

nergy, Poverty, and Gender

Enabling Equitable Access to Rural
Electrification:
Current Thinking on Energy, Poverty,
and Gender

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Energy, Environment & Development (EED)

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Preface

The intersection of energy, poverty alleviation and gender is a key issue that a number of energy programs and bilateral donors are eager to address. Because of pressure to meet the dual objectives of environmental and climate change and poverty alleviation, energy programs are being designed without proven models, and models are being sought urgently. Adding to knowledge in this area could improve the contribution of energy projects to poverty and gender objectives in a wide audience.

Only limited conceptual or empirical work is available specifically on this intersection of objectives, particularly concerning renewable energy. A number of studies address energy and development issues, but treat gender only peripherally, if at all, or as a separate rather than integrated topic. A gender and energy literature is developing. Much relevant study and experience is available in related areas from which guidelines and “best practices” can be drawn: energy and development, rural electrification and development, renewable energy “best practices,” microfinance and small-scale enterprises, energy and poverty, gender and poverty, and gender and energy work. Research from other related sectors such as water and sanitation, social forestry, and household energy is also available.

This briefing paper summarizes current thinking on energy, poverty, and gender. A particular focus is given on rural electrification with renewable energy, based on Asia Alternative Energy (ASTAE) program’s historical comparative advantage. Nonetheless, this is only a snapshot of the reality of rural energy poverty, which is noted where appropriate.

In the first section, energy, poverty, and gender relationships are explored. Sustainable energy development and poverty thinking is described, the energy-poverty-gender nexus is analyzed, and current efforts in energy and gender are reviewed. New thinking on poverty is described in the second section, together with some implications for the energy sector. Some promising approaches, based on recent studies, to widening access to rural electrification to the poor in general are summarized in section 3, and key empirical questions are identified concerning energy-poverty links.

Section 4 focuses on four key issues of rural electrification programs for poor rural women: gender-disaggregated data and analysis; wood energy, cooking, and their impact on health; gender-specific electricity needs; and equal access to credit and other resources for microenterprises.

In conclusion, the important needs are to disaggregate by gender in the project cycle, document existing experiences, encourage multidisciplinary dialog, and develop new approaches in energy, poverty, and gender.

The bibliography lists key sources, even when it has not been possible to adequately review them all in this report. This review is indeed still far from complete in analyzing the vast literatures and project experiences on energy, poverty, and gender that relate to this topic.

A companion report on major institutional actors and their activities has also been prepared (Panjwani and Cecelski 2002). This report is available at www.energia.org and will be maintained and updated regularly as long as resources permit.

This paper was prepared in a relatively short period as the basis for a brainstorming meeting in January 2000 for a Dutch-supported project entitled *Asia Alternative Energy Policy and Project Development Support: Emphasis on Poverty Alleviation and Women*, being launched by ASTAE. It could not have been prepared in such a short time without a number of critical inputs on short notice from key experts and organizations working in these areas. These are listed in appendix 1 at the end of this report, and are sincerely thanked.

The paper was updated and revised in July 2002 to take account of some recent developments. In particular, the author is grateful for comments and suggestions on the first version by Andrew Barnett, Joy Clancy, and Margaret Skutsch, and for the support of Enno Heijndermans at ASTAE, together with the very useful comments of three anonymous reviewers.

This paper should be seen as an initial exploration of the diverse literature and projects. It seeks only to raise some possibly important issues for further conceptual teasing out and development. This will require a multidisciplinary input and a team approach.



Acronyms and Abbreviations

APDC	Asian and Pacific Development Centre
ASTAE	Asia Alternative Energy Program
BAVM	Benefit assessment and valuation methodology
CDF	Comprehensive Development Framework
DFID	Department for International Development
ESCAP	Energy Sector Management Assistance Programme
EDRC	Energy and Development Research Center
EnPoGen	Energy-Poverty-Gender
EDRC	Energy & Development Research Centre
ENSIGN	Financing Energy Services and Income-Generating Activities for the Poor (a project under the APDC and UNDP)
ESMAP	Energy Sector Management Assistance Programme
FAO	Food and Agriculture Organization of the United Nations
LPG	Liquefied propane gas
NGO	Nongovernmental organization
NREL	National Renewable Energy Laboratory (U.S.)
REDP	Rural Energy Development Programme
RESCO	Rural energy services company
SED	Sustainable Energy Development
SHS	Solar home system
SEWA	Self Employed Women's Association
TERI	Tata Energy Research Institute
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNIFEM	Women's Fund of the United Nations
UNRISD	United Nations Research Institute for Social Development



Executive Summary

Gender and poverty challenges in widening access to electricity in rural areas are arising in the context of renewed interest in rural electrification, especially through renewable energy, as a tool for both sustainable energy development and greater equity in rural areas. Poverty reduction and gender equality are now integral goals for all major development institutions. Energy assistance programs are seeking models and approaches to respond to these mandates.

This paper reviews the current thinking on energy, poverty, and gender and focuses on rural electrification and renewable energy as an initial attempt to conceptualize linkages and needs in this area.

Energy, Poverty, and Gender

Sustainable energy development (SED) has been defined in financial, social, and environmental terms. Renewable energy and energy efficiency are usually characterized as “win-win” options in SED, meeting the objectives of both environmental improvement and poverty alleviation (with financing being the principal challenge).

Recent thinking emphasizes that *choice* in energy options is critical to meeting the needs of poor people and that a variety of strategies and tradeoffs will be necessary, including fossil fuels. Despite many efforts, rural energy poverty is still widespread. New approaches emphasize an explicit poverty focus, decentralization and participation, and the integration of energy efforts with other development sectors. Gender issues, however, are not prominent in these new approaches.

Energy has been pushed higher on the sustainable development agenda by recent United Nations (U.N.) meetings, and is being linked to the Millennium Development Goals adopted by the U.N. General Assembly.

Over the last two decades, gender issues have attained increased prominence in the debate on sustainable energy development. International programs, such as ENERGIA, an international network on gender and sustainable energy, the United Nations Development Programme (UNDP), the National Renewable Energy Laboratory (NREL), and Winrock International, a company, have helped to bring critical issues of gender equality and efficiency to the table (Panjwani and Cecelski 2002). Policy researchers and development practitioners have begun building a body of evidence and experience that links attention to gender in energy policy and projects to equitable, efficient, and sustainable outcomes in development. A number of energy programs, for example, the Energy Sector Management Assistance Programme (ESMAP), the UNDP, and the

Energy and Atmosphere Programme (EAP) are starting to pay closer attention to gender and are launching important initiatives.

Despite these developments, the importance of bringing a gender perspective to energy policy analysis and design is still not widely understood, nor have the lessons for development been fully integrated by donors or national policy makers. Although many are sympathetic, gender is still commonly viewed predominantly as a political agenda and given this, not central to questions of energy efficiency or project effectiveness.

Current efforts on gender and energy focus on the following:

- ❑ Building up a body of evidence and experience (conceptual, methodological, and case studies) linking attention to gender in energy policy and projects to equitable, efficient, and sustainable outcomes in energy and development
- ❑ Advocating in national and international arenas on the importance of bringing a gender perspective to policy analysis and design
- ❑ Capacity building, advice, and assistance to energy programs, policy, and projects in integrating a gender perspective
- ❑ Creating networks and institutions at the national, regional, and international levels to support these efforts at the practical and political level.

There is a growing literature on energy and gender. Gender is also appearing increasingly in the mainstream energy publications mentioned earlier, although often as a separate topic not integrated with strategies and solutions. The focus in the literature is mainly on poor rural women, wood energy, and microhousehold and project-level analysis. Project experience is also becoming available, although much is not yet documented. Some especially relevant initiatives and reports are described in the companion report to this paper.

New Thinking on Poverty: Some Energy Implications

New thinking on poverty broadens the definition of poverty to include empowerment, security, and opportunity. Important aspects include learning from the poor, which shapes understanding and strategies, and recognizing the importance of intersectoral policy instrument interactions. In the energy sector, intersectoral linkages are well recognized as critical to ensuring the impacts of, for example, rural electrification interventions.

However, the perspectives of empowerment, security, and opportunity have not been part of the normal professional or bureaucratic concerns of many of those involved in energy policy and practice. Linkages of energy strategies with this framework have been little explored. Energy is not widely recognized as a basic need in development circles, and working relationships between macroeconomists-engineers and other social scientists have been slow to develop in the energy sector in contrast to other sectors, such as health and agriculture.

Different ways of thinking are partly responsible for this omission: Poverty and gender thinking prioritizes people, whereas energy thinking often prioritizes other objectives, such as efficiency or environment. The few attempts to view energy primarily through the lens of poverty are quite startling in challenging us to alter our perspective.

Rural Electrification, Rural development, and Poverty

There is no doubt that rural electrification typically benefits the nonpoor more than the poor. In fact, like many other new technologies, it can increase inequities in rural areas. Nonetheless, there are clearly means by which access can be widened and the poor can more likely benefit from rural electrification. A number of recent studies point to specific success factors in widening access. A number of projects have applied these to target the poor, and in some cases women, and some documentation is becoming available. Given the rapid pace of developments in, for example, solar home system experience, there are many experiments that may offer new lessons—even since the last review in 1995.

Some promising directions for analysis and application are as follows:

- ❑ Appropriate tariff and connection policies, including, for decentralized systems, credit and leasing.
- ❑ The role of subsidies and the impact of restructuring of the power sector on subsidies and access.
- ❑ Demand analysis, including using gender-disaggregated analysis.
- ❑ Financing and other institutional mechanisms, including microcredit, rural energy services companies (RESCOs), community- and other nongovernmental organization– (NGO-) based approaches, and private participation in small-scale infrastructure provision.
- ❑ Productive uses of electricity, especially uses that may only be possible with decentralized systems.
- ❑ Institutional coordination of complementary infrastructure.

Two key questions emerge from the current thinking on rural electrification (and energy in general) and the poor:

1. What is the relationship between specific energy strategies and *poverty reduction* (as opposed to merely *widening access*)? Though anecdotal evidence is available, there are very few empirical studies that convincingly demonstrate a linkage, as there are in other sectors, for example, health.
2. What is the effect on the poor of privatization and market reform in the power sector?

