

services availability, the conditions of poverty directly affecting women, and the opportunities for development presented when efforts are made to provide affordable access to modern energy carriers, such as electricity and clean burning fuels. Sustainable energy approaches must include a focus on the role of gender in development. Policy frameworks to support sustainable energy options must directly reflect the energy use patterns of women and support the expansion of productive activities available to women through enhanced energy services, especially in rural areas.

The Bureau for Development Policy supports advocacy and analysis activities on key development issues and provides practical support and lessons learned from global experiences in development cooperation in priority programming areas. This publication is an excellent example of sharing experience on women and energy linkages, both what works and what provides insight for improvement. It looks at real activities attempting to link gender, energy and sustainable human development objectives through concrete projects. This provides the raw material to draw policy conclusions on what conditions are needed to enable new approaches that address women's energy needs. As the international community prepares for the World Summit on Sustainable Development (WSSD) to be held in Johannesburg in 2002, we hope such material will contribute to dialogue on how multiple development objectives can be addressed through integrated approaches at the national level.

This publication is the result of collaboration among the Editor and Executive Editor, case study authors, experts of the Technical Advisory Group, and UNDP staff working in the field of sustainable energy. I congratulate them on their efforts. This case study effort was made possible through support from the Swedish International Development Cooperation Agency and the UNDP Global Programme on Sustainable Energy. On behalf of UNDP, I thank the government of Sweden for their support for this important effort. I sincerely hope that energy practitioners, gender experts, national authorities, civil society organizations and those working in the field of international development find the material presented here useful in supporting efforts to link sustainable energy, gender and income-generation activities at the national level.

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New York, April 2001

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UNDP is very grateful to Professor Salome Misana, who served as the Executive Editor, as well as the Editor Gail V. Karlsson, who skillfully and effectively coordinated and consolidated the inputs from the authors and the Technical Advisory Group members. Their expertise on energy, women and development issues has greatly informed the efforts of UNDP on these topics. Janet Jensen's contribution to the final text editing was much appreciated and special thanks are due to Mary Zehngut and Jayne Kozak for creating the distinctive look of the publication.

UNDP is greatly indebted to the authors of each chapter for their thorough and comprehensive contributions that are at the heart of this volume. Many thanks are also extended to the TAG experts for sharing their experience and giving

invaluable comments and insightful advice, especially at the November 2000 review meeting held in New York. Their many timely inputs and suggested revisions guided the direction and outcome of the publication.

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## SUSTAINABLE ENERGY AND WOMEN

# INTRODUCTION

GAIL V. KARLSSON AND SUSAN E. MCDADE

**T**his book of case studies was prepared as part of a United Nations Development Programme (UNDP) project entitled "Energy and Women: Generating Opportunities for Development," which was initiated in February 1999 with support from the Swedish International Development Cooperation Agency (SIDA) and UNDP's Sustainable Energy Global Programme.

UNDP's Initiative for Sustainable Energy, which began in 1996, examines energy's link to socio-economic development and gives guidance on how energy activities can become important instruments for eliminating poverty, regenerating the environment, creating employment opportunities, promoting sustainable livelihoods, and advancing the status of women. This work was reinforced when, as part of the preparations for the 1997 UN General Assembly Special Session to review progress on sustainable development, UNDP published *Energy After Rio: Prospects and Challenges*. This publication examined the major changes in energy systems called for in Agenda 21, the plan of action adopted at the 1992 Earth Summit, and made recommendations on sustainable energy strategies, including specific energy service approaches to address the burdens faced by women in developing countries. These themes were further articulated in *World Energy Assessment: Energy and the Challenge of Sustainability*, a joint publication prepared by UNDP, the UN Department of Economic and Social Affairs, and the World Energy Council, as an input to the 2001 session of the UN Commission on Sustainable Development dealing with energy.

The Energy and Women project looks at new approaches to the use of energy as a means of addressing both poverty alleviation and the advancement of women, two of UNDP's major priorities. One of the project's key assumptions is that greater access to modern energy services can provide significant social and economic benefits, especially for women and girls in developing countries, who are the primary providers and users of traditional fuels such as wood, dung and charcoal. Reduced drudgery for women and increased access to nonpolluting power for lighting, cooking, and other household and productive purposes can have dramatic effects on women's levels of education, literacy, nutrition, health, economic opportunities and involvement in community activities. These improvements in women's lives can, in turn, have significant beneficial consequences for their families and communities.

**This publication looks at critical policy and programme design options to improve women’s access to modern energy services based on the lessons learned in the eight case studies presented. To understand which issues must be addressed in effective policymaking at the national and local level, such concrete experiences provide a wealth of insight. UNDP hopes that this effort will provide input for government policymakers, energy sector agencies, civil society groups and development assistance organisations to generate opportunities for development through energy activities.**

In many parts of the world, limitations on the availability of energy services create barriers to socioeconomic development. Worldwide, approximately two billion people use traditional solid fuels for cooking and heating, and almost as many lack electricity. Without access to modern forms of energy for lighting, cooking, heating and cooling, refrigeration, pumping, transportation, communications and productive purposes, people must spend much of their time and physical energy on basic subsistence activities. Lack of energy services is correlated with many of the elements of poverty, such as low education levels, inadequate health care, and limited employment possibilities. At the local and national levels, a reliable energy supply is essential to economic stability and growth, jobs, and improved living standards.

Much of the energy use in developing countries involves consumption of traditional fuels by poor households. For the most part, household needs are not adequately addressed by existing energy policies that focus mainly on urban areas and industrial development. Because of high capital investment requirements and the need for extensive transmission and distribution lines, in many countries it is not economically feasible to meet the energy needs of rural populations by means of conventional large-scale, power plants. It seems clear that new approaches to the delivery of energy services are needed. Efforts to meet the energy needs of rural communities through increased availability of small-scale decentralised approaches show real promise for raising living standards in these areas and also introducing more environmentally friendly energy systems. The production, distribution, and consumption of energy in rural areas can serve as an engine for growth and development.

## Women and sustainable development

One major factor influencing current attitudes towards energy is a growing agreement on the need for sustainable development policies. The 1992 UN Conference on Environment and Development (the Earth Summit) led to international consensus on the need for sustainable development, which balances economic growth with concerns for social equity and environmental protection.

Extension of the benefits of development to all people, men and women, is fundamental to the fulfilment of the social equity objectives of sustainable development. Unequal treatment of men and women, and their differentiated social and economic roles, has led to increased poverty for women in many countries. Of the approximately 1.3 billion people living on less than one dollar a day, 70 per cent are women. Literacy rates for women remain consistently lower than for men by about 30 per cent in developing countries, while the illiteracy rate for young women in rural areas is two to three times greater than in urban areas. Female school enrolment is 13 per cent lower than male enrolment at the primary level, and the gap increases at higher educational levels. Failure to address gender disparities, marginalization and discriminatory practices has, in many regions, contributed to entrenched conditions of poverty for women.

In 1995, the United Nations Fourth World Conference on Women in Beijing emphasised the vital role of women in sustainable development and the need to promote greater overall development opportunities for women. Although women’s status varies according to their country, income level, ethnicity, age and social status, the Beijing Conference found that women throughout the world continue to have fewer options and opportunities than men.

With regard to energy, the Beijing Platform for Action called on governments to support the development of equal access for women to sustainable and affordable energy technologies. In developing countries, it is women who, because of their traditional roles, are most vulnerable to the effects of environmental damage and increasing scarcity of traditional fuels. The deterioration of natural resources reduces opportunities for income-earning activities and greatly increases women’s unpaid work. The Beijing Platform of Action stresses women’s potential contributions to the development of ecologically sound consumption and production patterns, as well as natural resource management.

In keeping with the Millennium Summit commitment to halving the number of people living in poverty by 2015, UNDP supports the objective of reducing by half the number of people who lack access to modern energy services in the same time frame. Indeed, the provision of energy services is an essential prerequisite to support economic growth and poverty reduction in order to achieve this global poverty reduction target. The distinct energy needs and consumption patterns of women, who as a group are overrepresented among the poor, must be addressed through policy and programme frameworks to meet internationally agreed poverty reduction targets.

