# ENERGY AND POVERTY IN NEPAL

## Challenges and the Way Forward

United Nations Development Programme

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UNDP Regional Centre in Bangkok

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# Foreword

More than a billion people in the Asia-Pacific region do not have access to electricity and 1.7 billion are dependent on traditional biomass fuels for their cooking and heating needs. Access to affordable modern energy services can improve their productivity and enhance their living standards.

Even so, there are no specific targets for the energy sector in the Millennium Declaration, a historic document signed seven years ago by the world's leaders. Affordable and sustainable modern energy services are a necessity for countries to meet their Millennium Development Goals (MDGs). Efforts of the countries in the Asia-Pacific region to meet these aims will be hindered unless adequate attention is paid to the crucial role energy services play in the development process. This is particularly true for the economic, environmental and social well-being of the poor.

With fluctuating energy prices, the poor in many countries in the Asia and Pacific region face a daunting future. For them, access to affordable and essential modern energy services, which could improve their living conditions and ensure a means to earn a living, will fall outside their reach.

Recognizing the urgency for countries to factor in access to modern energy services, particularly when shaping national poverty reduction initiatives, the United Nations Development Programme (UNDP) provided technical and financial support for national-level rapid energy assessments. The primary aim of this work, carried out through the UNDP's Regional Energy Programme for Poverty Reduction (REP-PoR) and completed in 2006, was to identify gaps and priority needs in linking energy services provision with poverty reduction.

The framework for rapid gap assessments linking energy and poverty was developed as a joint effort of the UNDP Regional Centre in Bangkok (RCB) and UNDP country offices in the region, with the support of experts from the region. The draft framework was discussed at two sub-regional meetings, one held in Bangkok, Thailand (August 2005), and the other in Apia, Samoa (September 2005). The meetings were helpful in customizing the framework to suit specific needs and circumstances of the participating countries.

Subsequently, the UNDP country offices held national-level stakeholder consultations to consolidate the findings and recommendations of the assessments. This work benefited immensely from the support of government officials and representatives of civil society. Documented in individual country reports, this work serves as a resource and reference material for programming and planning for access to modern energy services for the underserved, particularly, the poor.

This document is a summary of the Country Report on Nepal and is part of a series of REP-PoR's Asia-Pacific publications. It draws on the key findings of the country report, summarizes the challenges faced at the national level and provides priority recommendations. Specifically, critical issues related to energy policy, including institutional structures, regulatory frameworks, priority programmes, financing measures, gender concerns, as well as monitoring and evaluation support are highlighted. It offers a way forward, outlining issues and options for the country.

Our hope is that this document will be of relevance to national policy-makers, development partners, energy service providers, civil society organizations and academia in implementing various measures to promote access to modern energy services for the poor.

**Elizabeth Fong**
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# Preface

This report sets out to examine the ways and means for providing affordable, accessible and reliable energy services towards achieving the Millennium Development Goals (MDGs) and poverty reduction in Nepal. The underlying premise of this study is that access to affordable and sustainable sources of energy has strong links with poverty reduction. This is particularly the case in terms of energy and its effects on household income, health, education, gender and the environment. The report also offers options for the country to overcome its energy sector challenges.

In the context of Nepal, which has significant level of income poverty and high inequality of resource endowments, more than one-third of the population – primarily rural – lives on less than one dollar a day. There is a significant urban–rural divide that dictates a wide range of energy access and types of energy consumed. Only 40 percent of the total population has access to electricity of one kind or another, and only 27 percent of those served are rural residents. Poor communities and households are forever linked to inefficient fuels for cooking, heating, agro-processing, lighting and other end uses.

This study examines critical energy issues in Nepal, including the institutional structure of the energy sector, policy and regulatory frameworks and sectoral programmes. It analyses reasons for the narrow reach of energy services to rural provinces, dependence on traditional fuels and inefficient technologies, restricted supply of energy by rural energy enterprises and inadequate means of financing for energy. Gender concerns are also examined in rural energy projects and programmes. It highlights the urgent need for key data and indicators to support monitoring and evaluation of energy access for areas that are least served.

This report concludes that the lack of a single institution that can coordinate the entire energy sector is a major constraint to the creation of a comprehensive pro-poor energy strategy. Such an institution could be established or an existing one could be strengthened to enhance and facilitate inter-agency coordination. The proposed institution could

provide a socio-economic vision and a poverty reduction road map to the entire energy sector. It could bring together fragmented energy markets; remove barriers to efficient functioning of existing and new markets; promote the exchange of information; encourage coordination; and avoid duplication of efforts among various isolated players.

Promising energy initiatives can and do exist in Nepal. For instance, the Government's Renewable Energy Policy has enabled the emergence of micro-level energy enterprises such as biogas, solar and wind power. The Rural Energy Development Programme (REDP) launched in 1996 by the Government in collaboration with the United Nations Development Programme (UNDP) successfully promotes a decentralized, public-supported and community-led rural energy model. The model offers a viable institutional option complementary to a traditional decentralized approach. The REDP model has emerged in the backdrop of Local Self Governance Act in 1999 by enabling legislation to strengthen the capacity of local government agencies to plan, administer and evaluate energy service delivery to rural areas.

Furthermore, Nepal's main micro-finance institute, the Rural Microfinance Development Centre (RMDC), has been a successful financing model. It operates as a wholesale lender to rural cooperatives and to non-governmental organizations (NGOs) providing financial services to the poor. It has recently suggested that it will expand it financial services to include the provision of energy services for the poor.

The REDP has developed a success model of integrated rural energy programmes and has served as a foundation of national energy policy. Nonetheless, coordination and decentralization of the energy sector and access to finance have been major stumbling blocks in expanding the model. The country urgently needs integration of a strong energy component in the larger rural development programmes that respond to local requirements. By increasing the reach of the REDP's model, the National Planning Commission could work more collaboratively with the Ministry of Local Development (MLD) to advocate decentralization of energy access. To enhance access to finance at all levels, policy advocacy and restructuring of national financial mechanisms could be addressed. This could include encouraging improved credit mechanisms that would move away from subsidies and grants that provide only one-time financing of renewable energy technologies.

We trust that the report is unique in terms of giving insights into bridging the gaps between the access to energy and poverty reduction efforts in Nepal. Our aim is to provide country-specific information on

institutional structures, energy resources, policy recommendations and capacity and financial gaps that can point the way towards improving access to modern energy services, particularly for the poor.