Experience in this area is relatively new.

Key Gender Issues in Rural Electrification Programs

Unfortunately, many past studies of social impacts of energy interventions have failed to address gender issues or have addressed them only perfunctorily. Most likely, gender will not automatically be included as a variable for analysis without a specific mandate.

Four of the key energy issues for poor rural women that demand the attention of rural electrification programs include the following:

- ❑ *Data needs and analysis.* Disaggregating energy use, supply, and impacts by gender to provide a better basis for applying well-known field methods and analytic tools for incorporating gender in project design and implementation, as well as at the micro- and macropolicy levels.
- ❑ *Wood energy, cooking, and health.* Seeking integrated approaches and various solutions (including fossil fuels and perhaps electric cooking) that recognize the importance of wood energy and cooking for poor women and its health implications.
- ❑ *Women's specific electricity needs.* Addressing water pumping, agricultural processing, security, work productivity, and health in the framework of sectoral development initiatives.
- ❑ *Equal access to credit, extension, training.* Assuring energy and electricity supplies for women's domestic tasks as well as their microenterprise activities.

Findings and Needs

The findings above indicate the following needs:

- ❑ To routinely disaggregate energy use, supply, and impact by gender at all stages of the rural electrification project cycle.
- ❑ To document existing experiences in order to provide both empirical evidence of strong linkages between energy, poverty reduction, and gender and examples of “best practices,” models, and approaches.
- ❑ To encourage a dialog and interaction between the various ways of thinking in energy, poverty, and gender, as well as to create capacity to work in this interdisciplinary area.
- ❑ To develop new approaches to integrating energy (including decentralized supply options) with other development sectors.

Given the recent growth of interest and activities in this area and the limited existing capacities available (experts and organizations, especially in the South), any initiatives will be well advised to focus on capacity-building, interact closely with other programs, and establish partnerships with the various organizations now interested in energy, poverty reduction, and gender equality.

1 Energy, Poverty, and Gender

The energy dimension of poverty—energy poverty—may be defined as the absence of sufficient choice in accessing adequate, affordable, reliable, quality, safe and environmentally benign energy services to support economic and human development.

World Energy Assessment 2000

Sustainable Energy and Poverty

The definition of sustainable energy today has broadened from the primarily economic development focus in the 1970s to concerns with environmental sustainability in the 1980s and financial sustainability in the 1990s, and finally to the current inclusion of social sustainability, equity, and poverty in the past few years, a reflection of current development debates. Although sustainable energy still carries the connotation of renewable energy and energy efficiency as proposed by its early advocates, it has broadened to include sustainable use of fossil fuels and electricity.

Renewable energy and energy efficiency are usually characterized as “win-win” options in sustainable energy development (SED), meeting the objectives both of environmental improvement and poverty alleviation, with economics being the principal challenge. It is increasingly clear, however, that this is unlikely to be true in every case. Real-life situations are considerably more complicated. Any technology when applied in the field results in gains and losses for different groups. More likely, there are “win-win,” “win-lose,” and “tradeoff” situations between environmental objectives and poverty reduction, to use a framework proposed by Munasinghe (1995). As a recent review of renewable energy activities from the Energy Sector Management Assistance Programme (ESMAP) (1999) points out, restricting support to renewable energy for SED could deny poor people the opportunity for productivity growth that fossil fuelled technologies would facilitate (ESMAP 1999).

The United Nations Conference on Environment and Development (UNCED), which took place in Rio in 1992, drew international attention to linkages between environment and economic development. However, it placed energy concerns mainly in the context of climate change. Agenda 21 focused on renewable energy and energy efficiency, primarily as means for protection of the atmosphere. Not until 1997, at the U.N. General Assembly Special Session (UNGASS) to review progress five years after Rio, were the essential linkages between energy and socioeconomic development presented in an integrated

fashion (UNDP 1997), and a chapter specifically on energy was adopted in the Program for further implementation of Agenda 21.

In April 2001, the UNDP began advocating the adoption of a new global target, the achievement of which would be a prerequisite to fulfilling the other International Development Targets of the Millennium Goals adopted by the U.N. General Assembly in January 2001: helping to halve the proportion of people without access to clean and affordable fuels and electricity by 2015. Rural electrification and liquid or gaseous fuels for cooking are the two main strategies advocated by the UNDP to accomplish this goal.

In the spring of 2001 energy was at the top of the agenda when the U.N. Commission for Sustainable Development met in its ninth session (CSD-9), and energy was identified at CSD-10 as one of the key themes to be discussed at the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa, in August 2002.

Current thinking on energy and poverty is concisely summarized in box 1. This consensus is broadly in line with major recent reports by the UNDP (UNDP 1997; UNDP, UNDESA, and WEC 1999), the World Energy Council and the Food and Agriculture Organization of the United Nations (WEC and FAO 1999), the Stockholm Environment Institute (1999), and the World Bank's own "Rural Energy and Development: Improving Energy Supplies for Two Billion People" (1996).

Box 1. Current Thinking on Energy and Poverty

The current state of informed opinion concerning energy and poverty has been summarized by many agencies and a new consensus has emerged:

- ❖ Approximately two billion people do not have access to "modern" forms of energy, such as electricity and liquid fuels.
- ❖ "Modern" forms of energy are a necessary input for economic development and the elimination of poverty. The substitution of inanimate energy for human energy has proven to be an essential element in removing drudgery and increasing well-being.
- ❖ But improved forms of energy are not sufficient conditions for development. Many "complementary inputs" are also required, including "end-use" technology to convert energy into useful outputs such as illumination, milling, pumping, transport, and communications.
- ❖ Conventional modern forms of energy (fossil fuels and electricity) will remain the fuel of first choice for many poor people for many years to come, while traditional biomass fuels will remain the main fuel of necessity.
- ❖ Biomass fuels are not always "renewable" as sometimes they are harvested renewably and sometimes "mined" destructively.

- ❖ Poor people need energy for many tasks (lighting, cooking, mechanical power, heating and cooling, and communication) and they require multiple fuels (electricity is not enough).
- ❖ Women and children usually form the majority of poor people in any community, and women are usually major users and suppliers of energy resources in marginalized communities.
- ❖ Poor people already pay cash for improved energy services, particularly for the convenience of electric lighting and radios. Beyond this, the additional income to pay for modern energy services will usually be associated with investment in sustainable (profitable) and productive energy end-use activities.
- ❖ The fuels and technology traditionally available to poor people result in very low energy conversion efficiency. However, this efficiency can be improved both domestically and in commercial and institutional uses through changes in technology.
- ❖ The energy supply sectors of many developing countries are in the process of being restructured to attract private capital. This poses both a threat and an opportunity for poor people. As energy supplies are delivered on a more commercial basis, their availability to poor people may reduce. However, "unpackaging" energy supply systems opens up opportunities for the private sector to supply energy services to poor people who do not have access under current arrangements.
- ❖ Funds from tax revenues, aid agencies and charities are unlikely to be able to provide energy services directly to any but the smallest fraction of poor people. This means that market mechanisms will have to provide the finance for improved energy services, but their extent and effectiveness will have to be massively expanded to meet current unmet needs and the needs of growing populations.
- ❖ The State has a vital role to play in providing the "enabling environment" that is necessary for the private sector to supply improved energy services to poor people. Subsidies (including aid) may well be essential, but they need to be applied with great care so that they may make markets rather than destroy them.

Barnett 1999

The Energy-Poverty-Gender Nexus

Gender analysis of poverty is not so much about whether women suffer more from poverty than men, but rather about how gender differentiates the social processes leading to poverty, and the escape routes out of destitution. An understanding of the causal processes leading to poverty has important policy implications: it raises questions about whether it can be assumed, as is often done, that the kinds of policies that can strengthen the position of poor men will have much the same impact on poor women.

Razavi 1998

Poverty means, among other things, limited access to energy sources. The poor use energy and other scarce resources to eke out livelihood strategies. Poverty influences and determines which source of energy chosen in a household. It is also one element that can enhance or detract from survival strategies of the poor. Furthermore, rural energy poverty has a gender bias.

There is a growing literature on energy and gender (see, for example, the bibliography to this paper). Annotated bibliographies on (a) gender and energy and on (b) gender and energy in Africa are currently being finalized.¹ Gender issues are also appearing increasingly in the mainstream energy publications mentioned earlier, although often as a separate topic not integrated with strategies and solutions. The focus in the literature is mainly on poor rural women, wood energy and health, and issues at the microeconomic and project level.

Project experience is also becoming available, although much is not yet documented. Some especially relevant initiatives and reports are described in the companion report to this paper (Panjwani and Cecelski 2002).

Some “gendered” findings of past research on energy demand of the rural poor are as follows:

- ❑ Energy is needed for household uses, such as cooking, lighting, space heating, and other appliances; for agricultural uses, such as tilling, irrigation, and postharvest processing; and for rural industry uses, such as milling and mechanical energy and process heat. Energy is also an input to water supply, communications, commerce, health, education, and transportation in rural areas. Much of this energy use and production is by women.
- ❑ Higher-income people generally use more efficient and more convenient sources of energy, such as gas and electricity, whereas poor people use less efficient and less convenient sources, such as fuelwood and human energy. In actuality, multiple fuel use is common at all income levels and the “fuel ladder” is perhaps more accurately replaced by a “fuel pyramid” of multiple fuels for different purposes and at different times. What is important to note is that poor people have fewer energy options than do the nonpoor people, and they often pay more for them both absolutely (paying higher unit prices) and relatively (as a percentage of their income) than do the nonpoor. Poor women nonetheless highly value and need multiple energy options to help manage their daily work and time.
- ❑ The main use of inanimate energy in rural areas is for cooking and heating. Biomass is the primary fuel used and will continue to be so for the foreseeable future. The major source of energy in rural areas is human labor, used for both survival activities and production. This dependence on biomass and human energy is an important factor in rural poverty, and it is not measured either in

¹ These will be available at <http://www.energia.org/>.

national accounts or in energy balances. Women's (and children's) role in this energy use system is well known. Negative effects of energy scarcity on poor women have been well documented. Health is a primary concern here.²

- ❑ The presence of a large number of female-headed households in many developing countries, as well as women's primary responsibility for energy procurement and management (and the invisibility of these tasks in national energy accounts), gives this energy poverty a particular gender bias. The risk of poverty is greater for women, with about one-third of rural households in developing countries being female-headed.³
- ❑ Neither public nor private energy infrastructure provision are gender-neutral. Women use energy and electricity differently than men because of their different household and productive activities. For example, decisions on how and where electricity and electricity services (such as information and communication technology packages) are provided to households and communities influence women's ability to take advantage of these services.
- ❑ Women's microenterprises (an important factor in household income, as well as in women's welfare and empowerment) are heat-intensive (food processing), labor-intensive, and/or light-intensive (intensive-intensive home industries with work in evenings). Lack of adequate energy supplies—and other coordinated support—for these activities affect women's ability to operate these microenterprises profitably and safely. Conversely, the provision of affordable energy can be a key factor in enabling rural enterprises.