## Energy needs of women in developing countries

In most cultures, women and men have differing roles and responsibilities according to socially defined division of labour based on gender. This gender asymmetry is reflected in a variety of social and economic dimensions. In terms of reproductive activities, women generally have primary responsibility for the care and feeding of children and families, as well as health care and education. In many developing countries, it is the women who perform most of the work related to subsistence agriculture, plus gathering and managing fuel and water. Their productive activities are often unpaid and labour-intensive. When women in rural areas do generate income, it tends to be within the informal sector, and not adequately reflected in national accounting systems. This serves to under-represent the importance of energy as an input to women's economic activities. Because they operate mostly in the informal and unpaid sectors, poor women have less access to financial resources, credit and equipment than do men, and less of a voice in household, or community-level, decision making.

In past years, most energy programmes intended to improve the situation of women in developing countries have focused on household cooking and heating needs. Projects have emphasised approaches such as the introduction of improved stoves, production of briquettes from waste materials as an alternative to wood or charcoal, or tree planting to increase fuel wood supplies. Such projects, if they are properly designed, can be extremely important in terms of reducing existing domestic burdens on women and girls. They can also enhance opportunities for women to engage in income-producing activities, which are often performed on a part-time or irregular basis in conjunction with household activities.

Women are not only involved in cooking, however. They are engaged in many other tasks and responsibilities that could be accomplished more easily and efficiently if they had access to lighting and electricity, and the energy services electricity can provide.

Electrification makes basic subsistence activities such as water pumping and grain grinding much less time-consuming, and can power labour-saving as well as income-generating equipment. Availability of electricity is also essential for creating new employment opportunities and supporting value-added activities linked to agricultural production. Small-scale manufacturing, food processing industries, trading and marketing opportunities are all greatly expanded when energy services are available and have direct positive influences on women and their communities.

When women have safe and reliable lighting in the evening, they are better able to perform essential child-care responsibilities, and their children have more time to read. Lighting for homes, businesses, streets and marketplaces is also critical for facilitating women's involvement in educational, entrepreneurial and community activities.

## Women are particularly impacted by lack of energy for development

Energy poverty is a problem that has a disproportionate effect on women and girls, especially in rural areas. The most obvious factors relate to time and physical effort. Many women in developing countries have to spend long hours gathering fuel and hauling water, using their own labour to carry heavy loads over long distances. They are especially vulnerable to the adverse impacts of deforestation, desertification and ecosystem disruption. As fuel wood becomes scarce due to over-harvesting, land clearing or environmental degradation, many women are forced to travel farther and spend more time and physical energy in search of fuel.

When women are overburdened, they are more likely to keep their daughters home from school to assist with household activities, including fuel and water collection, thereby limiting opportunities for girls to move forward through education, and increasing the likelihood that their families will remain in poverty. Education and literacy levels are positively correlated with decreases in fertility rates. Women with more education tend to have fewer children, and to be better able to care for them. The fuel-related burdens experienced by women in developing countries hinder social and economic progress throughout the community and have long-lasting impacts when personal and social development opportunities are lost.

Besides lost opportunities and exhaustion, women are faced with a variety of health problems related to gathering and transporting fuel. Carrying heavy loads of wood damages women's bodies, and they must worry about falls and threats of assault, as well as snake bites, while gathering wood. In many rural areas, there is no alternative to walking. There is little in the way of transportation infrastructure, and women rarely have access to vehicles to carry their loads.

Women experience other health hazards from cooking for long hours over poorly ventilated indoor fires. They, and their young children, are exposed to large amounts of smoke and incompletely burned particulates from indoor fires, together with pollutants such as carbon monoxide, benzene and formaldehyde. As a result they often suffer from respiratory infections, lung diseases, cancer and eye problems. Worldwide, close to two million premature deaths per year are attributable to indoor air pollution from cooking fires.

Growing food and processing it without any mechanised equipment is extremely tedious and time consuming. In rural areas of developing countries, women grow most of the family's food and must grind grain and other staples by hand. Their lives are spent in drudgery and repetitive activities. Mechanised grinding equipment and improved food processing alternatives allow women to provide more food for their families with less effort, and perhaps even produce additional amounts for sale and income generation. Energy services enable improved food production, processing and human well-being.

Without water pumps, women also have to haul water by

hand. Electric water pumping not only eases women's lives, but also improves community sanitation and nutrition. Water scarcity limits the family's ability to wash their hands and clothes, and decreases their consumption of cooked foods. Pumped water used for irrigation increases crop yields and food security. Water and energy are essential basic services to support human development.

Without lights and motors, productivity is limited, and families have few opportunities to improve the quality of their lives or future prospects. Women are fully occupied by their daily survival tasks and have little time or means to take on additional income-earning activities that could move them and their children out of poverty, or to work on other sorts of community development projects. Lack of opportunities in rural areas due to energy poverty is a major factor driving increased migration to cities in developing countries. Without electricity, there are few jobs in rural areas other than farming, and workers tend to move to the cities in search of employment. Often the women are left behind in the villages, struggling to provide for themselves and their children. The absence of energy services is a key barrier to development and growth opportunities in rural areas, and impacts women in distinct ways.

### **National policies affect women's access to energy for development**

Energy policies relating to fuel choices, electricity-generating capacity, and energy delivery systems have impacts on development that are not generally analysed in all of their social and economic dimensions. Although most policymakers view energy policies as gender-neutral, men and women are affected differently by energy policies wherever their work roles differ, as is the case in many developing countries. Attention to these differing interests is needed in order to achieve effective and equitable distribution of energy services.

The limited reach of rural electrification in developing countries poses special problems for women due to their traditional roles. Because of dispersed and relatively low overall energy demand levels in rural areas, plus inadequate capital financing for widespread grid extension programmes, many areas are unlikely to be connected to central power grids in the foreseeable future. Greater emphasis on rural energy needs would be particularly beneficial to women in these areas. Decentralised and off-grid electricity generation is extremely important to support rural development and meet the illumination and mechanisation needs of women.

Depletion of traditional fuel sources and limitations on grid extension have prompted calls for new energy systems that support sustainable development. Sustainable energy approaches emphasise efficiency, cleaner fuels, and adoption of alternative energy technologies that use solar, wind, micro hydro and modern biomass resources. Since women currently play a key role as collectors and managers of traditional fuels in developing countries, a transition to alternative fuels and technologies will

require the active engagement of women in their roles as energy providers and consumers. Yet, in many countries, women's needs are not adequately considered in assessing energy options, and women have been effectively excluded from participation in energy policy formulation and decision-making processes due to their low political and economic status or the lack of national traditions for stakeholder-driven policy formation processes.

Rural households and communities often have very limited information on alternative energy technologies or how to use them. This presents a barrier to introduction of, and demand for, new energy options. People need more information about technology options such as improved cook-stoves and renewable energy systems, and about modern fuels like liquid petroleum gases (LPG) and biomass-derived fuels. If this information and the technologies themselves were more widely available and accessible, women and men would be better able to make their own choices out of a range of possible options.

Where energy options currently are available, poorer households often pay higher per unit costs for energy services because they buy fuel in smaller amounts or have less efficient equipment. They may use kerosene or candles for lighting and dry cell batteries to run small appliances. These energy inputs are paid for in cash and are very costly in terms of the scale and quality of energy services delivered. Energy-efficient alternatives generally have higher up-front costs, even though the energy services provided are less expensive on a life-cycle cost basis. Innovative financing mechanisms for new equipment would allow households and small businesses to pay over time, thereby increasing their access to better but more capital-intensive technologies.

Worldwide, governments are moving away from maintaining a publicly controlled energy sector towards increased liberalisation and competition. It is unlikely, however, that the private sector will be able to meet the energy needs of rural areas without government support. Although a more market-oriented approach to the energy sector can provide important benefits, liberalisation can have negative effects on the poorest people, who cannot afford prices set by competitive markets. A crucial role for governments is to establish effective policies and enabling frameworks to promote expanded availability of energy services and the protection of poor and marginalised groups.

### **Addressing women's concerns in energy policies and planning**

What then are pro-women energy policies? For the most part they include the basic energy policies required to support rural development, but with an increased emphasis on energy services that are most used or needed by women. A starting point is to identify those energy services of primary importance to women and to remove barriers and provide incentives in support of those services. To do this, the profile of demand for energy services by

women must be understood and documented. The pattern of economic activities undertaken by women must also be assessed and policy emphasis given to support those activities for which energy is a major input. Critical pro-women energy policies include:

**1. Policies to support electricity for illumination.** Clearly both men and women use illumination services, but lighting tends to have greater significance for women. Global evidence has shown that the availability of illumination in the home increases female educational attainment and literacy and extends the working day of women to include income-generating opportunities related to cottage industry activities. Lighting in public places also increases the safety of women and communities and allows women greater access to public gatherings. Since illumination does not require a great deal of electrical power, better lighting can be provided through low-cost lighting options using battery power, small home systems or decentralised village power systems. Policies that promote the availability of lighting, therefore, represent a relatively inexpensive means of providing benefits that are particularly important for women. Kerosene pricing policies will also affect illumination opportunities for women.