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# Acknowledgements

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This report is the first in the series of nine country reports for Asia and a synthesis report on similar lines for the Pacific island countries. Like any multi-stakeholder work, this report reflects the efforts of many people over last two years. We would like to express our appreciation for the inputs, suggestions and support provided by them. We appreciate the excellent support provided by the energy and environment team of UNDP Nepal in the entire process of the gap assessment and the preparation of the original country report. We acknowledge the national expert Govind Nepal, who was responsible for preparing the original country report and went the extra mile in capturing, consolidating and processing all the inputs gathered from an elaborate country consultative process. Ibrahim Hafeezur Rehman provided overall technical support and insightful guidance in the preparation of the original report to the country team. We place on record our appreciation for the national country team consisting of the Advisory Committee members Madan B Basnyat, Mahesh Acharya, Baburam Ranabhat, Bikash Raj Pandey, Ganesh Ram Shrestha, Sundar Bajhgain, Lisa Simrique Singh and Kiran Man Singh. Feedback and helpful insights from more than 200 participants of the consultation workshops organized in Kathmandu, Nepalgunj, Pokhara and Biratnagar cities of Nepal during the finalization have enriched and helped finalizing the gap report.

The final production of this abridged version owes much to the efforts of the UNDP Country Office focal point in Nepal, Tek Bahadur Gurung, and contributions of Kamal Rijal and Usha Rao. The analytical structure and conceptualization of the gap assessment report went through many rounds of reviews and revisions by the core REP-PoR team in RCB, comprising Nandita Mongia, Thiyagarajan Velumail, Thomas Jensen and Bhava Dhungana, during the last two years. We appreciate the inputs

from Abu Sadat Moniruzzam Khan, Sooksiri Chamsuk and Sanna Salmela-Eckstein, who contributed at different stages while the country report was being finalized.

We appreciate and acknowledge TERI Press for designing and editing this report. All the above-mentioned efforts have made the writing of this report possible.

# List of Acronyms/Abbreviations

| | |
|---|---|
| ADB | Asian Development Bank |
| AEPC | Alternative Energy Promotion Centre |
| BSP | Biogas Sector Partnership |
| CBO | community-based organization |
| CBS | Central Bureau of Statistics |
| CEF | Community Energy Fund |
| CES | Centre for Energy Studies |
| CRT | Centre for Rural Technology |
| DANIDA | Danish International Development Assistance |
| DDC | District Development Committee |
| ESAP | Energy Sector Assistance Programme |
| EU | European Union |
| FNCCI | Federation of Nepalese Chambers of Commerce and Industry |
| HDI | human development index |
| ICIMOD | International Centre for Integrated Mountain Development |
| ICS | improved cook stove |
| IEDI | Industrial Enterprise Development Institute |
| IoE | Institute of Engineering |
| IWM | improved water mill |
| IWMP | Improved Water Mill Programme |
| MDG | Millennium Development Goal |
| M&E | monitoring and evaluation |
| MFI | microfinance institution |
| MHFG | Micro Hydro Functional Group |
| MLD | Ministry of Local Development |
| MoEST | Ministry of Environment, Science, and Technology |
| MoF | Ministry of Finance |
| MoPE | Ministry of Population and Environment |
| MW | megawatt |
| NAST | National Academy of Science and Technology |
| NEA | Nepal Electricity Authority |
| NGO | non-governmental organization |
| NPC | National Planning Commission |

| | |
|---|---|
| RECAST | Research Centre for Applied Science and Technology |
| REDP | Rural Energy Development Programme |
| REP | Rural Electrification Programme |
| REP-PoR | Regional Energy Programme for Poverty Reduction |
| RET | renewable energy technology |
| RMDC | Rural Microfinance Development Centre |
| SAARC | South Asian Association for Regional Cooperation |
| SCID | Small and Cottage Industries Department |
| SHS | solar home system |
| SME | small and medium enterprise |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| VDC | Village Development Committee |
| WECS | Water and Energy Commission Secretariat |

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|---|---|
| **Capital** | Kathmandu |
| **Area** | 140,000 square kilometres |
| **Population (2006)** | 27.7 million |
| **Total primary energy supply/Population (2004)** | 0.34 toe/capita |
| **Gross domestic product (GDP) (2004)** | 6.15 billion US$ 2000 |
| **Energy production (2004)** | 8.07 Mtoe |
| **Poverty** | 33% |
| **Traditional fuel consumption (2003)** | 93.2% of total energy requirements |
| **Electricity consumption/Population (2004)** | 69 kWh/capita |
| **Net imports (2004)** | 0.99 Mtoe |
| **GDP per unit of energy use (2003)** | 4.0 US$ 2000 PPP per kg of oil equivalent |
| **$CO_2$/Population (2004)** | 0.11 t $CO_2$/capita |

**Sources** IEA (2006); UNDP (2006); and UNFPA (2006)

# Energy and Poverty in Nepal

## Challenges and the Way Forward

## Background

Nepal's strategic location at the foothills of the Himalayas has numerous benefits, as also predicaments. While the country is well-endowed with natural resources, its tough terrain makes equal distribution of resources difficult. As a result, the incidence of poverty is high in Nepal. One-third of Nepal's population (CBS/MoPE 2003) lives on less than US $1 a day (CBS 2004)—most of them are in its villages, home to 86 percent of the country's population (CBS 2003). The *Nepal Human Development Report 2004* reveals that the human development index (HDI) in urban areas (0.581), is considerably higher than in rural areas (0.452).

This urban–rural HDI divide dictates the nature and types of energy consumed in Nepal. More than 87 percent of the total energy consumed in Nepal comes from traditional sources such as fuelwood, agricultural residues and cattle dung. Much of this consumption is in rural areas, where traditional energy is easily accessible and modern energy is scarce. Conversely, commercial sources of energy, such as coal, petroleum and electricity, comprise only about 12 percent of total energy consumed, much of which is restricted to urban areas (MoF 2005). Electricity is available to only 40 percent of the country's population (CBS 2001), while urban residents – comprising only 15 percent of the total population – receive 73 percent of this supply.

***Over 87 percent of energy consumed in Nepal comes from traditional sources.***

Despite a number of completed and ongoing energy programmes in the country, the linkage between energy and poverty is still found to be weak. The expertise, interest and vision of supply-side actors, including donors and the national government, are responsible for such results.

Extending efficient, affordable and modern energy services to Nepal's rural poor is crucial for the country's battle against poverty. There have been several national-level statements of intent on expanding the role of energy services for poverty reduction, such as the one by the National Planning Commission (NPC 2002). However, Nepal's energy sector faces many structural and technical challenges to effectively convert intent into action. An assessment of the country's energy sector enables an understanding of the specific challenges, which prevent the formulation of visible, well-coordinated and effective initiatives to address poverty through the use of modern energy services.