Current Efforts in Gender and Energy

Over the last two decades, gender issues have attained increased prominence in the debate on sustainable energy development. International programs, such as ENERGIA, an international network on gender and sustainable energy; the Energy Sector Management Assistance Programme (ESMAP), through its Gender Facility; the United Nations Development Programme (UNDP), in its Sustainable Energy and Environment for Development Unit; the Energy and Development Research Center (EDRC) in South Africa; and Winrock International's energy program, are helping to bring critical issues of gender equality and efficiency to the table. The Energy, Poverty and Gender

² Shell Foundation funding of work on indoor air pollution and health, and an ESMAP project in India, including a recent TERI/World Bank regional meeting on Indoor Air Pollution, Household Energy and Health (New Delhi, May 10–12, 2002), have raised the profile of this topic recently. See www.worldbank.org/cleanair.

³ Some recent studies question whether female-headed households are necessarily poorer than male-headed ones, while acknowledging that differences in power, nutrition, health, and time allocation may be more important indicators of differences in well-being along gender lines.

(EnPoGen) project of Asia Alternative Energy Program (ASTAE) has been engaged since early 2000 in documenting these relationships in three case study countries (China, Indonesia, and Sri Lanka) and in developing both quantitative and qualitative methodologies for incorporating poverty and gender in rural electrification projects through a case study in a Global Environment Facility project in Cambodia. Policy researchers and development practitioners have begun building a body of evidence and experience that links attention to gender in energy policy and projects to equitable, efficient, and sustainable outcomes in development.⁴

Despite these promising developments, however, the importance of bringing a gender perspective to energy policy analysis and design is still not widely understood, nor have the lessons for development been fully integrated by donors or national policy makers. Although many are sympathetic, gender is still commonly viewed predominantly as a political agenda and, given this, not central to questions of efficiency or project effectiveness.

Current efforts on gender and energy focus on the following:

- ❑ Building up a body of evidence and experience linking attention to gender in energy policy and projects to equitable, efficient, and sustainable outcomes in energy and development.
- ❑ Advocating in national and international arenas on the importance of bringing a gender perspective to policy analysis and design.
- ❑ Capacity building and assistance to energy programs, policy, and projects in integrating a gender perspective.
- ❑ Creating networks and institutions at the national, regional, and international levels to support these efforts.

⁴ A companion EnPoGen report to this paper is available on *Major Activities in Energy, Poverty and Gender*, detailing current activities and actors in energy, poverty, and gender. This database will be posted at www.energia.org and, resources permitting, maintained and updated regularly.

2

New Thinking on Poverty: Some Energy Implications

The constraints that energy poverty imposes on a development strategy are still invisible in the mainstream development debate. The ways in which energy needs are met has enormous implications for low-income households, but the householders themselves, unlike policy-makers, do not separate the urgent need for land, water, housing, energy services, education, health, transport and employment in a sectoral way.

EDRC, Rural Electrification in South Africa, 1998

Definitions of Poverty

The definition of poverty has expanded over the past two decades from a focus on command over market-produced goods (income) to a recognition of the importance of public goods and common property resources (the entitlements approach) and the inclusion of other dimensions such as health and literacy in “sustainable livelihoods.”

Perhaps most significantly, much poverty thinking has moved from defining poverty by the wants and needs of professionals to defining deprivation and poverty by the wants and needs of the poor. Methodologies for learning from the poor have become more rigorous, and learning from the poor has expanded the definition of poverty further to reflect a concern with vulnerability and risk and with powerlessness and voice.

Combining such qualitative findings with quantitative information about poverty, and the use of participatory approaches, has been shown empirically to improve poverty outcomes and project success. For example, Isham, Narayan, and Pritchett (1994) have shown that economic rates of return to World Bank projects were statistically significantly associated with the degree of participation of beneficiaries in the design and implementation of projects.

The World Development Report 2000/2001

The *Approach and Outline to the WDR* (theme: Attacking Poverty) identified the following three common features in successes in poverty reduction:

- ❑ *Empowerment*. Empowering the poor by addressing inequalities that prevent them from influencing policies and interventions affecting their lives and that also impede overall growth and development (including gender inequalities).
- ❑ *Security*. Addressing risk and vulnerability that characterize the realities of the lives of poor people and of poor nations.
- ❑ *Opportunity*. Sustaining economic expansion and human development in the medium term in which the poor participate.

This trilogy is proposed as an optic through which to view, and to assess, different packages put forward in the context of the Comprehensive Development Framework (CDF) in terms of poverty reduction impact.

In their background paper for the *World Development Report 2000/2001*, Kanbur and Squire (1999) summarize contemporary thinking on reducing poverty and come to two broad conclusions:

- ❑ Many aspects of poverty are closely correlated (for example, income and health), so broadening the definition of poverty does not change significantly aggregate measures of poverty. But broader definitions allow “a better characterization of poverty and the terrible hardships burdening the poor, and therefore increase our understanding of poverty and the poor.” A better understanding of poverty and the poor contributes to strategy and allows better design and implementation of programs to help people escape poverty.
- ❑ More policy instruments become relevant to fighting poverty when the definition of poverty is broadened. “The various aspects of poverty interact in important ways, such that policies do more than simply add up...the impact of appropriately designed combinations will be greater than the sum of the individual parts.” Careful integration of sectoral policies is therefore necessary.

Implications for the Energy Sector

Little or no mention is made of rural energy poverty in current thinking on poverty, with the exception of occasional references to strengthening of infrastructure and public services to the poor.⁵ Energy is not yet fully recognized as an aspect of poverty whose policies are relevant to fighting poverty.

Broadening the definition of poverty beyond income to other sectors could well include rural energy poverty. Emphasis in poverty reduction thinking on recognizing and integrating the interactions among various sectoral policies is highly consistent with experience in the energy sector where, for example, the synergetic effects of

⁵ For example, in any of the preparatory forums and documents for the WDR, although apparently some inputs on energy were later made (D. Barnes, personal communication).

complementary development infrastructure, such as rural electrification, health clinics, schools, and markets have often been noted in the literature.

On the energy side, the perspectives of empowerment, security, and opportunity have not been part of the normal professional or bureaucratic concerns of many of those involved in energy policy and practice. Linkages of energy strategies with this framework have been left virtually unexplored. Rather, attention has often concentrated on technology choice, the efficiency and management of energy use and production, and the much perceived and emphasized dangers of environmental damage and climate change.

As Clancy (1999) points out, rural energy has never been widely accepted in development circles as a basic need like water and food. Energy sector macro-economists and technologists (unlike their counterparts in the water and agricultural sectors; see, for example, UNDP and World Bank Water and Sanitation Programme—South Asia 1999) have on the whole not developed working relationships with (noneconomist) social scientists over the years, acknowledging the importance of the social dimension. One factor may be the arms-length working nature of the energy sector. Although health, forestry, agriculture, and water sectors function through extension workers who work closely with communities and people on a continuing basis, energy agencies work on a macro or project basis, perhaps reducing opportunities for social awareness.

Meanwhile, donors have by and large limited energy assistance to electric power plants, leaving oil and gas to the private sector and fuelwood to be handled by forestry departments (Andrew Barnett, personal communication).

The World Bank, in its recent work in the energy sector, has placed considerable emphasis on the policies and tools that would need to be used by governments of developing countries concerned with tackling poverty, in thinking about their role in the energy sector. The energy chapter of the draft *Poverty Reduction Sourcebook*, posted in April 2001, adopted the new thinking on poverty in the World Bank (see Rural Electrification and the Poor: Key Issues in chapter 3) and suggested the following five energy development goals and indicators:

- ❑ Expand access to improved energy services (to contribute to the poverty alleviation outcome of increased income).
- ❑ Improve energy supply reliability.
- ❑ Ensure fiscal sustainability associated with energy supply and use (both to contribute to increasing capability).
- ❑ Improve energy sector governance and regulation (to improve security).
- ❑ Reduce health and environmental costs associated with energy supply and use (to increase empowerment).

The ESMAP Energy and Development Report 2000 on *Energy Services for the World's Poor* focuses on three questions:

1. What energy policies and projects will be most successful—and cost-effective—in knocking down barriers preventing low-income households and communities

from gaining access to modern energy and services? (The report argues that knowledge of energy demand of the poor is necessary to determine this.)

2. Has energy market reform helped or harmed the poor? What methodologies can help determine this?
3. What institutional tools (market structure and ownership, regulation, and pricing) can open opportunities for “propoor” innovation?

The few attempts to view energy primarily through a poverty optic are quite startling in challenging us to alter our perspective. At Village Power '98, for example, in the midst of macroeconomic presentations on rural energy in various regions by senior officials, Mieko Nishimizu, World Bank Vice President for South Asia, recited a day in the life of a poor Nepali woman, illustrating the linkages of energy to poverty from the woman's own point of view. In South Africa, an innovative EDRC study has investigated “ways of knowing” in rural development and rural electrification policies by fictionalizing a real woman as a window through which to imagine the life of the rural poor, energy needs, and decisionmaking power in and outside the household. The questions that Crawford-Cousins poses (and in her paper answers) about Mrs. Mohlamonyane are shown in box 2.