**2. Policies to support availability of mechanical power and electricity for energy-using productive devices.** Higher levels of electrical power are required for running mechanical equipment than for lighting alone. When electricity is used to support activities that generate revenue streams, women and their families can earn more income, and can therefore afford to pay for both equipment and the electricity required to use it. Government policies to support decentralised rural electricity systems are essential for expanding economic activities in rural areas, where women's opportunities are most limited. Whether derived from conventional energy sources (diesel power) or decentralised village-based systems using renewable energy sources such as photovoltaics and modernised biomass, policies to support electrical power in rural areas are essential. These have a direct positive impact on women when mechanical power for grinding grain, pumping water and supporting nonfarm productive employment becomes available.

**3. Policies to support the availability of cleaner fuels and enhanced markets to address the thermal energy needs of women related to cooking, heating and food processing.** Affordable access to modern fuels, such as liquefied petroleum gas (LPG), can reduce women's dependence on fuel wood and traditional biomass. In many areas LPG is not available, however, and policies are needed to promote distribution systems and smaller canister sizes. Lack of access to cleaner fuels and the

high costs of related stove technologies have proven to be barriers preventing women from moving up the energy ladder away from traditional fuels. When women are involved in fuel-intensive economic activities that use thermal energy inputs, such as beer brewing, food processing and kiln-based industries, their profits can be significantly increased by the use of cleaner fuels and more efficient stoves. Pro-women policies to reduce the energy burden related to heating and cooking needs should specifically address these issues.

**4. Policies to support technology development and dissemination in sectors and applications where women are most active.** Due to the existing social division of labour, men and women are involved in different economic and subsistence activities. Because of gender-based energy use patterns, efforts to improve technologies such as stoves, kilns, grinders, presses, and pumps will have a direct impact on the condition of women. This has implications for policies regarding the use of public research and development funds, the focus of technical training programmes, and the design of technology needs assessment activities. Policies are needed that support improved technologies and energy-efficient equipment for use by women, as well as technology dissemination and education activities that expand the economic opportunities of women.

**5. Policies to support energy service financing and credit facilities to promote energy-using business opportunities.** For women to have increased access to illumination, mechanisation and improved fuels, credit mechanisms are essential and must be accessible by women to enable them to distribute the financial costs of improved energy services over longer time frames. Credit is important for both poor women and men, but because women have less access to commercial credit than men do, in order to meet women's energy needs, financial institutions and credit mechanisms must specifically target, or be available to, women and women's organizations. Policies to support credit opportunities for women must address the collateral or revenue stream requirements of commercial credit organizations, as well as the legal status of women and other factors that may exclude women as borrowers. Credit facilities are essential to expand the business opportunities of women in energy-using industries and to enhance women's access to cleaner and more efficient technologies.

**6. Policies to provide improved information on markets and consumer demand for energy products to assist women in becoming energy entrepreneurs.** Lack of knowledge about available energy technologies, the price of traded products, urban consumption patterns,

and nonfarm economic activities pose barriers to women seeking to undertake or expand their engagement in value-adding, energy-related economic activities. Policies, programmes and institutions that address these information barriers can support increased economic participation and empowerment of women through energy activities.

Non-energy sector policies relating to women may also impact energy outcomes. Unless issues related to the legal status and political participation of women are addressed, pro-women energy policies cannot be fully effective. Important policy issues to support women and energy objectives include:

**7. Policies to support gender equity in all economic sectors and the participation of women and women's groups in national and local policy formation processes.**

The need for such policies is not unique to the energy sector, but gender sensitivity is certainly important in improving energy policies. Enhanced consultation with women and women's groups, and the inclusion of gender considerations in a broad range of sectoral policies, can improve the effectiveness of energy programmes as well as the ability to reach overall development goals. Policies to support the advancement of women and girls can be particularly important in reinforcing sustainable energy policies that target women. Such efforts are needed at the local, regional and national levels in both public sector activities and the development of civil society participation in policymaking.

**8. Policies to remove barriers to the full participation of women in economic, social and political life.** When barriers exist that affect women's legal status, land-tenure opportunities, property rights, child custody or access to public services and facilities, the ability of women to take advantage of opportunities related to expanded energy services will be limited. In addition to policies to actively support gender equity, concerted efforts are needed in many countries to remove barriers, legal or otherwise, to the full participation of women in the development process.

Planning processes that involve widespread participation and consultation among energy producers, distributors and consumers can help all parties to understand and address current constraints affecting energy sector programmes, including constraints related to the status of women. Since women are often the primary users of fuels and energy-consuming appliances, it makes sense that they should be consulted concerning their assessments of energy priorities and problems, as well as approaches to their solutions. There are often cultural and practical barriers, however, that limit women's ability to participate in consultative processes when they do occur, so special efforts generally need to be made to fully include their concerns and perspectives.

Women already have valuable knowledge about local conditions and resources. In fact, for centuries women have managed forests and used forest products for fuel, food and fodder. Their knowledge of ecosystem management systems can provide significant contributions to energy planning processes. Additional education of women and women's organizations about energy policy issues can increase their ability to contribute to energy solutions, including the adoption of new, cleaner fuels and equipment. Women who are educated about energy alternatives can also play important roles as educators and activists concerning energy efficiency, renewable energy sources and better uses of traditional fuels. Throughout the world, there are untapped opportunities for women to act as agents for sustainable energy solutions.

Decentralised approaches to energy supply can open up more opportunities for rural women engaged in income-generating activities. Overall, however, there has been little planning or policy focus on energy for productive uses by women. The challenge is to encourage women and their organizations to become more effective entrepreneurs, including energy entrepreneurs. If women were encouraged to engage in entrepreneurial activities related to energy services and technology distribution, they could play an important role in disseminating alternative approaches that address rural energy needs. Since they are familiar with the specific hardships women experience due to lack of energy services, women energy entrepreneurs are in a good position to reach other women and explain the characteristics and advantages of various energy alternatives.

Because access to modern energy services is so critical to the achievement of overall sustainable development goals, focusing more attention on women and energy linkages, increasing women's contribution to new energy approaches and ensuring that women benefit from these approaches will improve the overall effectiveness of national development objectives and policies, as well as specific energy plans and programmes.

## **Preparation of the Energy and Women Project case studies**

An important element of the UNDP Energy and Women project was to analyse energy projects in terms of their involvement with and impacts on women and sustainable development, emphasising energy for productive uses and income generation, and to present that information in the form of case studies. The projects selected have achieved varying levels of success, and some are still in the early stages of implementation, but they all contain ideas about how to strengthen linkages between energy project activities and women's development needs. To provide a basis for policy design, information is needed on what activities and what enabling conditions impact the success of women in economic activities and in overcoming poverty. Case studies help identify what critical development bottlenecks need to be addressed in policy formulation and

suggest areas needing direct policy support in order to expand opportunities open to women.

It is our hope that this information will be useful to UNDP country office staff throughout the world, as well as officials in national governments who deal with energy policies and women's issues, members of non-governmental organizations and grassroots women's groups, funding organizations and others involved with planning and implementation of energy projects and policies.

The objective of compiling this volume was not to select "best practices," but to look at projects addressing women and energy issues with a view to extracting lessons learned about success criteria for good project design, implementation and sustainability. The enabling conditions at the local and national level that facilitate or undermine the achievement of sustainable energy objectives were also considered. The selection of projects for analysis and evaluation was based in large part on national consultations and regional workshops conducted in Africa, but in order to offer a broader perspective, relevant cases from other regions were also considered.

One important function of a publication such as this is to document lessons learned from actual activities and programmes linking energy and women. Analysis of what approaches work best and which issues pose the greatest obstacles for reaching women and rural communities with modern energy services, is a critical element needed to inform policy analysis and national planning efforts. As the case studies will show, there are numerous important policy, technical, financial and organizational elements to consider when trying to design energy services and systems to meet the needs of women and communities.

### UNDP Regional Workshop for Southern Africa

The Energy and Women project began by sponsoring national consultations in southern Africa in May of 1999. National experts, government officials and leaders of community organizations met in different countries to consider how national energy policies impacted on, and could be improved in relation to, women's development needs and priorities. Country reports were prepared by representatives from Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe, and presented at a regional workshop held in Pretoria, South Africa on June 21 and 22, 1999.