## The Challenges

### *Vertically aligned institutional structure*

Institutional arrangements in Nepal's energy sector are vertically arranged according to sub-sectors, such as electricity, petroleum and coal, forest and renewable energy. At the national level, ministries delegate operational responsibilities such as tariff setting, energy distribution and infrastructure expansion to various departments within them. At the district and local levels, Village Development Committees (VDCs) and District Development Committees (DDCs), non-governmental organizations (NGOs) and community groups are active in extending energy services to rural communities. There are also over 14 multilateral or bilateral agencies working in the energy sector, including United Nations Development Programme (UNDP), Asian Development Bank (ADB), Danish International Development Assistance (DANIDA), European Union (EU) and the World Bank.

Although there is a profusion of institutions (NEA, AEPC and so on) focused on the various energy sub-sectors, there is no single institution spanning the entire energy sector, providing a horizontal alignment and necessary focus on linkages between energy and poverty, and giving overall direction to a collective pro-poor energy strategy. Instead, the primary focus of most institutional mandates remains confined to generation and distribution of electricity. Poverty reduction is largely an appendage to these focus areas.

At the local level, the decentralized, public-supported and community-led institutional model promoted by REDP has proven successful and offers a viable institutional option that can complement the existing centralized approach (Table 1). However, in spite of the success of REDP, local institutions

**TABLE 1**
**ENERGY INSTITUTIONS AND EXISTING LINKAGES BETWEEN ENERGY AND POVERTY**

| Major institutions involved in Nepal's energy sector | Linkage between energy and poverty |
|---|---|
| Nepal Electricity Authority (NEA): state-owned electricity generation, transmission and distribution company | Recently launched the rural electrification programme that aims to provide access to modern energy services for productive and domestic use in rural households in grid-served areas. |
| Alternate Energy Promotion Centre (AEPC): state-owned regulator and facilitator of the renewable energy sub-sector | Offers subsidies under the Renewable Energy Subsidy Policy to promote renewable energy use in rural and remote areas, and partly funds research on renewable energy technologies (RETs). Activities funded by AEPC are associated with the RETs that serve off-grid areas. |
| UNDP (Donor organization) | Launched the Rural Energy Development Programme (REDP), in association with the Government of Nepal, to facilitate rural income generation and poverty reduction through the development of modern energy sources and services for domestic and productive use; REDP has been upscaled with resources from the World Bank through AEPC; the programme also covers off-grid areas. |
| Local government bodies, NGOs, and community-based organizations (CBOs) | Play important roles in the implementation of programmes such as REDP, and are key stakeholders in energy and poverty programmes for rural Nepal. CBOs are the main mobilizers of financial resources, the labour for rural energy projects, as well as managers. They also participate in the planning of various renewable energy projects. |

**Box 1 Key challenges related to institutional arrangements**

- In the absence of a central organization that guides the entire energy sector towards common poverty reduction objectives, institutions have been unable to look beyond sub-sectoral interests. For instance, they are not aware of each other's mandates and thus plan in isolation. Such planning has not resulted in resource optimization.
- There is duplication of efforts resulting from a lack of coordination among various institutions. For instance, in some areas, the extension of the national grid has made functioning of micro-hydro plants redundant and thus resulted in the loss of national productive assets.
- Lack of settlement of power-sharing disputes between local- and national-level institutions has hampered effective local–national institutional partnerships. The Central Government's scepticism regarding the capacity of local bodies in exercising their delegated authority has inhibited the spirit of decentralization and put brakes on local rural energy development initiatives.

do not have wide fiscal or executive powers, and rely on government institutions for policy guidance, regulatory frameworks, and financial support. Disagreements and disputes over policies, responsibilities, and power-sharing modalities plague central–local institutional arrangements. As a result, the effectiveness of local forms of government in the energy sector has been limited only to a few donor-funded programmes such as REDP.

### *An evolving programme framework for energy service delivery to the poor*

Energy sector programmes in Nepal have mainly been initiated by many actors: Government, international agencies and NGOs (Table 2). While most programmes seek to expand generation and transmission capabilities, some have focused on the larger issues of poverty reduction and gender equity through the provision of modern energy services. REDP is one such example that emerged in the backdrop of Local Self Governance Act in 1999. REDP took advantage of this enabling legislation to strengthen the capacity of local government bodies to plan, administer and evaluate energy service delivery to rural areas.

**TABLE 2**
**MAJOR ENERGY PROGRAMMES IN NEPAL WITH LINKAGES TO POVERTY REDUCTION**

| Programmes | Implementing/ partnering agency/ agencies | Poverty linkages |
|---|---|---|
| Rural Electrification Programme (REP) | NEA with the support of Danish International Development Assistance and the Asian Development Bank | By inviting community participation in distributing grid electricity, REP hopes to encourage grass-roots energy entrepreneurship for income generation, and to thereby ease livelihood concerns in rural areas. |
| REDP | AEPC with the support of UNDP (initially) and World Bank in the second phase to upscale the successes | An impact assessment focusing on the success of REDP in meeting the MDGs is being undertaken. The findings will enable REDP to further align itself to poverty reduction objectives. |
| Improved Water Mill Programme (IWMP) | CRT Nepal supported by The Netherlands Development Organization (SNV)[1] | IWMP aims to benefit the poorest women and children in remote areas of Nepal. |
| Smoke and Health Project | Practical Action Nepal | Has implemented low-cost solutions for indoor smoke reduction. |

[1] SNV is the Dutch acronym for the Netherlands Development Organization.

***Biogas Sector Partnership aims to provide energy access to the poor.***

Other relevant programmes include the Biogas Sector Partnership – Nepal (BSP Nepal), which aims to provide energy access to larger sections of the poor. Also, a two-year pilot project titled 'Incorporating the Needs and Roles of Women in Water and Energy Management' has been completed by the Centre for Rural Technology Nepal (CRT Nepal). Assisted by United Nations Environment Programme/International Centre for Integrated Mountain Development (UNEP/ICIMOD), the project has resulted in a number of local innovations by women's groups.

Most energy programmes (government- and international-institution-led) in Nepal are planned at the central level. Local collaboration is restricted primarily to implementation although the planning process generally does allow local partners to participate in periodic and annual plan formulation exercises. The interface between local and central institutions is provided by District Development Committees (DDCs).

## Box 2 Key challenges in the programme framework

- Local government bodies are dissatisfied with central agencies, which are perceived to be indifferent to local proposals including local programme needs, objectives and modalities. The Association of District Development Committee Nepal has been lobbying with the Government of Nepal for the Committee's rights to take decisions on energy projects within its jurisdiction, since 1991.
- Unequal distribution of funds and indifferent central agencies have widened the gap in roles of central and local agencies during programme implementation.
- The success and the lessons from REDP are not being adopted and upscaled at a desired pace.
- Rural energy needs for cooking and heating are largely ignored. There is no promotional focus on available cooking energy technologies, including gasifiers, bio-briquettes and solar cooking.