Box 2: Rural Electrification, Poverty reduction, and Gender: Relevant Issues in South Africa from “Mrs. Mohlamonyane’s” Perspective

- ❖ Which of Mrs. Mohlamonyane's household energy needs could and should be met by electricity in order to significantly change her experience of her life as “difficult”? What level of service should she receive? Are current limited energy supplies or solar systems more appropriate for Mrs. Mohlamonyane's home?
- ❖ How much should (or could) Mrs. Mohlamonyane pay for electricity? Should she pay a flat monthly rate or use a prepayment meter? Might electrification intensify Mrs. Mohlamonyane's economic marginality?
- ❖ Will Mrs. Mohlamonyane, who is acutely aware of her fuel needs, be able or want to cook with electricity? The current limited supply option will get electricity to more people. Should Mrs. Mohlamonyane be offered the choice to cook electrically, and if not now, in the future?
- ❖ For Mrs. Mohlamonyane to use the electricity supplied to her dwelling, she needs appliances. Will she be able to buy appropriate, affordable, safe, and efficient electric appliances? Are such appliances accessible to rural people? Does Mrs. Mohlamonyane have access to a regular cash income that allows her to safely enter hire-purchase agreements or to maintain membership in a *stokvel* over time?
- ❖ Will the electrification of Mrs. Mohlamonyane's house substantially improve her physical and mental health and the health of her children? Will electrification have an effect on her physical safety, her self-esteem, or her status as a woman at a household, community, or national level?
- ❖ Will electrification improve Mrs. Mohlamonyane's access to formal and informal education? Will it improve her children's access to educational opportunities?

- ❖ Will lighting, educational television, and radio programs, perhaps by access to mass media in health education, effectively improve the health of the Mohlamonyane household??
- ❖ Will rural electrification affect the use of Mrs. Mohlamonyane's domestic space? Domestic violence?
- ❖ Who controls which resource flows within Mrs. Mohlamonyane's household?
- ❖ What is rural development for Mrs. Mohlamonyane? How will electrification of her dwelling contribute to the improvement of Mrs. Mohlamonyane's livelihood? Will it increase Mrs. Mohlamonyane's access to cash income?
- ❖ Will electrification by making possible the use of appliances and machinery, such as refrigerators and deep freezers, sewing machines and welders, enhance Mrs. Mohlamonyane's rural income?
- ❖ Will electrification provide opportunities for Mrs. Mohlamonyane to increase her agricultural production and to market her surplus for cash or to move into commercial agricultural production?
- ❖ If Mrs. Mohlamonyane's time is so constrained by her unpaid employment in pursuing her livelihood, does household electrification represent an opportunity for labor saving and thus time saving? Will the electrification of her dwelling mean that Mrs. Mohlamonyane will "save" the time she currently "spends" on fetching and carrying wood and that she will "invest" this time in "more productive" activities, thus obliquely or directly addressing the question of her extreme poverty and immiseration?
- ❖ Will electrification of her home make Mrs. Mohlamonyane a "more modern" person?
- ❖ Are Mrs. Mohlamonyane and the other members of her domestic unit less likely to become migrant workers in the squatter settlements of the urban areas if their household is electrified? Is rural electrification a long-term social investment in rural stability?

Crawford-Cousins 1998

They give a flavor for a change in perspective which is now an important element of poverty thinking.

3

Rural Electrification, Rural Development, and Poverty

In the normal processes of development, most of the gains go to the rich and less poor. The question we confront...is how the poorer can capture more of these potentials and gain more from these opportunities....[For example,...] [f]or putting poor people first, especially resource-poor farmers, field evidence [from lift irrigation in India] points to electricity pricing and supply as powerful instruments.

Chambers and others 1989

Rural Electrification and the Poor: Key Issues

Many studies have concluded that rural electrification benefits higher income populations more than lower income ones (Jechoutek 1992; Foley 1990; Munasinghe 1987; Barnes 1998; Cecelski 1990 and 1996). Although privatization and market approaches used in, for example, solar home systems promotion may appear at first glance to be the culprit, in fact similar findings are true for public grid extension programs. “The explanation is straightforward: only those with sufficient resources for the initial investment in the connection and the energy-using equipment will be in a position to benefit from electricity (as from any energy supply)” (Jechoutek 1992). In fact, surprising as it may seem, rural electrification technologies, like other technologies, can even increase inequities between rich and poor and between men and women in rural areas.

What Khennas and Barnett (2000) point out for micro-hydro is equally applicable to photovoltaic home electrification or other renewable electrification programs with environmental objectives that imply a rapid increase in the volume of sales:

[T]here are hard choices to be made in the allocation of resources. Micro hydro investments that are primarily intended to increase the adoption of micro hydro are likely to need to be financially viable and will therefore be located where sales to the grid are possible (and profitable) or where there are concentrations of effective demand (or there are so-called “anchor customers” who can pay for the bulk of the power supplied). Whereas programs that are intended primarily to increase the “access” of specific groups of people to improved energy supplies are likely to be located where resource-poor live and this will frequently be in more remote areas (that will not be reached by the

central grid for some time, if ever), where all other options will also be expensive but where micro hydro is the least cost.

Poor households do value highly and benefit from electrification when they have access to electricity in their homes. Improved public services (such as in health and education) likely have indirect positive benefits for the poor too; these rely very much on development of complementary infrastructure and services together with electrification. Spin-off effects on wage employment of increased output (because of mechanization or irrigation, for example), may also be considerable, but these depend on the overall growth dynamic in a region, not only on electrification.

The following two key issues for research with operational implications emerge from current thinking on rural electrification (or, indeed, energy in general) and the poor:

1. What is the relationship between specific energy strategies and poverty reduction, as opposed to merely widening access?

There are very few empirical studies that convincingly demonstrate a linkage. A recent quantitative study sponsored by the Department for International Development (DFID), encouragingly, concludes that micro-hydro “is a relatively efficient method of poverty reduction, in terms of costs per person moved across the poverty line. [And]...micro-hydro is also able to reach a number of the extremely poor...through the channel of wage employment...and linkage activities.” (Moseley and Fulford 1999). Similar methodologies could usefully be applied to other energy interventions, with care taken to “engender” the analysis (unfortunately, the above microhydro study, like many other social impact studies in the energy sector, fails to include gender issues in its scope).

2. What is the impact on the poor of privatization—the widespread structural and market reform ongoing in the power sector?

Restructuring of the electricity sector and power sector reform are likely to reduce the possibility of cross-subsidies in grid electrification, unless service territories contain both urban and rural areas. Utilities may limit coverage to regions and households that will be profitable. The poorest households may need some regulatory protection in this scenario, such as low access charges, lifeline rates, and low cost wiring (Barnes 1998).

So far, there do not seem to be any empirical studies available on the effects of power sector reform on the poor. (ESMAP has initiated a literature review on energy markets reform and the poor that may shed some light on this subject.) A Canadian International Development Agency–sponsored socioeconomic study, which includes gender on power sector reform in the Indian state of Kerala, is under way (Lele 1999). This study is one of the first to measure the impacts on the poor and women of macroeconomic energy policies. A similar impact methodology could be used to evaluate other macro energy interventions in terms of poverty and gender impacts.

There is no doubt that rural electrification can be a powerful instrument for putting poor people first, as illustrated in box 3.

This example is given not to advocate for flat rates or a particular policy in one country but rather to point out that specific analysis and policies (that may even be counter-intuitive) can be necessary to benefit the poor. “Win-win” situations, that is, in this case, sustainability in terms of commercial viability as well as equity, are not automatic and trade-offs may be necessary. Field studies and sensitive, poverty-oriented analysis are necessary to identify appropriate actions.

Box 3. Electricity Pricing and Supply as Powerful Instruments for Putting Poor People First: The Case of Private Lift Irrigation in India

Private initiative, which has developed 96–98 percent of the Lift Irrigation (LI) area has given inequitable direct access to irrigation water, but landless people and resource-poor farmers have variously benefited through increased labor demand and wages, opportunities to buy water, and appreciation of land values. For putting poor people first, especially resource-poor farmers, field evidence points to electricity pricing and supply as powerful instruments.

On pricing, pro rata charging is bad for resource-poor farmers, with its associated high water prices and arbitrary, exploitative, and monopolistic water-selling, whereas flat tariffs are good, with their associated low water prices, buyers’ water markets, and a more dependable service from sellers. For equitable development of groundwater, flat rates offer several crucial advantages.

Resistance to flat tariffs, however, may persist or increase on account of two apprehensions, namely that flat rates will impair the viability of state electricity boards and reduce the efficiency of water and power use. These apprehensions are important although not necessarily valid. Flat rates set at appropriate levels should not undermine viability of the electricity boards; on the contrary, they should strengthen it. On supply, the management of electricity supply can increase productivity and equity, more so with flat than pro rata tariffs, with quality, including timeliness, predictability, and convenience, substituting for quantity.

Chambers, Saxena, and Shah 1989

Widening Access to Rural Electrification: Success Factors

The literature suggests that there are clearly means by which access can be widened and the poor can more likely benefit. In general, these are measures that provide the poor with more choice and more voice in acquiring and using electricity. There is some experience now with a number of strategies in rural electrification that specifically target the poor, and, in several cases, women. Such strategies for widening access could be examined, based on field investigations and case studies, for their actual impacts, not only on access

but on poverty reduction and gender equality. Some possible directions for analysis are given below.

Some of the more important recent studies that point to success factors for wider access to electricity in rural areas include the following:

- ❑ A “best practices” study of photovoltaic household electrification by Asia Alternative Energy Program (ASTAE) (Cabraal, and others 1995) with case studies in Indonesia, Sri Lanka, the Dominican Republic, and the Philippines.
- ❑ A report by the National Rural Electric Cooperative Association (NRECA) on new designs for rural electrification, based on private sector experiences in Nepal (Inversin 1994).
- ❑ A report on low-cost electricity installation for the former Overseas Development Administration (Smith 1995).
- ❑ A comprehensive research project on the role of electricity in the integrated provision of energy to rural areas of South Africa (EDRC 1998).
- ❑ Cross-national household energy research on the urban energy transition, energy, and poverty (Barnes and others 1998).
- ❑ A “best practices” study of rural electrification (Barnes and others 1998) with case studies in Thailand, Costa Rica, Ireland, Laos, and so forth.
- ❑ A “best practices” study on microhydro electrification programs (Khennas and Barnett 2000).