The regional workshop provided an opportunity for participants to share information about the constraints affecting women, and to discuss ways for women to gain better access to energy for domestic and productive purposes. They agreed that more attention needs to be paid to women's energy needs, especially in rural areas, and that women themselves should be more involved in solving those problems. They also expressed frustrations about prior projects dealing with improved cook

stoves, briquette making, wood-lot management, solar electric panels, and solar cookers or food dryers. Frequent complaints were that these energy projects were donor-driven, did not involve consultations with the expected users, and ended when the donor funding was finished. In the experience of workshop participants, there was often insufficient follow-up or analysis of projects, and inadequate attention was paid to elements that would ensure project continuity. There was agreement that project level support would not reach the objectives of meeting women's energy needs unless there were widespread national programmes and supporting policies to extend the scope and impact of energy efforts. The workshop concluded that new approaches are needed for designing and implementing energy projects involving women.

### Regional Workshop on Women and Sustainable Energy in Africa

Many of the themes raised at the South Africa workshop were echoed at a March 2000 regional workshop in Nairobi, Kenya, organised by members of ENERGIA—an international network working on issues relating to gender and sustainable energy—in collaboration with the Environmental Liaison Centre International, UNIFEM and Winrock International.

Participants at the workshop were drawn from Ethiopia, Ghana, Kenya, Lesotho, Mali, Mozambique, Namibia, Nigeria, Senegal, South Africa, Swaziland, Tanzania, The Netherlands, Uganda, Zambia and Zimbabwe, including some who had attended the UNDP workshop in South Africa. Those attending included representatives from NGOs, government ministries, international organizations and universities, as well as experts with direct experience with women and energy issues. Most of the countries represented had conducted prior national consultations, sponsored either by ENERGIA, UNIFEM or UNDP.

One of the common problems identified at the regional meeting was the fact that most national energy policies support urban and industrial sectors, and few address household and rural needs. Since rural areas have limited access to basic infrastructure, many rural women lack access to efficient energy services or even information about possible options. Participants emphasized that lack of education and training, as well as societal constraints, limit women's participation in energy decision-making processes, and that planners and policymakers have generally not recognised women's distinct energy needs. Many expressed the need for sharing information among countries in the region, and for documenting lessons from past projects to avoid mistakes and to build on promising approaches at the programme and policy formulation levels.

The discussions, conclusions and recommendations of both workshops, as well as the background materials presented, were very important in informing the scope and design of this publication.

## Key issues identified for consideration in the case studies

The Energy and Women project convened a special group of technical advisors to assist in the selection and preparation of the case studies. Development of this publication was guided by inputs from that expert group, the recommendations and information received from participants in the national consultations and regional workshops, and the analysis and field experiences of UNDP. A number of key factors for successful project design were identified, and authors were asked to consider these factors in analysing particular projects. While many of these factors are desirable for sustainable development projects in general, these specific topics were seen as particularly important for projects dealing with women and energy linkages. These same factors point to important areas for expanded consideration and policy analysis in the framing of energy programmes and national policies to extend energy services to rural areas to meet the economic and social development needs of women.

**Benefits to women.** The national consultations and regional workshops in Africa indicated that women were interested in reductions in the time and effort required for gathering fuel and performing household tasks, improvements in lighting and indoor air quality, and enhanced income opportunities. Prior energy projects specifically targeted towards women dealt mostly with household energy use. These case studies put more emphasis on income production, skills training, and capacity building, which allow women to play a greater role outside of the domestic sphere, and on enhanced individual, family and community opportunities for growth and development.

**Income generation.** Because women in developing countries generally cannot afford to pay for new equipment unless it somehow can be used to generate income, most of the cases were selected to include an income-generating component. In some cases, women have been able to earn money through activities that provide fuel or energy services that they can use themselves and also sell to others, becoming small-scale energy entrepreneurs. In other cases, women use more efficient equipment or energy sources to increase profits from their traditional income-producing activities, such as food production and processing.

**Environmental protection.** Although international organizations and donors tend to emphasise the need for environmentally friendly energy systems, participants in the national and regional consultations pointed out that energy projects designed to meet goals related to reducing deforestation or carbon dioxide emissions tend not to be successful unless the people involved feel that their lives and local conditions are directly improved by the project. The case studies chosen primarily deal with projects using decentralised energy equipment and evaluate the interconnections between environmental goals and local development needs.

**Access to credit.** Affordability and financial credit were identified as essential elements of projects aimed at providing

poor users with greater choices among fuels and energy technologies. Access to credit can help users acquire new technologies, but women are often not eligible for credit from banks because of collateral requirements, and amounts available from microcredit institutions are not sufficient for acquiring energy equipment. The Energy and Women project looked for cases that applied innovative financing strategies to address some of these concerns.

**Financial and practical viability.** The case studies examine factors likely to allow projects to continue beyond the pilot phase and expand in scope. Participants in the regional workshops observed that projects are not sustainable if they rely primarily on donor financing, especially if funding is offered only on a short-term basis. Long-term financing and marketing strategies are needed to make projects self-sustaining and financially viable. Since women cannot afford to pay for energy services if they have no sustainable income base, workshop participants emphasised the need for strategic assistance with skills training and financial management to help women entrepreneurs improve or expand their businesses, and observed that the best entry point for this support is through organised women's groups that come together for collective productive purposes.

**Stakeholder participation.** One of the fundamental assumptions of the Energy and Women project was that greater involvement of women users in the design and implementation of energy programmes could produce more relevant and effective policies and outcomes with greater benefits to women, their families and their communities. The national consultations in Africa revealed that in most countries national planners have limited connections with women in local communities, so that even when community women have relevant experience and knowledge and could make significant contributions to development of energy projects, they have very few opportunities to provide input. The case studies were expected to provide examples of ways to actually promote greater participation by women in the design and implementation of energy projects, planning and policies.

## Application of lessons learned from the case studies

The Energy and Women project aims to move beyond information gathering and analysis. The long-term objective is to integrate successful gender-sensitive approaches into mainstream national energy policies, and into country and local-level project design processes.

A number of conclusions are drawn in the "Overview" chapter that follows concerning policy considerations arising from the case studies. They include the need for credit mechanisms that reach women, energy services that meet women's unique needs, energy approaches that generate income to both empower women and sustain increased energy activities, and

the critical importance of capacity building, business training and technology information. The need to establish mechanisms to capture the experiences and perspectives of women and organised women's groups in the national policy-setting and review process is also discussed.

New approaches to the provision of energy services to meet family and community needs in developing countries can provide a powerful means of moving forwards towards overall national economic, social and environmental goals. For such

approaches to be sustainable, however, experience shows that more attention is needed to women and energy linkages related to energy production and distribution, and utilisation of energy services.

UNDP hopes that publication of this book of case studies will make a significant contribution towards application of useful models and concepts for sustainable energy policies and programmes that provide benefits to women in developing countries, as well as to their families and communities.





## LESSONS FROM THE FIELD

# OVERVIEW

SALOME MISANA

**E**nergy is inextricably linked to all major development issues. Indeed, the ready availability and quality of affordable energy expands people's possibilities and capabilities, which is one way of defining human development. The links between energy and development have been recognised at major international forums throughout the 1990s. They have been clearly articulated in a number of publications, particularly *Energy After Rio: Prospects and Challenges* (UNDP, 1997) and the recent *World Energy Assessment: Energy and the Challenge of Sustainability* (UNDP et al., 2000). These publications also analyse the specific ways in which the use of traditional fuels in developing countries affects the lives of women and children, showing that they are disproportionately burdened, primarily because of health impacts and lost opportunities.

This book of case studies starts from the premise that satisfying people's needs for modern forms of energy can be an effective entry point for improving standards of living and health, and creating new job and business opportunities, especially for women. It is important to recognise that women and men have different needs, interests, roles and differing degrees of access to energy resources and services. This is further differentiated among the rich and the poor, the rural and the urban populations. Energy policies, and indeed all development policies, must address these distinctions in order to be effective.

By tradition, women in Africa and most other developing areas are responsible for activities such as cooking and food processing that have high energy demands. Consequently, they shoulder much of the household energy burden, using their own labour for domestic tasks and for collecting needed fuel. Because of the central caregiving role of women, improving women's access to new sources of energy can have a ripple effect, enhancing the lives of their families and communities as well. As these case studies clearly demonstrate, however, providing energy in useful, convenient and affordable forms is not a simple matter, especially in rural areas where extension of the electricity grid is not economical.