***High tariffs and technical complexities are major hurdles in power transmission.***

## *Constrained access to modern energy services in rural Nepal*

Only 46 percent of Nepal households receive some form of modern energy service, and about 43 percent of these households receive grid electricity. By August 2005, of the 613.5 MW (megawatts) electricity produced in the country, grid-connected hydropower generated 550.6 MW (NEA 2005). However, access to electricity varies from region to region, with poorer regions having lower access (Table 3). The rural poor and remote areas are straddled with constraints of high tariffs and technical complexities in power transmission, and consequently are tied to inefficient fuels for meeting their energy needs.

**Table 3** Access to electricity by development regions in Nepal: estimates for 2005

| Development region | HDI | Households with access to electricity (%) | Grid-electrified households (%) | Off-grid electrified households (%) |
|---|---|---|---|---|
| Eastern Development Region | 0.493 | 43.33 | 40.47 | 2.86 |
| Central Development Region | 0.490 | 54.43 | 52.64 | 1.78 |
| Western Development Region | 0.491 | 51.79 | 45.17 | 6.62 |
| Mid-Western Development Region | 0.402 | 29.20 | 26.32 | 2.89 |
| Far-Western Development Region | 0.404 | 28.40 | 25.19 | 3.21 |
| Nepal (total) | 0.471 | 45.83 | 42.53 | 3.31 |

**Sources** Nepal (2006) and UNDP (2004)

Households consume most of the energy generated in rural areas, leaving rural industries under-serviced by modern energy. For instance, only four percent of micro-hydropower-generated energy is used for productive end uses (WELink/Neha 2003).

**BOX 3 KEY CHALLENGES TO PROVIDING MODERN ENERGY SERVICES**

- Access to energy services in general has been limited by low purchasing power of the people and lack of availability of easy credit.
- Access to energy for productive purposes is often not limited so much by the lack of availability of energy as by the high net cost of energy.
- Rural industries, typified by small operations and markets, do not have the same financial capacity as urban industries to pay for electricity. A study conducted in the Pinthali micro-hydro plant revealed that an energy-induced local furniture industry was closed due to the high cost incurred in transporting its product to the market (Nepal 2001).
- Despite strong policy commitments, harnessing energy for productive uses in rural areas has been the weakest link in Nepal's energy service delivery programmes. Despite the inclusion of the 'use of 10 percent micro-hydro-plant-generated energy for productive purposes' as an eligibility criteria for receiving subsidy, less than five percent energy is being used on average for productive purposes.

***Low purchasing power and high cost are major challenges to providing modern energy services.***

## *Dominance of traditional fuels and inefficient technologies*

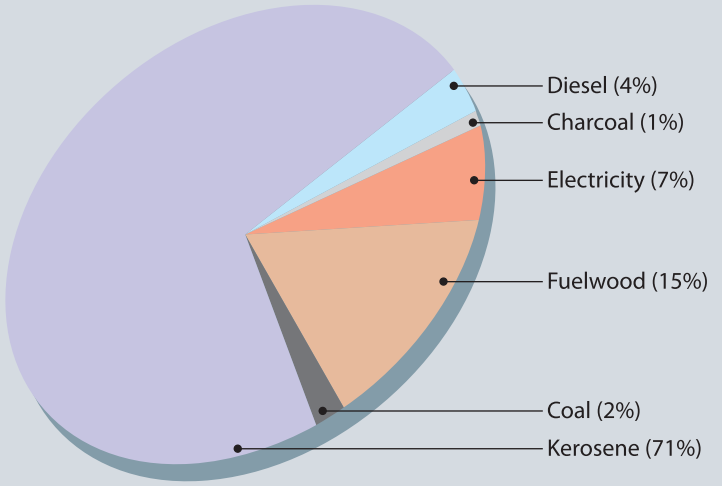
The nature of energy use, coupled with the non-availability of modern energy services, makes traditional sources of energy (fuelwood and animal manure) the primary fuel options in rural households. The energy consumption in rural Nepal is dominated by cooking (63.9 percent), livestock feed preparation (16.5 percent), heating (8.5 percent), water boiling (2 percent), agroprocessing (3.4 percent), lighting (1.3 percent) and other end uses (4.3 percent) (UNDP 2005). Most of the energy needs pertaining to agriculture are met by human and animal power. It is only the small commercial agricultural sector that relies on diesel for operating pumps and tractors. Consequently, the share of electricity in agricultural energy consumption is only one percent (WECS 1998).

The energy profile of Nepal's rural industry is better in the context of modern energy services; but even here, small and medium enterprises (SMEs) and micro-enterprises rely primarily on kerosene, diesel and coal for their energy needs. These energy sources are largely used for

operating inefficient technologies and together account for 77 percent of total energy consumption in rural industries (Figure 1).

A major limiting factor for energy diversification in Nepal is the relatively high cost of alternative energy technology. Due to lack of funds, the state has limited capacity to support energy diversification. Moreover, energy programmes engaging the rural poor lack training on emerging sources of energy. Rural entrepreneurs are not exposed to information about the effectiveness of alternative energy technologies in other rural settings.

**Figure 1** Energy consumption in the rural industries (1997)




**Source** WECS (1998)

## Box 4 Key challenges to providing affordable energy solutions

- High costs of alternative energy along with high electricity tariffs make switching from diesel and other hydrocarbon-fuelled equipment difficult.
- Efforts to reduce petroleum imports are rarely discussed at the policy level.
- Imported energy raises the cost of energy, rendering it out of reach of most rural households.

### *Capacity and policy neglect of rural entrepreneurial potential*

Aided by international funding and Government subsidies, modern energy services have played a significant role to help develop SMEs in

Nepal. Existing frameworks, particularly the Government's Renewable Energy Subsidy Policy, have also enabled the emergence of small renewable energy enterprises devoted to developing energy sources such as biogas, solar and wind power. For example, in the renewable energy sector, there were 29 turbine manufacturers/installers in the micro-hydro sector by mid-July 2005 (AEPC/ESAP 2005) and 28 private solar photovoltaic companies by end 2004 (Nepal 2006). Even the grid-electricity sector has seen entrepreneurial activity with the promotion of community-based electrification. Small rural enterprises are considered as avenues of steady income generation and equitable distribution in rural communities.

However, rural enterprises face a shortage of energy services. Poor regions of the country, such as the mountainous region, barely have enough energy generation capacity to meet domestic demand and, consequently, the need for energy for productive uses is sidelined. As a result, most SMEs and productive enterprises are dependent on inefficient modes of energy production and utilization and are, therefore, unable to gain competitive parity with large urban industries.