Tariff and Connection Policies

Tariff and connection policies are key to reduce up-front costs. One success factor in widening access to grid rural electrification in several case study countries, according to a recent “best practices” study by ESMAP, was reducing initial connection charges or spreading them over several years by rolling into the tariff (Barnes and Foley 1998). A study on the urban energy transition (Barnes and others 1998) suggests that one sensible energy assistance program for the poor is block rate tariff structures along with connection charges rolled into the overall price that the public pays for electricity, reducing barriers to entry. Lifeline tariffs have been positively reviewed, but real calculations on cross subsidies are needed (Margaret Skutsch, personal communication).

Metering systems that enable the poor to pay in small quantities, such as the prepaid cards used in South Africa, are a promising approach, especially as costs for these decrease. Decentralized systems have tried to solve the problem of upfront costs through credit, leasing, and subsidies.

Subsidies

Subsidies have been justified by the fact that access to adequate energy supplies is critical to livelihood strategies of the poor; there are, in fact, many reasons for subsidies to renewable energy (Khennas and Barnett 2000). The problem with this approach is that

subsidies may not be sustainable. It is well known that energy subsidies do not always benefit the poor but rather benefit better-off households. However, Barnes and others (1998), in their comparative urban household study, found that broad-based subsidies for transition fuels do appear to help the poor by reducing their energy expenditures and capping traditional fuels prices. Given limited resources for subsidies, Mathur (1998) advocates targeting subsidies to households that would prioritize modern energy if their incomes increased. Doing so could, in theory at least, include poor households, but it is more likely to be higher-income households.

To be financially sustainable, must efforts simply ignore the poor and aim at higher-income households that can afford the new technologies? Should marketing aim at higher-income households that not only can afford the initial costs, but can afford to take on the risk of trying out new technologies? These households can be provided with credit. Some poor households will still be able to finance and benefit from renewable energy technologies through cash purchase (gifts, remittances, savings schemes). When the technology is proven and costs drop, systems may eventually become affordable for the poorest. However, this approach not only contributes little in the short term to poverty alleviation; it runs the risk of even intensifying inequalities between rich and poor, as has often occurred in new technology introduction, for example, the Green Revolution in Asia.

Infrastructure Coordination

The need for complementary infrastructure, such as roads, markets, buildings, equipment, and skilled staff, often not provided in tandem with electricity, in order to achieve economic benefits from electrification, has frequently been emphasized. Detailed studies of health, education, and small and medium-size enterprise sectors in a recent policy research review of the development rationale for rural electrification in South Africa confirm that rural development benefits of rural electrification in that country will be limited without such institutional coordination (EDRC 1998). Some evidence even suggests that provision of infrastructure in a complementary fashion provides not just additional, but exponential benefits, as a result of the synergies available (Barnes 2000 draft).

Demand Analysis

Ranking or prioritizing areas or types of households, through detailed surveys and demand analysis, is an alternative when institutional coordination of infrastructure provision is daunting. Households and areas already possessing the potential to use electricity (more densely populated growth areas) are then targeted first, enhancing financial viability. This was found to be a success factor by the Barnes and Foley (1998) study.

There is considerable experience of demand analysis in the electricity sector, although this has not often focused on women's needs specifically. The extensive experience with

demand surveys in the household energy, and water and sanitation sectors, which have more typically used gender-disaggregation in research and analysis, may be more helpful in drawing lessons in this regard.

Financing Mechanisms

Credit in various forms for purchase or use of renewable energy technologies is used in order to overcome the market constraint of high capital costs and limited financing for renewables. However, the most optimistic credit scenario for, for example, solar home systems (SHSs) assume that 50–75 percent of rural households will be able to afford SHSs without subsidies, even with liberal credit programs and leasing in place. That still leaves 25 to 50 per cent of unconnected rural households, most likely the poorest section, without electricity.

Microcredit programs have been active in renewable energy recently, and some have experience with lending to women (such as Grameen Shakti, a renewable energy company; ENSIGN, and the Vietnam Women's Union). Others are initiating activities (Uganda PV project with Uganda Women's Bank). Many resources exist on microcredit programs experience generally, for example, the World Bank's program on Sustainable Banking for the Poor (SBP), from which lessons can be drawn.

Community-NGO approaches have been demonstrated to be effective in local capacity building and development of microlevel institutions, and integration of energy programs with the overall development process (Putti 1998). However, they are often perceived as risky, time-consuming, and input-intensive and usually only reach a fraction of the people in need. Community-based rural electrification initiatives in Laos and Nepal, however, seem to have wider replication abilities. The Nepal Rural Energy Development Programme (REDP) has had a particular gender focus and now has several years of successful experience.

Fostering private participation in small-scale infrastructure is a relatively new approach advocated to meet the needs of the poor in a commercially viable way. Details of the approach are available in deLucia (1998), and an overview of this approach and case studies, among others, on photovoltaic electricity in Brazil and hydropower microturbines in household and small and medium-size enterprise electrification in Nepal) are forthcoming in a special issue of *Natural Resources Forum* on small-scale natural resources and related infrastructure development. In relation to equity in such electricity provision, deLucia points out the following:

- ❑ Small-scale private suppliers are already active, for example, electricity customers provide reseller service to neighbors, merchants in bazaars, and minigrids.
- ❑ Small-scale infrastructure provision has both forward and backward linkages to local capital markets, suppliers, and so forth and, hence, local development benefits.

- ❑ Private suppliers are more customer-driven than public ones and can tailor the level of supply to customer demands better, for example, basic service for poor customers and higher-level service for higher-income customers.
- ❑ This approach provides greater access and is also financially sustainable.
- ❑ Although such differentiation has its drawbacks, it allows overcoming the most glaring inequity, namely the inequity between those with access to services (often subsidized) and those without.

Box 4. Targeting Low-Income Households: Necessary Dimensions of a Credit Financing Guarantee Scheme with Institutional and Organizational Support for Household Biogas Plants in Nepal

- ❖ An area or village or community where there is: a significant number of lower income households that might be potential biogas investors or users if the collateral problem is overcome and easy access to water supplies so the additional water requirements of a biogas plant does not become a heavy burden on the household, especially on women and children.
- ❖ An activist nongovernmental organization (NGO) or other entity working in the area and in particular with poorer households, preferably with previous experience both in biogas and in community or other group savings or lending.
- ❖ One or preferably more than one biogas plant supplier, preferably willing to give agent fees to an NGO that provides new biogas plant customers. A relatively convenient branch office of a participating bank. (deLucia 1998).

NGOs and community-based initiatives can also be partners in this approach. Some necessary dimensions of a credit-financing guarantee scheme are given in box 4, based on experience in Nepal with a pilot scheme with institutional and organizational support for household biogas plants in Nepal, which expands the reach of the existing biogas programs to lower income households. In this scheme, the collateral requirements of local banks are being satisfied by a form of substitute collateral and guarantee fees.

Productive Uses of Electricity

Are productive uses of electricity the key to benefits for the poor? Does decentralized electrification offer some specific advantages not obtainable with grid electrification in increasing productivity in rural areas? Cecelski (1996) argues that some such benefits of decentralized electrification may be under counted. Some of these benefits may be especially important for women, who often work at home in informal production. An FAO study (2000) of the impact of solar photovoltaic systems on rural development argues the need to go “beyond the light bulb” to have an impact on income generation.

Solar-powered lighting has been effective in pest control in southern India, and solar refrigeration has permitted increased marketing of fish in Indonesia, for example

(Kadyszewski 1998). Wind-generated electricity is the basis for women's microenterprise (popsicle-making) on a remote island in Indonesia (Winrock 1999), and microhydro generation allows grain-grinding enterprises to flourish in Nepal. The majority of benefits from solar systems financed by Grameen Shakti in Bangladesh appear to come from the use of lighting to extend working hours, whether in manufacturing (saw mill, carpenter), services (TV and radio repair shop, barbershop), or home industry (basket making, net weaving, tailoring). Other benefits of improved lighting in these small enterprises were better efficiency and quality of work, better working environment, and a more attractive and secure environment for customers (Barua 1998).

Several UNDP and Global Environment Facility projects recently designed in Asia have focused on income-generating uses of renewable energy in order to demonstrate strong linkages with the UNDP's mandate of poverty alleviation and gender equality as well as to support national development priorities in these areas. For example, a recent project designed in Palawan, Philippines, sets up a fee-for-service rural energy services company (RESCO), supported by a renewable energy development center based in a business center, to help identify opportunities for economic productive uses of renewable energy services. Other similarly oriented projects have been designed for Fiji, Mongolia, China, India, Thailand, and the Philippines. (Xiaodong Wang, personal communications)

The evidence from grid electrification is mixed, however. Dynamic rural growth areas appear to grow following electrification, whereas stagnant areas continue to stagnate. Irrigation typically produces increases in output, but this could just as well be realized with diesel pumps as with electric pumps. An interesting question for decentralized renewable energy supplies is whether by their nature they may encourage economic growth in remote areas where other energy sources are not an option. Anecdotal examples apart, there has been little examination of poverty and gender impacts of such efforts.

4

Key Gender Issues for Rural Electrification Programs

Interlinkages between gender and poverty will influence the scaling up strategies adopted for rural electrification. Measures to expand access of the poor to electricity, although commendable, are unlikely to be successful in meeting the energy needs of poor rural women without an explicit gender focus. This is not to say that gender should be the only focus; race or ethnic group, income, and other factors are often equally important. However, it appears likely that the kinds of policies and asset interventions that can strengthen the position of poor men will not necessarily automatically have the same impact on poor women. This is because the social processes leading to (energy) poverty, and hence the escape routes out of (energy) poverty, are differentiated by gender (Razavi 1998).

Current thinking on four key energy issues for poor rural women in relation to rural electrification programs are described below:

- ❑ *Data needs and analysis.* Disaggregation of energy use, supply, and impacts by gender in order to provide a better basis for applying well-known field methods and analytic tools for incorporating gender in project design and implementation, as well as at the macro policy levels
- ❑ *Wood energy, cooking, and health.* Finding integrated approaches and various solutions (including fossil fuels and perhaps electric cooking) that recognize the importance of wood energy and cooking, especially for poor women, and health implications
- ❑ *Women's specific electricity needs.* Addressing water pumping, agricultural processing, security, work productivity, and health in the framework of sectoral development initiatives
- ❑ *Equal access to credit, extension, and training.* To assure energy supplies for women's domestic tasks as well as their microenterprise and agricultural activities.