Meeting the energy needs of women calls for a shift in focus to the demand side of the energy system, to the end users of energy and energy services. The case studies presented here describe a number of decentralised solutions for providing access to energy services. Because the initial needs of rural households are relatively modest, they can benefit greatly from small-scale off-grid solutions.

**Although the projects considered here offer promising approaches, most of them nevertheless encountered significant social, economic, technical and political challenges. Our hope is that the lessons that can be drawn from them will be useful for others that are helping communities, and especially poor and rural women, to take advantage of more efficient, safe and convenient forms of energy.**

**This chapter provides a synthesis of the key lessons learned from the projects included in this collection of case studies. The majority deal with African countries, where issues of access to modern forms of energy are most intractable, in large part due to lack of social, financial and physical infrastructure. Case studies from Nepal and Bangladesh are also included, however, since energy scarcity affects people in all regions, and these examples present interesting approaches for providing energy services in remote locations. The case studies are briefly summarised below.**

#### **BANGLADESH: BATTERY-OPERATED LAMPS PRODUCED BY RURAL WOMEN**

In an area of remote islands beyond the reach of the grid, electric lighting to replace kerosene lanterns was identified as a high priority. Local women have learned to manufacture battery-operated lamps in a small factory and market them for household and business uses.

#### **GHANA: IMPROVING RURAL WOMEN'S ENTERPRISES**

Consultations with community women revealed that they needed energy-efficient equipment to improve working conditions, increase profits and reduce time and effort required for traditional post-harvest agricultural processing work. Initial projects involve the use of an improved press for shea butter production and a more efficient, less-polluting fish smoker.

#### **KENYA: UPESI RURAL STOVES**

In areas of wood scarcity, rural women participated in testing and evaluating stoves designed to use less firewood and also produce less smoke. After training, they were able to produce, install and market the stoves, and adapt them further to meet customer demands.

#### **MALAWI: NDIRANDE NKHUNI BIOMASS BRIQUETTES**

To address problems of deforestation and fuel shortages, women in a densely populated low-income area were trained to produce and market briquettes made from sawdust and waste paper. Location of the project near a commercial city proved to be important because of high demand for fuel to meet household and small business needs, and proximity to waste material suppliers.

#### **MALI: MULTIFUNCTIONAL PLATFORM FOR VILLAGE POWER**

A diesel engine mounted on a platform provides off-grid energy to rural villages for a variety of uses, including grinding, processing agricultural products, pumping water, charging batteries and running lights. Women's groups have been trained to operate and maintain the equipment and sell energy services to local customers.

#### **NEPAL: MICRO HYDRO FOR MOUNTAIN VILLAGES**

In hilly areas of Nepal, micro hydro systems provide decentralised power for remote villages. An innovative process of community mobilisation and skills training ensures that men and women alike are able to use the energy supply for productive work and social benefits.

#### **SOUTH AFRICA: IMPACT OF WOMEN'S ENERGY GROUP ON NATIONAL POLICY**

As the new democratic government in South Africa moved to establish more equitable energy priorities, a group of women energy experts and activists pushed for greater attention to women's needs. Despite frustrations, they were able to call national attention to women's energy concerns, and the current energy minister has introduced policies to address past inequities based on race and gender.

#### **UGANDA: SOLAR SYSTEMS FOR RURAL ELECTRIFICATION**

In areas without grid-based electricity, commercially marketed solar photovoltaic systems supply much-needed electricity for homes, businesses, schools and clinics. An attempt to provide loans through local banks to cover initial purchase costs showed the need for more flexible and appropriate credit arrangements.

**E**nergy issues are complex and linked to the policies and influences of multiple economic sectors and national conditions. This complexity is even greater when gender-disaggregated considerations related to the distinct economic and social roles of men and women and their diverse energy needs are taken into account. These interlinkages and differentiations must be reflected in energy policy, programme, and project planning processes.

Even in well-thought-out efforts to provide energy services, unforeseen problems arise or subtle social dynamics (quite often having to do with gender-based issues) suddenly become obvious. That is why successful programmes generally start with small-scale pilot initiatives and projects that encourage learning through experience and have flexibility built into their design. While there are no simple and easy solutions, the following lessons drawn from the case studies presented in this volume provide a kind of checklist of design features that can often spell the difference between failure and success.

While the unit of analysis considered in the majority of the case studies is at the programme and project level, this collection of experiences provides the basis for a number of important conclusions. These can provide essential elements for sustainable energy policy formation to meet the needs of women and rural communities. The lessons learned are presented in nine broad categories.

### **1. A favourable enabling policy environment and the support and coordination of local and national government institutions are critical to the successful introduction of new approaches to delivery of energy services.**

Although many governments have included the idea of promoting decentralised and renewable energy technologies in their national energy policies, the major emphasis is still on petroleum fuels and conventional power plants. Energy policies tend to be focused on the supply side, with little attention to the energy demand characteristics of women and rural communities. The absence of specific policies to promote alternatives for rural energy creates barriers for innovative approaches to the delivery of energy services. When appropriate enabling policies are in place, efforts to address the unique needs of women and rural communities will be more successful.

In Nepal there was a clear national policy framework to support decentralised micro hydro systems to meet rural energy needs. Government subsidies for micro hydro power were essential for the financial viability of the project. Supportive policies were also present in relation to financing and credit availability, an essential element to support decentralised systems. Government support for the provision of lines of credit through banks and lending institutions was a significant factor in the project's success. Financing was supplied not only by the Agricultural Development Bank of Nepal, but also by local and regional institutions. In fact, engagement of all different levels of government was central to the entire Nepal experience,

which involved village and district-level development committees, as well as national ministries responsible for water and energy, forestry, industry and electricity and planning. In addition, national policies facilitated development of private sector hydropower companies by establishing legal and institutional provisions for equipment standardisation, subsidies, and partnerships with government agencies. This case study illustrates the importance of linkages and cohesion in the policy approaches of different levels of government, as well as the importance of addressing linkages across sectors.

The alignment of local and national policy environment was also demonstrated in the Malawi project, which enlisted local community development committees as partners and engaged them in activities to introduce briquette-making technology and provide training to women's groups. This was supported in part by the national policy that favoured decentralisation and thereby supported the establishment of institutions at the district and community level to promote stakeholder participation. The Malawi project also benefited from the introduction of favourable government policies on forestry management, energy and the environment. These policies, established after the 1994 elections, reflected an increased political commitment to support women's rights, local development and participatory democracy.

In Mali, the government does not have a clear policy for bringing decentralised power to rural areas, but has recognised the potential for using the multifunctional platform as an engine for development and poverty reduction in rural communities. The project's regional support and advisory units are supported by a national-level government coordinator who provides management oversight and monitors integration of the project with the activities of national agencies and donor groups. In this case there are local-to-national linkages reflected in project management and coordination arrangements.

The need for cross-sectoral coordination was particularly highlighted in the South Africa case study. There, an analysis of government energy policies not only revealed the need for gender sensitivity, but also showed the importance of integrating energy with other development sectors. Such an integrated approach would ensure that women could own land, obtain rights to crops, and have greater access to financial resources.

Uganda's national gender policy was a key factor in the government's efforts to make the solar photovoltaic project more gender-sensitive. Since the project worked with private sector companies and found that very few women were involved in solar businesses, the staff made a special effort to involve women as technicians and entrepreneurs. The project also worked with financial institutions in an attempt to address discrimination against women in terms of access to credit. The gender policy is coordinated with Uganda's rural electrification strategy, which is aimed at reducing inequities in access to electricity and therefore supports decentralised electricity development and accessible financing mechanisms.

Without the support and coordination of different levels of government institutions, it is very difficult to move from

the pilot project phase to more broadly based energy delivery programmes, especially in rural areas. Policies will be most effective, however, if they address the specific concerns of women regarding access to mechanised pumping and production equipment, improved cooking and heating technologies, and electricity for lights and appliances. Critical areas for national policy support in favour of sustainable energy approaches benefiting women include decentralisation, support for credit institutions, differentiated energy pricing to target poor and marginal groups, property and legal rights for women, and support for local community groups, including women's organisations.