***Most SMEs are dependent on inefficient modes of energy production.***

### BOX 5 KEY CHALLENGES TO BUILDING ENERGY ENTREPRENEURSHIP

- Rural enterprises are neglected at the policy level. Hydropower development policies and strategies do not place much emphasis on productive end use of energy.
- There are no policies promoting decentralized energy-based entrepreneurship in rural areas.
- Lack of funds, technical capacities and modern business skills are continuing perpetual barriers to the development of rural energy enterprises. Financial support from the Government and international bodies to develop SMEs is unevenly distributed, with urban SMEs receiving a larger share of aid than rural SMEs.
- Information-sharing opportunities have not been fully leveraged. Rural enterprises do not have formal mechanisms to share knowledge among each other, or with regional and international organizations. Moreover, best practices from Nepal's rural-energy-based enterprises are poorly documented and fractionally distributed, with the exception of UNDP's REDP.

## Gender concerns

Approximately, 40 percent of Nepalese women are economically active, most of them employed in the agriculture sector. Women are responsible for household production systems such as food processing, cleaning and storing of farm products, kitchen gardening and cooking food for village shops run by male family members. All these activities require energy in different forms, but currently, this is generated through traditional sources (mainly biomass) and used in inefficient devices. The existing energy consumption pattern results in high levels of drudgery for women and their vulnerability to several diseases. Moreover, socially prescribed roles limit women's access to economic resources such as land, capital, skills and know-how. All these have an impact on the energy options available to women. Yet, gender issues and concerns have not been fully integrated in the energy policies and programmes. Many challenges to improving gender equality remain. Despite the increase in the number of women in the paid workforce, gender disparities continue, and the gap in wage rates between men and women is significant.

***The existing energy consumption pattern results in high levels of drudgery for women.***

## Constrained access to finance

Due to the heavy financing cost of operationalizing a modern energy project, Nepal's energy projects are supported by financial incentives in the form of subsidies, grants, equity or loans. Funds for energy projects come from the Government, donors, microfinance institutions (MFIs), investors and banks. However, the flow of traditional bilateral and multilateral funds is not sustainable or predictable. Moreover, the growth of Nepal's energy sector may be constrained due to shortage of funds if trade- and efficiency-related global funds remain untapped.

The Government of Nepal has a centralized financing system in which all resources are largely controlled and managed by the Government agencies. However, REDP was successful to some extent in operationalizing the concept of community financing. Here, the participating households reach an agreement for collected fees to be deposited in the Community Energy Fund (CEF) managed by the Micro Hydro Functional Group (MHFG) along with the Rural Energy Development Section under the DDC (DDC-REDS) of each district as co-signatory. The fund is used for the administration and management of projects and also acts as a savings scheme. The fund can be used to extend loans for other purposes to initiate income generation and bolster other development activities of the households. CBOs will fix the repayment and interest schedules. Thus, the programme focuses on

demonstrating the efficacy of decentralized management of financial resources by passing ownership directly to local institutions.

Even though REDP has demonstrated the efficacy of local-level management of financial resources, it has not been able to institutionalize the process of decentralized financing. Moreover, opinion is divided in Nepal over the issue of decentralized funding for energy projects. Those opposed to decentralization worry about local capacities to fairly and effectively distribute funds. On the other hand, proponents of decentralization claim that localizing funding mechanisms leads to better energy projects and ensures genuine commitment to projects, since fund seekers are familiar with local funding institutions, and vice-versa. A middle path proposed by some experts suggests functions of project screening, post-implementation monitoring and supervision, and project operation be retained under local government bodies while the Central Government bodies be made responsible for the final selection of projects.

While the Government funds energy projects primarily through NEA, subsidies (usually offered through nationalized banks) for renewable energy have totalled over US $60 million since 1997. The performance of financial institutions in financing micro-hydro projects in Nepal is given in Table 4.

***Renewable energy operations are not successful due to non-availability of funds in rural areas.***

### Box 6 Key challenges related to access to finance

- Finance seekers have developed excessive dependence on grants and subsidies as opposed to credit.
- Commercial banks, though mandated by the Government to extend services to rural areas, have generally restricted operations to district headquarters.
- Financial institutions are found generally not interested in renewable projects because they are less informed. The perception is that renewable energy projects are not financially viable, and their administrative costs are higher and repayment rates are poor.
- National-level MFIs require special funds for mobilization costs for disbursing credit for renewable energy, as they do not prefer to disburse their own funds, and require operational costs for their services.
- Local-level MFIs provide small amounts of credit at high rates of interest (20–25 percent) for loans associated with income generation activities, and renewable energy is not seen as an income-generating project.

Table 4 reveals that apart from the Agriculture Development Bank of Nepal (a semi-government finance institution), commercial banks and private entrepreneurs have been hesitant investors in rural energy development, partially due to lack of financially viable examples among rural energy projects. Commercial banks, although mandated by the Government to extend services to rural areas, have generally restricted operations to district headquarters.

Most rural households are not able to access loans from banks due to the high interest rate and the need for collateral. More pertinent for the poor is microfinance, which plays an important role in developing low-cost, cleaner energy sources in Nepal. So far, about 150 MFIs have provided loans for biogas and solar home systems (SHSs).

Nepal's apex MFI, the Rural Microfinance Development Centre (RMDC), has been a successful financing model. It operates as a wholesale lender to rural cooperatives and to NGOs providing financial services to the poor. In a recent development that promises to expand modern energy access to the poor, the maximum sum of microfinance loans has been increased from NPR 30,000 (about US $450) to NPR 50,000 (about US $750) by the Nepal Rastra Bank (Central Bank of Nepal), encouraging the development of small renewable energy projects in rural areas. However, despite the increase, the loans are still small and, hence, microfinance is suited only for household-level credit, and not for electricity generation or small hydropower development.