Data Needs: Disaggregation and Analysis by Gender

Lack of statistics about how, why and how much energy is used by men, women and children is not the reason but an indication that attention is not paid.

Parikh 1995

There is no shortage of field methods and analytic tools for incorporating gender as an important factor in the design and implementation of energy projects, as Skutsch (1998) points out. In order to make use of these tools, however, basic information is needed about the differential activities, roles, preferences, constraints, participation, and access by women and by men. Women engage in different activities than men, and they use energy differently than men. For example, they often have different preferences for home lighting connection points.

Certain questions must be addressed. For example, are women or men the customers? If the customers are women, do they have access to cash income that will allow them to purchase the energy system? What do they need electricity and energy for? Who controls the income and who makes the decision in the household to purchase energy appliances?

Concerning finance, what is the share of loan portfolios made up of women versus men? What are the repayment rates for women versus men? We know that women generally have an excellent credit record in microcredit schemes; is the same true for renewable energy financing? What have been the impacts of various institutional and promotional approaches on women in terms of actual benefits, not just the number of installations?

Few studies have been made of the impact on women of renewable energy interventions (see Dhanapala 1995 for a rare example), and these have been hampered by lack of disaggregated data. Disaggregating information by gender about needs, preferences, income and expenditures, decision making, access to credit, and information in market surveys; disaggregating information about benefits and impacts in monitoring and evaluation studies; disaggregating information about staffing and employment in progress reports—all of these would improve the data on which projects are based and very likely the benefits of renewable energy to women.

It is at times astonishing that even many otherwise excellent socioeconomic analyses of the energy sector, while discussing cooking and other rural energy uses, continue to use such terms as “the villagers,” “the community,” “customers,” and “the poor,” as if the gender of these actors made no difference to the processes or strategies discussed.

Box 5 illustrates a gender- and poverty-sensitive management tool for assessing end user needs and monitoring and evaluating the social development-related impacts of World Bank rural energy projects, with a focus on poverty and gender implications. This tool is being developed under ASTAE’s Energy, Poverty, and Gender project. Lack of

data is another reason why gender issues have not been adequately addressed in macrolevel policies, such as energy investment, imports, and pricing (although it also can be argued that lack of data is the result, not the cause of this neglect). Most attention has been at the microlevel in terms of technological interventions, such as cook stoves, biogas, solar cookers, and wood plantations (Parikh 1995). Kerosene and gas import and pricing policies, in particular, affect energy availability for cooking. Electrification pricing and connection policies similarly affect energy availability for lighting and other tasks. Tools that could be applied in the energy sector engendering macroeconomic planning and management in national budgets are available. (see, for example, Esim 1998).

Box 5: User-Centered Framework for Monitoring and Evaluating Rural Electrification Projects (ASTAE EnPoGen/Winrock/ESMAP/ENERGIA)

The EnPoGen project methodology can be used for productive uses as well as any energy source. This is part of a World Bank ASTAE/EnPoGen (Energy, Poverty, and Gender) and ESMAP initiative to generate valuable, replicable, and good practices for application in future World Bank rural electrification projects. The objective is to develop a management tool for assessing end user needs and monitoring and evaluating the social development-related impact of World Bank rural energy projects, with a focus on poverty and gender implications. The resulting framework will be implemented and tested in the World Bank/Global Environment Facility Cambodia Renewable Rural Electrification Project (start-up scheduled for late 2002).

The approach integrates complementary participatory community assessment and social impact survey methodologies. A feedback loop provides information for community members, service providers, project planners and implementers, and policymakers, and feeds information from participatory assessments to surveys and vice versa. It is useful not only for post-project evaluation, but also for project design and ongoing project implementation and assessment.

The approach builds upon two existing World Bank methodologies:

- ❖ The Methodology for Participatory Assessments developed by the IRC International Water and Sanitation Centre and the World Bank's Water and Sanitation Program.
- ❖ The benefit assessment and valuation methodology (BAVM) developed by ESMAP for the Rural Electrification and Development in the Philippines Project.

While the MPA is highly participatory, poverty-focused, and gender-sensitive, and able to highlight the community's self-defined needs, it was adapted for use in rural electrification projects and made applicable to stand-alone energy systems. While the BAVM is applicable in an electricity project context and able to measure social impacts in monetary terms useful to World Bank energy projects, it was revised to take into account gender considerations, and adapted to be used for ongoing project monitoring in addition to evaluation.

Source: Gregory 2002.

Wood Energy, Cooking, and Health

The purpose of an integrated approach would be to maximize the effect of rural electrification, while recognizing its limited potential in current conditions to meet what are arguably the most important of all—thermal—needs, and thus paying attention to the provision of biomass and hydrocarbon fuels to provide the latter.

EDRC 1998

Cooking is women's most important energy need in terms of time and effort. Biomass continues to be the main source of cooking energy in developing countries, accounting for about one third of all energy and nearly 90 percent in some countries. Cooking is a very large share of household energy consumption and the largest single rural energy use in low-income countries. Cooking and heating with biomass and fossil fuels may contribute to carbon dioxide emissions and in some areas to deforestation and soil erosion. This means that, unless cooking needs are addressed, positive impacts on carbon dioxide emissions, on deforestation, and on women's health and time will be fairly marginal.⁶

Health risks of indoor biofuel cooking are now well known. In fact the World Bank has classed indoor air pollution in developing countries among the four most critical global environmental problems. The largest direct impact seems to be respiratory infections in children and chronic lung disease in nonsmoking women. This is one of the few energy-development linkages that has been well documented empirically. Other health impacts of biomass use include those due to gathering heavy loads of biomass in distant and sometimes dangerous areas. Indirect health impacts from lack of fuel for

⁶ Cooking and heating do not *have* to contribute to carbon emissions of course, if the supply is managed sustainably. Rationalizing biomass fuel supply (including increasing the costs) and improving biomass fuel technologies (which will be easier when biomass fuel prices go up) are likely solutions (Margaret Skutsch, personal communication).

proper cooking (malnutrition) and for boiling water (diarrhea and parasites) may be significant, although difficult to document (based on K. Smith in UNDP 1997).

The following three solutions aimed both at addressing these health problems and at easing pressure on rural biomass resources and forests have been proposed (Wim Hulscher, personal communication):

1. Switch to kerosene and liquefied propane gas (LPG). (This may be of particular interest from the health sector point of view, since this could be accomplished on a wide scale through macroeconomic pricing policies.)
2. Improve current wood stoves. (This may be of particular interest to environmental concerns, since greenhouse gas emissions would be reduced.)
3. Introduce solar cookers or ovens, biogas, or electricity for cooking.

Box 6: Linking cooking energy with the Millennium Development Goals

Findings of the Tata Energy Research Institute (TERI)/World Bank Regional Workshop on Indoor Air Pollution, Household Energy, and Health, New Delhi, June 8–10, 2002 include the following:

- ❖ Indoor air pollution (IAP) is estimated to kill 2 million women and children every year: about 500,000 deaths of women and children in India, about the same in China, and the remaining 1 million in other developing countries.
- ❖ WHO will soon rank the sustained household exposure to burning solid fuels as the fourth or fifth highest global risk to health after malnutrition, bad water and sanitation, and HIV/AIDS.
- ❖ The Millennium Goals for reducing infant mortality under five years of age cannot be met without addressing IAP. Gender obviously has a major role to play.
- ❖ Women in all developing countries spend between 2 to 9 hours each day collecting fuel and fodder and cooking. A study in Uttarachal, India, found miscarriages to be five times the national average at 30 percent, and linked it to heavy load-bearing during pregnancy. In Nepal, women suffer a high incidence of uterine prolapse that is in all likelihood linked to carrying heavy loads of wood soon after childbirth. Men of the developing world spend about 10 times less on such daily drudgery. Since biomass fuels are used mostly by lower-income groups, and women do most of the cooking, health is a significant issue in energy, poverty reduction, and gender.

What is the potential for electric cooking? Electricity is not usually advocated for cooking; it is thermodynamically inefficient and expensive for cooking. Nonetheless, electricity is already used for cooking in rural areas of some countries where women are moving into paid employment and appreciate the speed and convenience of cooking with electricity. Cooking with electricity is even being encouraged in some areas with excess hydro capacity. Development of low-cost, low-wattage thermal appliances such as

burners, kettles and irons is being pursued in Nepal. But clearly the majority of cooking needs cannot be met by electricity.

Some electricity providers, recognizing the need for cooking energy, are seeking to address cooking needs with other fuels while offering electricity for lighting (consider South Africa, India). Cooperation of utilities with biomass energy and improved stove programs is another strategy.

Addressing Women's Electricity Needs

One of the main problems for the women of [marginalized urban shantytowns of] Tacna [Peru] was the absence of electricity in their homes, for several reasons: they wanted to make the most of the evening to speed up their textile work; they needed to feel secure in their homes; they needed to facilitate the task of caring for their children; they needed to make the night less dark; they needed to light the streets that they and their families used.

Yturregui 1998⁷

Rural electrification and technology research need to specifically address women's needs for labor-saving, for time-saving, for improved health, for security, and for income. Women use electricity differently than do men, and they have different electricity needs.

Analysis of rural energy end use patterns typically does not distinguish between women's and men's energy uses. In fact, some of these may be quite different, depending upon gender-specific roles and activities. Many rural energy end use tables do not even include some of women's most critical end uses, such as drinking water pumping, food processing, fuel collection and crop transport, and transplanting and weeding in agriculture. This is, of course, because these household tasks are presently accomplished mainly with human energy, which is not included in energy balances.