**2. Successful approaches must address actual conditions. Policies, programmes and projects should start from an assessment of people's needs rather than a plan to promote a particular technology. The needs of different rural communities vary widely, and finding appropriate technologies and effective implementation strategies can be very site-specific.**

Policies and programmes need to avoid “one size fits all” approaches. Approaches that favour demand-side considerations rather than supply-side energy targets are more likely to reflect the actual needs of women and poor households. Energy needs should be considered within the overall context of community life, and energy policies and projects should be integrated in a holistic way with other improvement efforts relating to health, education, agriculture and job creation. A well-formulated needs assessment undertaken prior to programme design will ensure that the approach is grounded in the specific reality of the people involved, not driven by a donor's good but possibly misguided intentions regarding the need for a particular energy technology. Similarly, national policy design must distinguish between the energy needs of rural and urban groups, between the rich and the poor, and most importantly, between women and men.

In the Ghana project, the women knew exactly what they needed: technologies to make post-harvest processing easier and more effective. By helping them with this, the project drew support and enthusiasm. In this project, moving up the energy ladder included introducing liquefied petroleum gas (LPG) into the fish-smoking process. In Kenya, sales of improved stoves were least successful where women did not feel they were really necessary—in areas where wood scarcity was not so critical. In Uganda, households were offered solar panels, but sales were limited by the fact that the panels were difficult to afford and were not directly related to people's pressing needs for labour-saving equipment. The Bangladesh project was successful because it began from a needs assessment and then identified an appropriate technology. A local survey showed that lighting was a priority in the area, and the women involved in the project then proceeded to create a marketing plan based on people's willingness to pay for battery-operated lamps.

What is an appropriate technology in one place may not work in another place due to even slightly differing conditions, such as distances from markets, availability of resources, or varied traditions. That is why an initial assessment of needs, resources, capabilities and preferences is so important. Innovative methods of quickly obtaining indigenous knowledge and input—often called rapid rural appraisal techniques—can be valuable in gathering relevant information, including cultural sensitivities and gender-related issues. A thorough needs assessment may elicit different views from men and women that can then be addressed in the programme strategy.

Although it is reasonable to expect approaches to vary from one country to another, even within a relatively small region, different villages will respond differently to similar project inputs. In Mali, village-specific feasibility studies showed that local customs and practices affected the timing and amount of demand for post-harvest grinding and milling. In Bangladesh, the farther away a village was from a battery-charging station, the less likely people were to buy battery-operated lamps. In Malawi, the financial viability of briquette production was determined by proximity to an urban area where there was significant demand for fuel alternatives and where low-cost wood and paper waste products were readily available. In rural areas where wood could still be obtained for free, people had less income (and less motivation) for purchasing briquettes.

Starting with a needs assessment will ensure that the project design is appropriate and responsive to the distinct concerns of the people—men and women—in the communities involved. At the policy level, an accurate picture of the energy demand characteristics of targeted groups is essential for designing appropriate and effective energy policies. Just as different approaches are needed at the project level, distinct policy approaches are needed to address different demand groups. These case studies reflect some of the demand characteristics of women as energy consumers, including needs for lighting, cooking and heating, food and agricultural processing, water pumping and home businesses.

**3. Environmental issues must be addressed in the context of overcoming poverty and helping people meet basic needs. The most successful programme and policy approaches to sustainable energy are those that deliver improved services and expand opportunities while also protecting the environment.**

This lesson is very closely related to the point above. People struggling for survival are unlikely to adopt more environmentally friendly technologies unless it can be clearly shown how they can improve family health and well-being. Although global environmental issues are high on the agenda of many donors, due to intergovernmental processes that have made them priorities for national and international action, these objectives are not likely to be met unless they can be clearly linked to local needs. Fortunately, most sound energy strategies, which

have multiple benefits and energy technologies that are safer and more efficient at the local level, will also tend to have positive global impacts.

Sustainable energy approaches that have “win-win” economic and environmental benefits include: (1) the promotion of end-use energy efficiency to get more benefits out of existing resources and fuels; (2) the promotion of renewable energy systems, especially for use in decentralised systems to provide services in rural areas that are uneconomic for grid extension; and (3) the introduction of cleaner, modern technologies and energy carriers where energy services are scarce or absent.

The Nepal project used decentralised micro hydro energy systems to simultaneously address environmental issues, social progress and economic growth. The availability of hydro resources made it possible to develop modern energy production facilities without the environmental degradation associated with conventional fossil fuel systems. The Mali multifunctional platform project also provided decentralised power to meet economic and social needs, in this case using a diesel engine. Though not a renewable technology, the engine effectively met the energy needs of the local people, and the tradeoffs in terms of work and energy efficiency compared to using human or biomass energy made it worth while, even from an environmental standpoint. Where oil from the local jatropha plant is used as fuel for the engine, the project can be even more environmentally sustainable.

Approaches such as those in Kenya and Malawi were driven initially by concerns about deforestation that, although pressing from a national or international perspective, did not necessarily reflect the priorities of the targeted beneficiaries. In Kenya, users of improved stoves saw the benefits primarily in terms of improved health and reduced exposure of family members to smoke from cooking fires. In Malawi, buyers of biomass briquettes were less concerned with the environmental impacts of deforestation than with the availability of a reliable fuel supply.

These case studies indicate that at the local level, environmental priorities tend to be those with a direct link to health and poverty issues. Energy policies and programmes designed to promote environmental protection and energy-related natural resources conservation must also provide expanded economic opportunities or improved health and social conditions. This is essential if energy activities are to be successful in support of local sustainable development.

**4. The greater the income-generating effects of sustainable energy efforts targeting women, the easier it is to mobilise support. National energy policies that support energy services that increase economic opportunities for women can promote multiple development objectives.**

The most successful projects were those that stimulated income directly through engaging local people in the manufacturing and selling of energy technologies, as well as *indirectly*, through gains in productivity or expanded economic activity

resulting from new energy inputs. National and local energy policies that seek to expand the availability of energy services for value-added productive activities that are typically undertaken by women not only support economic growth, the well-being of families and the advancement of women, but are more sustainable over time.

When local people can actually make money from manufacturing or selling new energy technologies and services, an entrepreneurial dynamic is unleashed. The Bangladesh and Mali case studies clearly show that new possibilities for earning income can generate real enthusiasm. Earning money, in turn, can immediately improve women’s status in their communities and households. The women in the Bangladesh project earned money by manufacturing lamps, and in the process they also overcame social barriers and learned new business and management skills. While hundreds of households were able to enjoy improved and affordable lighting as a result of the project, a smaller core group benefited even more directly and substantially. A core group, with a high stake in the project results, can be a powerful impetus for sustained momentum and provide an excellent example for other groups to replicate based on the drive for expanded economic opportunities.

In Mali, women operated the diesel generators as formal businesses and became energy entrepreneurs, selling energy services to both men and women and thereby increasing economic activity in the community as a whole. Although the project is still in its early stages, the ability of women to both earn money and control equipment in a country where they have not previously had access to capital or assets, has begun to transform social and gender dynamics.

In the Kenya and Malawi projects, women also were able to realise income directly from the sale of energy-related products—the improved stoves and biomass briquettes. The success of the Uganda project, on the other hand, was limited by the fact that women were not involved in the marketing and distribution of the solar systems and so were not able gain benefits as energy suppliers. Women as energy entrepreneurs must be involved in the production, marketing and sales of energy products to gain the full economic and social benefits of this approach.

The Nepal micro hydro efforts focused on the use of energy systems as a means of promoting local entrepreneurial activity. As part of the project’s capacity building, each household received training for income-generating activities, which led to the opening of new businesses such as bakeries, saw mills and agricultural processing operations that utilised the newly available electrical power. In Malawi, the availability of an affordable fuel supply in the form of biomass briquettes also supported income-generating activities, particularly food-vending businesses that required reliable energy sources. In these examples, women were not only energy entrepreneurs, but the beneficiaries of improved energy services which expanded their economic and productive options. This contributed to improving their social status due to economic empowerment.

Since lack of energy is so closely related to poverty and limited economic growth, availability of new energy services is a key factor in community development. Projects that involve manufacturing and distributing decentralised energy-related technologies can provide new income streams for both producers and users of the equipment whether they are men or women.

Encouraging women to become energy entrepreneurs, rather than merely the beneficiaries of expanded energy services, has multiple development benefits. These include the advancement of women, expansion of economic activities, diversification of productive options, and the creation of new sources of wealth and income to support family investments in education and health. Energy policies that support the development of entrepreneurial energy activities and business approaches that involve and benefit women, can achieve positive impacts beyond the energy sector.