**Table 4**
**Credit financing of micro-hydro projects supported by the Alternative Energy Promotion Centre**

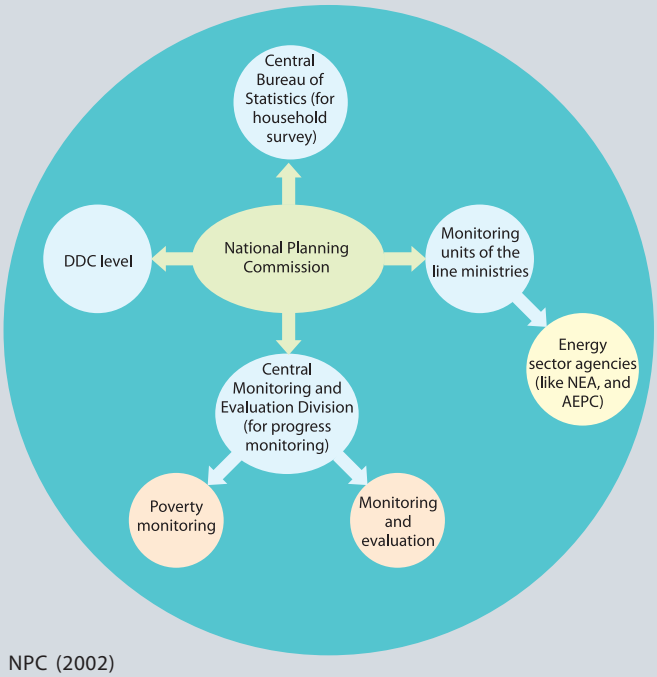
| Financial institution | Micro-hydro projects financed | Amount (in NPR) | Share in loan (%) |
|---|---|---|---|
| Agricultural Development Bank of Nepal | 33 | 14,654,289 | 60.07 |
| National Finance | 1 | 3,000,000 | 12.30 |
| Rastriya Banijya Bank | 3 | 2,917,848 | 11.96 |
| Paschimanchal Finance Co. | 1 | 2,000,000 | 8.20 |
| Nepal Bank | 1 | 1,200,000 | 4.92 |
| Village Development Council Local Trust Fund | 1 | 515,000 | 2.11 |
| Lumukurme Cooperative | 1 | 108,838 | 0.45 |
| Total | 41 | 24,395,975 | 100.00 |

**Source** Nepal (2005)

## *Monitoring and evaluation of programmes and projects related to energy and poverty*

The energy sector has some monitoring and evaluation (M&E) capacity, primarily due to the involvement of multilateral and bilateral institutions. The National Planning Commission (NPC), guided by the Tenth Plan recommendations, devised M&E indicators, tools and systems in 2004 (NPC 2004). Figure 2 depicts the institutional structure of the monitoring system under NPC. More indicators are being developed to monitor and evaluate the poverty reduction impact of (renewable) energy services by organizations such as the Department for International Development, UK, and AEPC/Energy Sector Assistance Programme (ESAP). Table 5 lists a few energy-related M&E processes. The participation of multilateral and bilateral institutions has infused a certain degree of M&E capacities in Nepal's energy sector, albeit most of these capacities have not been fully institutionalized by national organizations. While the presence of M&E indicators augurs well for the success of energy projects in Nepal, these have focused on quantitative targets rather than socio-economic impacts or even assessments of the productive use of energy.

From the perspective of poverty reduction, the Poverty Reduction Strategy Paper for Nepal has emphasized on expanding M&E procedures from the development of a project to include the impacts of the project




**Source** NPC (2002)

**FIGURE 2**
**INSTITUTIONAL STRUCTURE OF THE MONITORING SYSTEM AS PER THE TENTH PLAN**

**Table 5**
**Monitoring and evaluation procedures in energy sector organizations**

| Institution | Project areas | Modalities of monitoring and evaluation |
|---|---|---|
| NEA | Grid electricity | Conducts environmental and engineering M&E during project initiation and operation, guided by national guidelines and donor requirements. |
| AEPC | RET | Deploys M&E procedures to ensure quality standards of renewable energy plants, and the proper use of the Renewable Energy Subsidy Fund. |
| REDP | Micro-hydro | Collects monthly field-level reports and quarterly reports from district-based support organizations. Additionally, REDP central officers make field visits, whenever they feel necessary. |
| CRT Nepal | Improved cook stove (ICS) | Delegates its monitoring procedures to local promotion organizations with the support of AEPC staff, which is also associated with ICS projects. |
| | Improved water mill (IWM) | Equipment provided by vendors is subjected to stringent quality standards, and installation by pre-qualified service centres is monitored by field facilitators. |
| BSP Nepal | Biogas | Random checks on private enterprises utilizing BSP Nepal's resources are mandated by the organization. |

on poverty reduction. Although there is a newly established poverty-monitoring section in the NPC, poverty indicators have not yet been strictly monitored, partly due to the lack of precise poverty reduction indicators from preceding programmes. In 2004, the NPC's Poverty Monitoring and Analysis System included only the following two energy-related indicators.

1 Percentage of population with access to electricity
2 Average per capita electricity consumption

Thus, monitoring of energy and poverty cannot be accurate because there are no indicators of socio-economic impacts or productive energy uses. The lack of accurate and crucial energy–poverty indicators has stymied the development of M&E indicators to track energy and poverty

**BOX 7 KEY CHALLENGES RELATED TO MONITORING AND EVALUATION FRAMEWORK**

- Due to lack of any indicators of socio-economic impacts, impact monitoring is almost absent.
- Crucial indicators for energy and poverty are missing, and sectoral and sub-sectoral monitoring tools are not comprehensive enough.
- Feedback received through the monitoring and evaluation process is often not integrated into decision-making processes.

patterns. It is also noticed that the development role of energy is still narrowly defined by policy-makers.

### *Inadequate dissemination of energy-related information*

Although institutions such as AEPC and BSP Nepal have good information management systems that are shared with academics and students, the overall information-sharing modalities in Nepal's energy sector are weak. The knowledge management structures do not generate enough information, and what information is generated is prone to duplication. Citizens, especially those without access to television, Internet or radio, have fragmented and incomplete information about energy. Awareness generation on energy issues is primarily undertaken through mass media platforms, community forums and NGO campaigns. However, these are uncoordinated and isolated individual efforts.

***Understanding of renewable energy and energy efficiency is poor because of lack of proper information-sharing methods.***

Without sufficient dissemination of information on renewable energy or energy efficiency, popular understanding of energy is restricted to electricity. Information on types of alternative energy sources and associated technologies and their costs and benefits is inaccessible, especially in rural areas.

It is also difficult to access the limited information, particularly the one generated by the Government institutions. Although the Right to Information, as provided in the Constitution of Nepal, gives every citizen access to all non-classified Government information, it has not been translated into effective structures and procedures that enable easier access to information. Lack of access to information is a problem perceived widely across all sectors of Nepal. Citizens' capacity to access and comprehend energy data is hampered by the unavailability of a single source of information, as also by the language and terminology used.

### *Creating an apex institution*

REDP has developed a workable model of a rural energy programme. It has demonstrated that coordination at all levels, decentralized delivery and management and avoiding duplication of efforts are some of the key features for ensuring effective energy service delivery. Some of the main lessons that emerge from the programme are indicated here.

A workable model of rural energy service delivery needs to incorporate a decentralized participatory approach that transfers the mandate of delivery to local governance structures. In such a situation, national-level institutions need to be strengthened to support local institutions. The community-based model ensures incorporation of local concerns, facilitates enhancement of livelihood opportunities and minimizes inefficiency of the Government-administered programmes.