Electricity use by rural women, especially poor rural women, is currently low. But clearly, electricity can help meet some of women's high priority energy needs, such as the following:

- ❑ *Reducing labor in water collection by energizing water pumping.* Drinking water pumping is almost always the highest priority for women, unless clean water is

⁷ Interestingly, with no prospect of electrification in sight, this group of women, with UNIFEM support, decided to cope by improving the *mecha chua*, a traditional handmade candle. The women added mechanisms for faster lighting; making the kerosene fumes safer; making better wicks; making it more stable on the wall; saving fuel by using water; preventing accidents from happening when the lamp is on; and even making it more artistic and attractive with colorful decoration. The women manufacture the lamps themselves with plans to market in other marginalized areas of the city as an income-producing activity.

already available. There is a vast experience of planning and maintenance of drinking water installations by local women's organizations that can be drawn on here (van Wijk-Sijbesma 1998). The use of off-grid electricity to improve availability of clean water would have a high value to households in terms of health and quality of life and a particularly positive impact on women's time and labor-saving, and possibly their employment and confidence-building, through drinking water projects.

- ❑ *Saving labor and time in cooking where feasible*, for example, with excess output from small hydropower, perhaps with low-wattage, low-cost appliances, as discussed above.
- ❑ *Saving women's time and labor in agricultural processing, such as grain grinding, rice hulling and oil extraction*. Postharvest food processing is one of the most drudging and tedious of rural women's tasks. Electrification of rice mills and other grain, oil, and food processing facilities can thus reduce women's workload in the home. Indeed, these are typically the first rural industries to electrify after grid extension. Benefits arise from the time and effort saved in processing or from costs saved when a diesel mill electrifies, if these costs are passed on to consumers.⁸
- ❑ *Improving security and women's ability to participate in community and school activities at night, with street and community services lighting*. Safety is a major concern of women and often of men, too, that can be addressed by electric lighting. Electric lighting reduces both crime and fires, for which women are often blamed and even hunted down for witchcraft in parts of Africa.
- ❑ *Making women's domestic work easier and improving the productivity of women's income-earning work* through home and commercial lighting, refrigeration and key appliances, such as blenders and irons, with connection points, naturally, in the places around the house where women work. Lighting, the most common household use of electricity is unquestionably highly valued by households. But their effects on quality of life and development have been little studied. Anecdotal evidence suggests that the entertainment benefits of electricity are most appreciated by men, since women are usually too busy to partake of them. But lighting can enable the extension of working hours of both women and men, in both domestic and income-earning activities, for better and for worse; and

⁸ Postharvest food processing activities are also a major source of employment for poor women, however, and increasing the efficiency of production processes can result in control being taken over by men, with women losing employment, as happened with the mechanization of rice hulling in Indonesia and Bangladesh. The impact of electrification of postharvest processing on women's labor may also be limited because many of women's food processing tasks—such as fish smoking, baking and beer brewing—require thermal energy and thus rely on biomass. Others may be more appropriately improved through better hand, animal or mechanical means.

- ❑ *Enhancing women's and family's social capital*, whether health (water purification, lighting, and refrigeration in clinics, and perhaps in innovative ways, such as solar-operated fans to remove smoke from kitchens) or education (reading and homework). There is some evidence that women's leisure time (reading, radio, TV) increases with electrification (although the reasons for this are unclear) (Barnes 2000), and this could contribute to health and social capital. Providing clean water by energizing water pumping could also contribute to health.

Ensuring these benefits from electrification for women will depend not only on provision of complementary infrastructure and intersectoral coordination, but on specific attention to women's needs and capacities in accessing credit, extension, and training.

Box 7: Rural Electrification Benefits Women's Health, Income, and Status in Tunisia

In Tunisia, the longstanding (mainly grid) rural electrification program appears to have achieved significant benefits for women by explicitly integrating rural electrification in a national rural development policy in support of education, health, and gender equality. A 2001 study on user perceptions of benefits illuminated a number of positive linkages, according to users, between rural electrification and education, health, and the quality of life. Women and girls, in particular, appear to have benefited from improved access to education, health services (especially reproductive health), information from TV, and economic opportunities.

See appendix 2 for more details.

Microenterprise Support through Equal Access to Credit, Extension, Training

Women already have a track record of functioning as effective entrepreneurs in visibly successful organizations and networks (like Grameen, SEWA, etc.). The challenge is to transform them and their organizations into energy entrepreneurs.

Batliwala and Reddy 1996

Institutional factors, such as access to credit, extension, and training are already recognized by renewable energy experts as the principal constraints to renewable energy promotion. All of these constraints are exacerbated for women, so specific approaches are needed to reach women.

One of the key areas for enabling women's participation in improved energy equipment is credit and finance. Credit is already a focus of efforts to scale up rural

electricity access. Yet women do not have the same access to credit as men do, receiving about 10 percent of credit from formal institutions. Women need access to credit and other promotional strategies in order to benefit from renewable energy. Benefits can include the ability to purchase household appliances or obtain connections, to improve energy efficiency in their microenterprises, and perhaps to work as energy entrepreneurs. The latter two are especially important, because women use additional income from their enterprises for food, school fees, clothes, and other basic needs for their households.

A study by Women's World Banking identified a number of financing programs that have been successful in providing microcredit to women: poverty-focused programs within commercial banks; poverty lending banks; NGOs; and affiliate network institutions. The average loan size is, in some cases, in the right order of magnitude for solar home systems, for example. Furthermore, the repayment rates are quite high, mostly in the high 90 percentile range.

Numerous resources are available on microcredit programs, including gender aspects, such as the Sustainable Banking for the Poor program in the World Bank. Some of the factors that make these credit programs accessible to women include the following:

- ❑ Access to credit, not subsidies.
- ❑ Small loans with frequent and flexible repayment schedules.
- ❑ Alternative collateral requirements.
- ❑ Low transaction costs to the client (in money and time).
- ❑ An informal banking atmosphere where women are respected.
- ❑ Simple loan application procedures to accommodate illiteracy.
- ❑ The use of information channels that are accessible to women.

Little is documented about women's access to credit in renewable energy programs, although ongoing experiences by IREDA, ENSIGN, the Uganda Women's Bank, Grameen Shakti, and the Vietnam Women's Union may soon offer some lessons. Some ENSIGN experience is described in box 8.

Although credit can play an important role for women, still, credit is not a panacea for access to electricity by poor women. The effective use of micro-credit requires complementary resources—land, skills, capital—which many poor women lack. Scaling up rural electricity thus confronts the same issues not only of poverty alleviation, but of women's empowerment as a necessary condition for real development.

Box 8: Financing Energy Services and Income-Generating Opportunities for the Poor (ENSIGN)

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

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

Following are some lessons from the ENSIGN project:

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

Source: Ramani 2002.

5 Findings and Needs

This paper has reviewed the current thinking on energy, poverty, and gender, with a focus on rural electrification and renewable energy, as an initial attempt to conceptualize linkages and needs in this area. Some findings of the review include the following:

- ❑ Gender and poverty challenges in energy access are arising in the context of renewed interest in rural electrification, especially renewable energy, as a tool both for sustainable energy development and for greater equity in rural areas. Poverty reduction and gender equality are now integral goals for all major development institutions. Energy programs are seeking models and approaches to respond to these mandates.
- ❑ Gender issues have attained increased prominence in the debate on sustainable energy development over the last two decades. A number of energy programs are starting to pay closer attention to gender and are launching important initiatives, encouraged by the development of national and international networks on gender and energy.
- ❑ Despite these developments, the importance of bringing a gender perspective to energy policy analysis and design is still not widely understood, nor have the lessons for development been fully integrated by donors or national policy makers.
- ❑ Current efforts on gender and energy focus on the following:
 - ❑ Building up a body of evidence and experience (conceptual, methodological, and case studies) linking attention to gender in energy policy and projects to equitable, efficient, and sustainable outcomes in energy and development.
 - ❑ Advocacy in national and international arenas on the importance of bringing a gender perspective to policy analysis and design.
 - ❑ Capacity building and assistance to energy programs, policy, and projects in integrating a gender perspective.
 - ❑ Creating networks and institutions at the national, regional, and international levels to support these efforts at the practical and political level.
- ❑ Thinking and interest in gender and energy has also advanced recently, and a number of renewable energy programs have had experience with targeting women. Most of these have not yet been well documented. The growing literature on energy and gender focuses mainly on poor rural women, on wood energy, and on microlevel (household and project) analysis.
- ❑ In current thinking on energy and poverty, renewable energy and energy efficiency must find their places in integrated approaches that provide the poor with more choice and more voice in the energy sector.

- ❑ Energy is not a significant element in current thinking in social development. Working relationships between energy macroeconomists-engineers and social development experts (noneconomists) have been slow to develop. For donors, “energy” has focused on power plants, not fuelwood used by the poor.
- ❑ One reason for this may be the lack of empirical evidence demonstrating strong linkages of energy interventions, including renewable energy ones, to impacts and benefits for the poor (in contrast with some other sectors, such as health and water, where quantitative analysis of these linkages is well advanced).
- ❑ Another reason may be the very different discourses, or “ways of thinking,” in the energy sector and on poverty and gender. Poverty and gender thinking prioritizes people, whereas energy thinking often prioritizes other objectives, such as efficiency or environment. Both have their places, but their points of common interest and thinking have to be sought.
- ❑ Considerable experience now exists on strategies to widen access to rural electrification, including decentralized programs, that could be reviewed now. For example, solar home system experiences were last analyzed in 1995; given the rapid pace of developments in this area, there are many experiments that may offer new lessons. Several “best practices” studies suggest a number of effective policies for improving energy access by the poor.
- ❑ Promising approaches to increasing equity in rural electrification programs include the following:
 - ❑ Appropriate tariff and connection policies, including, for decentralized systems, credit and leasing.
 - ❑ Investigating the role of subsidies and the impact of restructuring of the power sector on subsidies and access.
 - ❑ Demand analysis, including using gender-disaggregated analysis.
 - ❑ Financing and other institutional mechanisms, including microcredit, RESCOs, community and other NGO-based approaches, and private participation in small-scale infrastructure provision.
 - ❑ Productive uses of electricity, especially uses that may be possible only with decentralized systems.
 - ❑ Institutional coordination of complementary infrastructure.
- ❑ Two research questions with operational implications that arise are as follows:
 - ❑ What is the relationship between specific energy strategies and poverty reduction (as opposed to merely widening access)? Although anecdotal evidence is available, there are very few empirical studies that convincingly demonstrate a linkage as there are in other sectors (for example, health).
 - ❑ What is the effect on the poor of privatization and market reform in the power sector? Experience in this area is relatively new.