**5. Energy policies that identify and enhance market opportunities in rural areas are essential for economic and social development and can be an important engine for growth. Effective marketing strategies are crucial for realising commercial opportunities and establishing long-term financial viability of energy-related projects.**

Rural villages with subsistence economies may simply not have the financial base to support investments in desirable energy technologies. Such investments become more attractive when the technologies provide revenue or expanded economic opportunities for the community. Governments play a critical role in enabling market conditions both by removing barriers to expanded energy activities (pricing, ownership, licensing or taxation bottlenecks) as well as through promoting increased access to energy technologies, consumer information and urban markets.

The revenue possibilities of energy activities targeting productive uses can be multiplied if marketing efforts allow them to reach a wider customer base. Marketing is a crucial part of most sound business strategies, and business-like models should be adapted wherever possible in project design, as a way to make them viable over the long term. In Bangladesh, for example, a detailed marketing plan analysed locations, customer characteristics, target markets, competition and electricity demand, as well as goals and budget implications for the production of battery-operated lamps.

The marketability of the products—in terms of quality, affordability and competing alternatives—should be carefully evaluated during the project design phase. If this had been done in the initial UNDP Malawi biomass briquette project, it might have been more effective. That experience did, however, contribute to better outcomes from the subsequent Ndirande Nkhuni briquette initiative in Malawi, which took advantage of a more populous location near a city where the potential demand and ability to pay were greater. The second project also did a better job of marketing the briquettes, through demonstrations

and brochures, thereby increasing its potential customer base.

In Mali, village-specific feasibility studies are used to determine whether or not there is enough demand and ability to pay within a community to support a multifunctional platform installation. If there is not enough market demand to cover operating costs, the project is not initiated in that location. Demand is calculated based on actual ability to pay for the services, not merely on the fact that such energy services are needed or would be beneficial.

In Ghana, future prospects for village women will be greatly enhanced if the project is successful in circumventing “middlemen” in the marketing chain so that women can realise substantially higher prices for their shea butter products. That project is also working to acquire a fish smoker that meets international standards, which would represent an immediately leap in commercial potential, and would greatly improve the profitability of local fish processing.

These case studies suggest that when local market conditions are carefully assessed and commercial opportunities taken into account, energy programmes are more likely to continue and expand in scope. They also suggest that these factors should be important considerations in informing energy policy formation targeting the expansion of energy for productive purposes. While the economic base of poor rural communities may be insufficient to expand energy services based on local resources, the ability to generate revenue through extending the consumer base for energy services and selling energy “embodied” products to urban markets can contribute to improved economic conditions in rural communities.

**6. In theory, energy initiatives should be able to pay for themselves in the long term. Short-term public policies may be needed, however, to subsidise initial costs, and to provide innovative financing and credit arrangements to offset investments in energy equipment. A critical role for government policy formation is the appropriate targeting of subsidies to benefit the poorest groups, as well as the inclusion of “sunset” strategies to phase out subsidies when they are no longer justified. Public policy is also essential to extend credit opportunities to women and rural communities.**

Though subsidies may be needed to get things started, continuing subsidies tend to distort markets and undermine project viability. Project driven approaches alone, if not designed to scale up over time, tend to result in permanent subsidies to alternative energy approaches which serve to weaken markets. In many countries, donor efforts in the provision of PV systems to households have served to undermine people’s willingness to pay for PV systems, ultimately limiting the size of the solar energy market. In the Uganda case, PV systems were sold using market mechanisms and credit arrangements but women’s lack of capital, collateral and financial documentation proved to be barriers limiting their participation.

In Kenya, marketing efforts for the Upesi stoves were complicated by earlier subsidies that had allowed the government to distribute improved stoves without cost to users, thereby weakening later efforts to charge market rates for the stoves. In Nepal, by providing subsidies through the determination of the electricity tariff for micro hydro energy used in remote areas, the government was able to support a sustainable energy option for rural communities without undermining urban energy markets.

While some households are willing and able to pay daily running costs for new energy technologies, credit arrangements will almost always be needed to help people living in poverty to meet the high first costs for new equipment. Credit systems allow first costs to be spread out over time in small payments similar to operating costs. In the Bangladesh project, for example, when women were able to buy batteries on credit, the market for the lamps increased.

Appropriate credit arrangements are crucial, but difficult to set up. Conventional banks resist the high risks and low returns associated with new approaches, and although micro-credit schemes are often offered as a solution, they can be very difficult to implement. In the Uganda case study, the micro-credit loans were too small-scale and short-term to finance the photovoltaic systems. An attempt to add a credit component to the project was complicated by the fact that the bank had not been consulted in the process of initiating the project. Because the bank viewed solar systems as consumer goods without any potential for income generation, it did not see how the women could repay the loans, and imposed collateral requirements that few potential customers could meet. As a result, although the project targeted women, only one woman entrepreneur actually used the bank's credit facility.

Many poor households cannot afford to borrow for consumer goods, but they could invest in new equipment if it allowed them to earn enough money to pay off their loans and cover operating costs. That is why productive uses of energy-related equipment are so critical.

In some cases, investments proved to be more feasible at the community level than the household level. In Nepal, once a village micro hydro system is installed, community members are able to purchase electricity out of the additional income they earn due to the project's skills training component. In Mali, the women's groups earn enough money from platform operations to pay off their loans and cover their operating costs. In both Nepal and Mali, however, the projects still rely on government or donor support to cover a portion of the capital costs.

In fact, none of the projects reviewed here are financially self-sustaining as yet. To put this in perspective, however, rural energy projects in many of the now-industrialised countries initially required substantial government subsidies. Moreover, most of these projects are still pilots, and thus not able to achieve the economies of scale that may be possible later on and that will determine long-term viability.

Government subsidies may be justified to underwrite the

high first costs of new energy systems or access to decentralised systems for people living in remote areas. Considering the costs of conventional grid extension, governments may decide that such subsidies are warranted to meet political, social or economic development objectives.

In any event, ongoing financing and credit arrangements are critical to the adoption of new energy-related technologies, and greater efforts are needed to allow women access to appropriate credit facilities. Government policy must address specific barriers faced by women trying to access credit. Often their legal status or lack of ownership rights or financial or personal documentation blocks their access to financing for energy services and technology.

**7. Capacity building is needed to strengthen involvement of women and attention to women's concerns throughout all levels of energy policymaking, planning and project implementation. National policies should recognise gender asymmetries and target women and women's groups to have increased access to capacity-building opportunities if social and economic goals linking energy and development are to be achieved.**

Capacity building at the project level can mean learning new skills, such as bookkeeping, marketing, managing a plant, or learning about various energy technologies and how to build or run them. It can also refer to the resulting sense of empowerment as people learn to take charge of their own lives and communities. Sometimes the self-confidence fostered through project activities increases people's ability to make other changes in their lives. Capacity building at the policy and national level with regard to women will often mean seeking the involvement of women's organisations and expanding the development opportunities for their members.

**The earliest energy technology, the three-stone stove persists as one of the most widely used cooking methods in the developing world.**

In terms of energy planning and decision-making processes, capacity building can have political or sociological dimensions as people learn to work within organisations and use them to exert more power. This was clearly demonstrated in South Africa where a women's energy network played an important role in the formulation of national policy. Within the network, women shared information and skills and helped each other work towards higher levels of professional competency and recognition. Networking is a particularly useful form of capacity building because it spreads new ideas, provides a means of sharing experiences, and strengthens women's ability to acquire and deliver substantive expertise.

The Nepal project was especially interesting in terms of capacity building. Providing a mechanism for women's participation, in spite of traditional social barriers, allowed the project to mobilise both women and men. As leaders of mixed groups (with both men and women), the women now have a voice in community affairs. Their self-confidence has increased, as has their capability for independent and collective action. Both men and women gained literacy and business skills and received training in use of the technology, small business operations and environmental management.

The Nepal project also worked within a network of community development committees that offered an ongoing mechanism for local democracy. The village development committees have representation at the district development level, and linkages to decision-makers at the national level. Thus the programme helps build capacity in governance at many levels, beginning with community mobilisation. The design of the overall programme also helps link local needs to national policy.

Skills training was built into all the projects, but some, like the Mali, Bangladesh and Kenya projects, did a particularly good job of training on many levels. The table in the Mali case study clearly shows how complex this task can be, requiring different types of training for different target beneficiaries. In Kenya, also, the different actors in the Upesi Stoves project—producers, distributors, retailers, promoters and installers—were given different training packages. For producers, the training was more technical, although it also included business management skills, such as pricing and record keeping. For retailers, there was in-depth training in customer relations and sales promotion, as well as costing and pricing. In Bangladesh, women participants were taught how to construct the lamps, and group leaders were given instruction in bookkeeping, accounting and business management skills needed for operating the manufacturing facility.