To overcome the issue of multiplicity of organizations involved in energy service delivery, it is desirable to set up forums working across institutions to develop and strengthen linkages and facilitate inter-agency coordination. To operationalize and streamline institutional arrangements, it is also necessary to develop guidelines within the existing purview of the national legal framework. In this context, setting up of a national-level institution that can provide a socio-economic vision and a poverty reduction road map to the entire energy sector will help. Energy-related inter-ministerial meetings under the leadership of NPC may be a starting point that could lead to the establishment of such a national-level institution. Among its duties, the proposed apex institution will need to devise appropriate legal and practical policies to further the role of energy in human development. However, implementation will have to be decentralized, consistent with the Local Self-Governance Act (1999). As the lead coordinator on issues related to energy and poverty, the proposed institution must also harness institutional capacities for poverty reduction. For instance, AEPC should be enabled to take the lead in devising strategies and action to make renewable energy an important tool for poverty reduction.

### *Integrating and decentralizing the programme framework for energy and poverty*

Nepal urgently requires integration of a strong energy component into the larger rural developmental programme framework that identifies and evaluates rural energy needs and provides energy services suited to local requirements. In this context, rural development programmes must

inform and consult local governments. The Ministry of Local Development (MLD) is the appropriate institution to coordinate different programmes with stakeholders at the national and local levels. MLD, with the help of NPC, should also advocate decentralization by lobbying with the Government for facilitating an enabling environment for self-governance. Such decentralization would enable local institutions to address existing gaps in rural energy provision, such as unaddressed rural energy needs for cooking and lighting, as well as provide a sustainable platform for regular feedback.

### *Renewable energy solutions to bridge the energy access divide*

To increase productive use of energy and reduce poverty in rural Nepal, the potential of renewable energy sources must be exploited to locally generate and distribute affordable power. AEPC, under Ministry of Environment, Science, and Technology (MoEST), should take the initiative to prepare policies and guidelines to rapidly and cost-effectively facilitate access to energy to deprived communities in remote areas. While doing so, NEA's rural electrification programme should also be part of the process.

***Strong energy component in rural development programmes is required.***

### *Research and tariff rationalization for cleaner energy technology*

At the policy level, efforts need to be made to reduce imports of petroleum products and promote adoption of cleaner, cheaper and more efficient energy sources. NPC, along with the Ministry of Finance (MoF), can prepare a plan for phasing out petroleum products from households and then from the industry and transport sectors. In the rural context, efforts to reduce the use of fuelwood in cooking are more crucial. Additional funds should be allocated to research institutes, such as the National Academy of Science and Technology (NAST), the Research Centre for Applied Science and Technology (RECAST), the Centre for Energy Studies (CES) and the Institute of Engineering (IoE), to conduct research on reducing the price of appropriate technologies. Capacity enhancement on new technologies, such as gasification, bio-briquettes and bio-distillation, should also be undertaken with international assistance.

To encourage modern energy use by rural SMEs, NEA has yet to finalize the variable tariff plan. The tariff under this plan should offer the Government a means to encourage SMEs to switch to clean fuels.

## Promoting rural entrepreneurship

REDP has shown a way for promoting energy entrepreneurship in Nepal by supporting micro-hydro, solar and biogas as entry points for the development of rural energy systems to reduce income inequalities and improve rural livelihoods. The programme focuses on integrated and decentralized management of energy services with emphasis on CBOs or private entrepreneurs to manage rural energy development. At the community level, the CBOs – like the MHFG – encourage their members to explore potential end uses appropriate to available skills and resources. Thus, the focus has been on promoting diversified end-use enterprises, including agro-processing mills such as rice hullers, grinders and oil expellers.

To take forward the benefits of REDP, the Government will need to consider a support package for rural-energy-based entrepreneurs, encompassing capacity building, information sharing and R&D. For this purpose, coordinated efforts of the Small and Cottage Industries Department (SCID), the Industrial Enterprise Development Institute (IEDI), the Federation of Nepalese Chambers of Commerce and Industry (FNCCI) and commercial institutions and MFIs are recommended. The support package for energy SMEs could include the following elements.

***To take forward the benefits of REDP, the Government needs to consider a support package for rural energy-based entrepreneurs.***

- Promotion of information management and dissemination.
- Creation of a platform for sharing international knowledge and experience through the UNDP, the South Asian Association for Regional Cooperation (SAARC) and bilateral agreements to provide quality training to rural entrepreneurs.
- Effective coordination between programmes related to SMEs and national-level training organizations.
- Promotion of the Government–SME partnerships that enhance the development impacts of energy projects.

## Mainstreaming gender issues for meeting concerns of energy and poverty

To incorporate gender concerns in energy service delivery for poverty reduction, it is desirable to assess the gender impacts of major energy programmes including the UNDP-initiated REDP, the SNV-supported IWM Programme, being implemented by CRT and BSP. The aim of such assessments and impact analyses should be to develop best practices and guidelines on mainstreaming gender issues into energy programmes.

For addressing drudgery-related aspects of existing energy consumption methods, it would be necessary to upscale the national biogas and ICS programmes. It would also be desirable to build the

capacities at the VDC/DDC level to mainstream gender and energy as cross-cutting themes in all their activities.

### *Policy-making and restructuring for greater access to finance for rural energy development*

The non-availability of finance is one of the biggest obstacles to the role energy can play in poverty reduction in Nepal. To enhance access to finance at all levels, policy advocacy and restructuring of national financial mechanisms are suggested. To attract global funds, necessary amendments should be made to policy documents, and relevant ministerial board or steering committee meetings should seriously discuss strategies to tap available international funds.

At the national level, moving away from subsidies and grants to finance RETs and pushing the credit mechanism is a viable option to build greater financial strength for rural energy development. Subsidies on SHSs and biogas plants in accessible regions of the country could also be reduced, while simultaneously setting up more stable sources of funds to develop renewable energy, through taxing petroleum products and instituting hydropower royalties.

***Assess the gender impacts of major energy programmes.***

At the local level, fiscal and monetary incentives should be provided to push MFIs into remote and rural and areas. The Nepal Rastra Bank (Central Bank of Nepal) should review the developmental role of commercial banks, MFIs and other dedicated banks, and take necessary measures to enhance this role. The difference between current lending and borrowing rates is significant. This will need to be narrowed with monetary policy intervention. Further, the repayment modality needs should be modified in favour of poor borrowers by matching the repayment time with the income-earning time of the borrowers.

Finally, to attract investments in rural energy, NEA and AEPC need to aggressively advocate the viability of rural energy projects for financial institutions.