Gender issues have rarely been addressed more than perfunctorily in socioeconomic assessments in rural electrification programs or indeed in the

energy sector in general, however, and more than likely this will not happen without a specific mandate and approach.

- ❑ Four gender issues that rural electrification programs should focus on are as follows:
 - ❑ *Data needs and analysis.* Disaggregation of energy use, supply, and impact by gender in order to provide a better basis for applying well-known field methods and analytic tools for incorporating gender in project design and implementation as well as at the micro- and macropolicy levels.
 - ❑ *Wood energy, cooking, and health.* Seeking integrated approaches and various solutions (including fossil fuels and perhaps electric cooking) that recognize the importance of wood energy, cooking, and health.
 - ❑ *Women’s specific electricity needs.* Addressing water pumping, agricultural processing, security, work productivity, and health in the framework of sectoral development initiatives.
 - ❑ *Equal access to credit, extension, and training.* To assure electricity supplies for women’s domestic tasks as well as their microenterprise activities.

The findings above indicate the following needs to:

- ❑ Disaggregate data by gender routinely throughout the rural electrification project cycle.
- ❑ Document existing experiences in order to provide empirical evidence of strong linkages between energy, poverty reduction, and gender and examples of “best practices,” models, and approaches.
- ❑ Encourage and support a dialog and interaction between ways of thinking in energy as they pertain to poverty and gender, as well as create capacity to work in this interdisciplinary area.
- ❑ Develop new approaches to integrating energy (including decentralized supply options) with other development sectors.

Given the recent burst of interest and activities in this area, and the limited existing capacities available (experts and organizations, especially in the South), any initiatives will be well advised to focus on capacity building, to interact closely with other programs, and establish effective partnerships with the various organizations now interested in energy, poverty reduction, and gender equality.

Appendix 1: List of Experts Contacted

Bina Agarwal, Institute of Economic Growth, Delhi

Wendy Annecke, Energy, Poverty and Development Program, EDRC, University of Cape Town

Douglas Barnes, South Asia, World Bank

Andrew Barnett, Sussex Research Associates Limited, Brighton, United Kingdom

Gustavo Best and Bart van Campen, FAO

Ramesh Bhatia, Senior Analyst, deLucia and Associates

Joy Clancy and Margaret Skutsch, Technology and Development Group, University of Twente

Deborah Cornland, former Energy director, Stockholm Environment Institute

Russell deLucia, deLucia and Associates

Kiran Dhiranpala, Sri Lanka

Soma Dutta, formerly of TERI, India

Simel Esim, International Center for Research on Women

Gerald Foley, Panos Institute, United Kingdom

Dharam Ghai, former Director, United Nations Research Institute for Social Development (UNRISD); former ILO chief, Rural Employment Policies Branch

Govind Kelkar, Gender, Science and Technology Program, AIT, Bangkok

Hasna Khan and Asma Huque, Energy Systems and Prokaushali Sangsad, Bangladesh

Dominique Lallement, ESMAP

Dorothy Lele, CIDA consultant, Canada

Matthew Mendis, AED

Sheila Oparaocha, ENERGIA Coordinator, ETC Netherlands

Venkata Ramana, Energy, Winrock India

Amulya Reddy, President, International Energy Initiatives, Bangalore

V. Santakumar, Center for Science and Development, Kerala

Kiran Man Singh and Satish Gautam, REDP and Nepal

Judy Siegel, Energy, Winrock Foundation headquarters

Kirk Smith, East-West Center, University of California–Berkeley

Xiaodong Wang, UNDP and GEF (Global Environment Facility) consultant in renewable energy (Asia and Pacific)

David Woolnough, Energy Adviser, Department for International Development (DFID)

Carol Yong, APDC, Malaysia

Appendix 2: Rural Electrification Benefits Women's Health, Income, and Status in Tunisia

Rural electrification in Tunisia is rooted in a strong national commitment to a broader program of rural development, gender equity, and the reduction of social inequities. The increase in the rate of rural electrification, from 6 percent in 1976 to 88 percent in 2000, has been paralleled by a reduction in the incidence of poverty from 40 percent at independence in 1956 to 7 percent in 2000; achievement of almost full enrollment of children in primary school; the growth of life expectancy from 50 to 70 years; and improvement in the status of women, with women now comprising a third of the labor force. The rural population in this period has stabilized, with the rate of urban growth passing from 4.3 percent in 1975 to 1.2 percent in 1999, despite a doubling in the total population. At present, 35 percent of Tunisians live in rural areas.

Improvement in health services programs (including family planning) and basic education programs were two of the three pillars of the national rural development drive that contributed to these achievements. The third pillar was rural electrification.

The development of rural women's conditions is closely linked with the evolution of health and educational conditions in rural areas in Tunisia. This improvement is clear from demographic trends following independence. In the 1950s, Tunisian women had on average six births; infant mortality was 50 percent. In the 1960s, infant mortality declined drastically, while fertility boomed, resulting in a high natural population growth. By the early nineties, however, the rural fertility rate was reduced to 3.7 percent (compared to 2.6 percent in urban areas). Tunisia is now rapidly approaching the model of two children per family.

Key factors in these improvements included the rapid development of basic health infrastructure required for the implementation of eradication programs against endemic disease, development of health personnel, and reduction of regional disparities between urban and rural in term of doctors per capita, development of primary health care through the reinforcement of basic health centers' role, improvement of the nutritional state of children; and increase and improvement of medical consultations before and after birth, and follow-up during pregnancy.

These key factors were all supported by rural electrification, as demonstrated in May 2001 by an informal socioeconomic rapid appraisal done in connection

with a study for ESMAP on the main factors in the success of rural electrification in Tunisia. This study on user perceptions of benefits illuminated a number of positive linkages, according to users, between rural electrification and education, health, and the quality of life. Women and girls in particular appear to have benefited from improved access to education, health services (especially reproductive health), information from TV, and economic opportunities.

The assessment was carried out in four villages in three regions of Tunisia: Bizerte in the North, Siliana in the Center-West, and Nabeul in the Northeast. The areas chosen had had electricity for between two and five years. The survey team conducted interviews with 54 households as well as with key informants in health, family planning and rural development services, and agricultural and agroprocessing users. Family planning assistants, who have a long experience of direct relationships with rural families in a larger population, interviewed an additional 50 households. The appraisal explored not only perceived benefits of rural electrification but also problems in service, for example, power cuts.

User Perceptions of Benefits of Rural Electrification: Education, Health, Status, Income

The household users had quickly taken advantage of connections. Each had on average two lights per room. Refrigerator, TV, and radio ownership varied between 1 for every 2 households and 1 per household, and some households owned cable dishes. (Nationally, 72 percent of Tunisian households owned refrigerators in 1994, and 92 percent owned televisions, of which 70 percent were color.) The beneficiaries were well aware of the benefits of rural electrification.

Education is the number one priority for families in all walks of life in Tunisia, so it is not surprising that the first benefit of rural electrification cited by households with school-age children is improving homework and school performance, while at the same time avoiding eye problems from using candles and kerosene lamps. Schools assert that the rate of enrollment of girls caught up with that of boys after electrification not only of households, but also of schools and public streets. Public lighting has reduced the risk of journeys to school, an important concern for families with girls. The construction of tarred roads, in a coordinated rural development effort, has also contributed to reducing the rate of absenteeism. Within schools, electric lighting has improved conditions, especially during the early dark hours of winter, when students previously were obliged to bring their own candles. All this is believed to have contributed to an increase in the rate of graduation to 60–70 percent in these rural areas.

Basic health and family planning has been the second most important social priority of the Tunisian state, after education, and this is also reflected in the benefits perceived from rural electrification. Rural electrification was provided at the same time as were clean water and well-equipped and staffed health clinics. For example, a nurse is permanently available, even in remote clinics, a general

practitioner visits once a week, and a specialist health team visits regularly. Health clinics have lights, a refrigerator, negatoscope, sterilizer, popinel, fans, oil heaters, radio, TV, and some have VCRs and health education videos. The majority of drinking water points are equipped with pumping devices, with electricity much in demand to replace diesel.

Beneficiaries and health staff attributed at least part of the responsibility for the reduction in the birth rate in their area to rural electrification, which increased the effectiveness of family planning and other health programs. Clinics report being able to expand the range of their equipment and services, for example, TVs and videos present programs on public health and disease prevention in some waiting rooms; instruments can be sterilized; and vaccines for babies and antitetanus shots for pregnant women are more widely available. According to a nurse attached to one clinic, the availability of refrigeration for vaccines and medicines has contributed to a noticeable reduction in childhood diseases, diarrhea, and poisoning.

Women's reproductive health in particular is seen as benefiting from electrification: women with electricity organize their daily tasks so that they have time to watch TV, which passes on many health messages on, for example, reproductive health and contraceptive methods; vaccinations; the prevention of sexually transmitted diseases; and health checks for breast cancer and colon cancer. The family planning units in these villages now use audiovisual aids in the village, making awareness-raising campaigns more effective. Better information for girls from family planning services, but above all from TV, is credited with the rapid decrease in teenage pregnancies. Even tube tying and implants, which require hospitalization, have been facilitated by electricity: with refrigeration, women are less reluctant to absent themselves from their household tasks, because they can prepare and store meals for their families in advance.

Women and health staff also perceived other changes in women's quality of life resulting from rural electrification. Both husbands and wives are reported to spend more time at home. Installation of TV (and even satellite dishes) in their homes means that women have become much more aware of political events of the day and know much more about what is going on in the world even than their husbands, thus giving them confidence to speak up and defend themselves and take more leadership roles. Rural women and children, especially girls, are becoming more demanding about personal hygiene and fashion conscious, following the latest TV advertisements and fashions.

Increased economic opportunities in the home and village for women are perceived as one outcome of electrification. Electric lighting makes evening activities possible, and many girls say they prefer to stay in the village and earn a living using a sewing machine, weaving, or knitting rather than work in the city as maids. Working as seamstresses and hairdressers (presumably a result of the

increased fashion consciousness) figure prominently among new economic activities seen as developing as a result of electrification. Equipment is often contributed to households by various state development programs. Refrigeration is also valued for allowing food and medicines to be conserved and for allowing money to be saved because people can make larger and less frequent purchases at once.

Based on Cecelski and others 2002.

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