For women, capacity building is an essential element of any development project. Benefits are not limited to project-level interventions and, in fact, capacity building at the local level can be an essential tool to develop increased involvement of women and their representatives at the regional and national level due to the empowerment process. This was clearly demonstrated in the Bangladesh, Mali and Malawi case studies. The case studies examined here show some of the different

forms capacity building can take, and demonstrate how acquisition of technical and managerial skills can lead to substantial expansion of women's roles—at home, at work, in their communities and in national decision-making processes.

**8. The full-fledged participation of intended beneficiaries, including women, is crucial in all phases of an energy programme design, implementation and evaluation. Targeted efforts are needed to include representatives of stakeholder groups, especially women, in national policy-setting processes related to energy.**

Analysis of these case studies shows that informed participation is one of the principal success factors in decentralised energy projects. When stakeholders—who understand local needs, resources and dynamics better than anyone outside their community, and whose lives will be directly affected by project outcomes—debate and decide the merits of different approaches and technologies, the project is more likely to succeed. When local people drive the process and feel ownership of it, whole communities can become empowered and mobilised. Efforts worldwide to expand democratic processes and participation at the national level to improve policy-setting and implementation processes build on this same observation. Informed policymakers who have consulted with community members and fully understand local conditions, especially the situation of women, will make better policies.

For effective delivery of energy services, the beneficiaries—both women and men—must define the end uses that are most important for them, decide what they are willing to pay for different levels of service and, based on a wide range of choices, plan for future needs. Communities should also be given the choice of whether to invest in energy at all or whether they would rather put their efforts into some other income-generating infrastructure.

Getting all the stakeholders to participate, however, requires special efforts. In Nepal, for example, separate planning committees for men and women were necessary to ensure that the women would feel free to speak up. In the Mali case, accommodating women, especially young mothers, proved difficult because of the multiple demands on their time.

Although women traditionally tend to be excluded from decisions about energy, these case studies show that when women are approached in the right way, and given enough information, their insights can be extremely useful, especially concerning technologies that they use daily. In the Kenya project, women field-tested stoves and helped adapt them to meet consumer needs, which resulted in a better and more saleable product. In the Ghana case study, a number of energy-saving technologies had been developed by research institutions, but their diffusion was slow because of the lack of involvement of the intended beneficiaries, most of whom were women.

Participation in all phases of the project cycle is important. Where women were involved only as end users, as in the

Uganda photovoltaic project, and not engaged in the design and implementation phases, their benefits were less significant than those of the men who were able to profit from marketing and distribution of solar equipment.

The one case study that deals with national energy policy formation processes, South Africa, lists a number of the challenges associated with involving stakeholder groups and women's organisations in national policy debate, especially when there is little experience or tradition in that regard. This is dealt with in more detail below.

Stakeholder participation has been found to be an important factor in successful development assistance efforts throughout the world, and these case studies show how increased attention to participation can improve the overall effectiveness of energy-related projects, programmes and government policy efforts.

**9. Introducing energy policies that take into account women's concerns is a complicated process. Appropriate national policies can support sustainable energy objectives that include gender-sensitive planning and projects. To inform national policy setting, mechanisms are needed to capture the lessons learned from local experiences, especially with regard to energy needs of women and the impacts of policies in other sectors on energy outcomes.**

Rural energy generally remains low on the list of priorities of government and corporate planners. Energy policies in most countries tend to focus on the industrial sector and urban centres, while decentralised options for rural areas are often neglected. Rural energy needs for domestic, agricultural and small-scale, informal production activities, where women predominate, are given low priority. Getting policymakers to focus on rural energy is difficult. Getting them to focus specifically on the needs of rural women is even harder.

Still, the South African example demonstrates that a small but committed group of individuals can make a difference. It was specifically included to show the complexity of instituting change at the national level. Though it did not fully achieve its objectives, it did manage to bring gender-based energy and equity issues to the national agenda, paving the way for future action. It also built political and leadership skills among the women involved, and perhaps influenced the later appointment of women to important energy posts.

One of the interesting things about the South African example was the fact that the members of the Women's Energy Group, who were professionals, faced many of the same barriers confronted by women in rural areas: they struggled with lack of recognition and exhaustion and multiple demands on their time. Without a strong base of support, they had difficulty wielding or influencing political power, and they found that effecting change would be an ongoing process that would take time and require organizational strength.

One factor highlighted in both the South Africa and Mali case studies was the need to collect relevant disaggregated data

on the ways in which men and women are affected differently by national policies. For example, the Women's Energy Group critiqued the integrated planning methodology used in South Africa on the basis that it looked at "households" as a category, without addressing the different needs and interests of men and women within households. Accurate and gender-sensitive information from the field can have a profound impact on policy formulation, demonstrating important inequities and gender asymmetries, and also showing how to overcome them.

In the Mali experience the linkages between the local programme managers' regional support units and the government's national project coordinator provide a potential mechanism for feeding insights from local experiences with decentralised energy back into national level policymaking. In the Mali case study, one of the points raised was that the current national poverty reduction strategy does not take into account energy poverty or women's time pressures. Yet, the fact that women are already so seriously overburdened would make any labour-intensive strategy for poverty reduction unlikely to succeed.

The presence of national policies to support gender equity and the advancement of women can also be essential elements to support improved energy policy. Malawi adopted a gender policy in 1999 as a means of ensuring that men and women benefit equally from development activities. This has encouraged efforts to expand briquette activities in order to promote development opportunities for women. The existence of a gender policy will not, however, ensure that energy activities provide benefits to women. This was evident in the Uganda case where, despite a national gender policy requiring all programmes and policies to address discrimination against women, credit mechanisms to support the purchase of solar panels did not reach women due to legal and collateral barriers.

In order to design and implement energy policies that directly support poverty reduction goals, continued efforts will be required by national and local government institutions to reflect and address the distinct energy needs and conditions faced by women and men. National policy-setting mechanisms in the field of energy can benefit from supportive policies related to gender equity and the advancement of women. Policy mechanisms in other sectors must likewise reflect the considerations related to women and energy in order to avoid unintended barriers to the extension of energy services.

### Where do we go from here?

Several themes clearly stand out from an analysis of these case studies. These include the importance of supportive policy frameworks for local energy activities, as well as the need to design energy, credit, and environmental policies based on the energy needs of women and communities. The importance of the expanded economic opportunities which flow from improved energy services was underlined throughout the cases, and several of them showed that women can be important agents of change in their communities when they become energy entrepreneurs.

Meeting the energy and development needs of poor and rural areas will require new attention to ways of mobilizing communities themselves. For that, key factors are training in technical and business skills, and adequate financing arrangements that allow communities to acquire new technologies and use them to achieve economic and social gains. Yet, it is difficult to mobilize communities to solve energy challenges without particularly considering the distinct roles and needs of women, especially since they are so heavily burdened under current circumstances and resource conditions.

Pro-women energy policies are those that recognize existing divisions of labour between men and women and seek to provide the energy services that women can use most. Such policies can reduce women's time and physical burdens, expand educational and productive opportunities and open new avenues for energy business development. As discussed above, one critical aspect of this is the need to move towards policy-making processes that specifically address the energy demand profiles of women and rural communities.

Unleashing the potential for community-based solutions requires care, new planning approaches, innovations in government policy development and a deeper understanding of the impact of gender differences. Efforts to expand energy services can provide a catalyst for new entrepreneurial activi-

ties, but they must be integrated into overall community development plans that also address needs for improved health, food production, clean water, sanitation, and basic education.

Some of the case studies in this book provide useful models for approaching village-level energy problems, but for the most part they are pilot projects. These case studies provide examples of approaches that address multiple development obstacles, including energy scarcity, gender inequity, income-earning limitations and environmental degradation. The real challenge is to apply these models on a broader scale, and to use the lessons learned from these examples to design better energy programmes and policies for the future.

If women's particular needs are properly addressed in national and local government policies, using some of the approaches suggested here, overall poverty reduction benefits and empowerment goals are much more likely to be met. There is great potential for improving the position of women in their households and society through energy. Increasing energy activities can be an important means for promoting development, as well as an end in the fight to overcome poverty. The experiences profiled in this collection show that innovative energy approaches can be an entry point for achieving integrated solutions to the challenges of sustainable human development and supporting poverty reduction goals in developing countries.

*Efforts to expand energy services can provide a catalyst for new entrepreneurial activities, but they must be integrated into overall community development plans.*