### *Building a monitoring and evaluation system for energy and poverty*

Monitoring the parameters that link energy and poverty in Nepal will require sustained efforts from various quarters. It is vital to develop a policy framework on the incorporation of decentralized M&E systems and tools. Benchmark indicators, including level of household income, level of employment, increase in productivity, participation in decision-making at household and project levels, reduction in drudgery and use of cleaner

fuels need to be developed and used to reflect linkages between energy and poverty.

Ensuring the reliability of information and mandating the use of information in decision-making and further planning are equally important. Baseline data of energy programmes need to be generated based on certain mandatory guidelines. Impact evaluation studies need to be comprehensive and should generate data on key indicators that link energy and poverty. NPC can issue orders through concerned ministries for generating such information.

### *Empowering the information provider and the information seeker*

***Establish a single-window information system at central and district levels.***

Nepal's energy sector requires a unified, easy-to-access source of information that will cater to all information needs. A single-window information system needs to be established at central and district levels. In the interim, AEPC and the Water and Energy Commission Secretariat (WECS) can serve as information centres (with shared responsibilities) at the central level, while DDC does the same at the district level.

Additionally, awareness and empowerment of both information providers and information seekers are imperative. Training must be provided to middle- and top-level management cadres on the process of evidence-based decision-making and to user groups on how to access information. Using existing development networks with extensive outreach in the areas of primary stakeholders can expedite the information acquisition process. Civil groups need to be supported by multilateral and bilateral agencies in ensuring proper implementation of the constitutional right to information.

## Conclusion

In Nepal, numerous energy programmes are being implemented but mainly through various isolated central-level institutions. The development of the energy sector faces challenges of

- rural–urban energy divide,
- low efficiency and high cost,
- weak poverty reduction strategies,
- low concern for gender parity,
- excessive donor dependency for energy programme financing,
- low productive use of generated energy and
- lack of integration of energy programmes into overall rural development programmes.

To reduce poverty from the energy perspective, the above challenges need to be addressed on priority basis. Immediate, mid-term and longer-term actions need to be introduced as follows.

### *Immediate measures*

- Encourage decentralization of energy development initiatives, capitalizing on current acts, rules and regulations.
- Promote existing technologies for meeting cooking needs.
- Develop indicators for M&E.
- Monitor international prices and cost of energy equipment.
- Provide incentives for productive end use of energy.
- Manage information and disseminate it through AEPC and MLD.
- Increase the share of internal funding by reducing subsidy on petroleum products and mobilizing royalty received from hydropower projects.

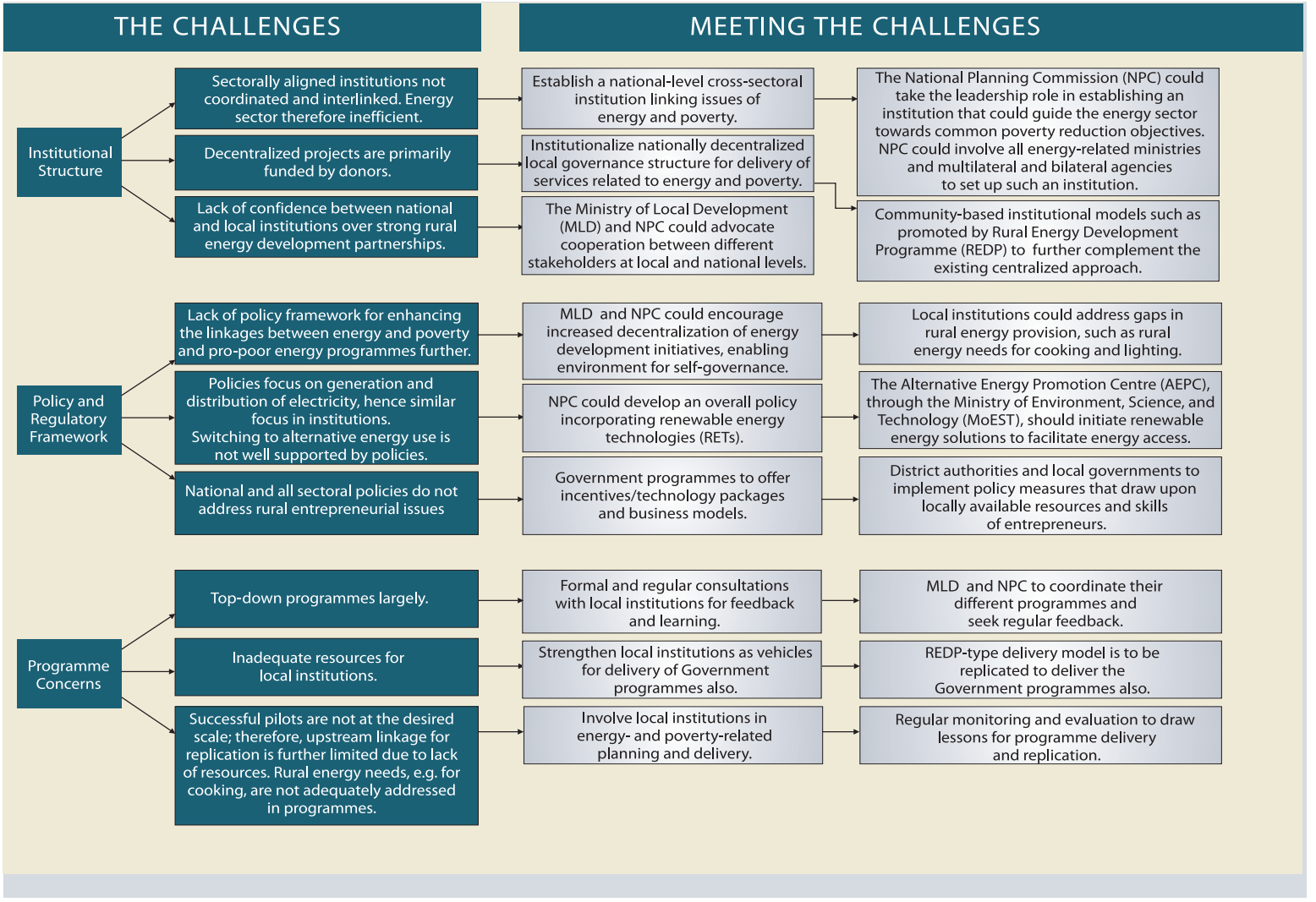
### *Mid-term measures*

- Introduce an approach that covers the energy sector as a whole. Form a cross-sectoral institution to facilitate coordination of energy programmes, and integrate energy into overall development programmes.
- Prepare and implement a credit-enhancement mechanism.
- Reshape programmes to achieve poverty reduction objectives through indicator-based M&E.
- Rationalize policies affecting the use of energy in productive sectors.
- Decentralize financial authority to the local level.

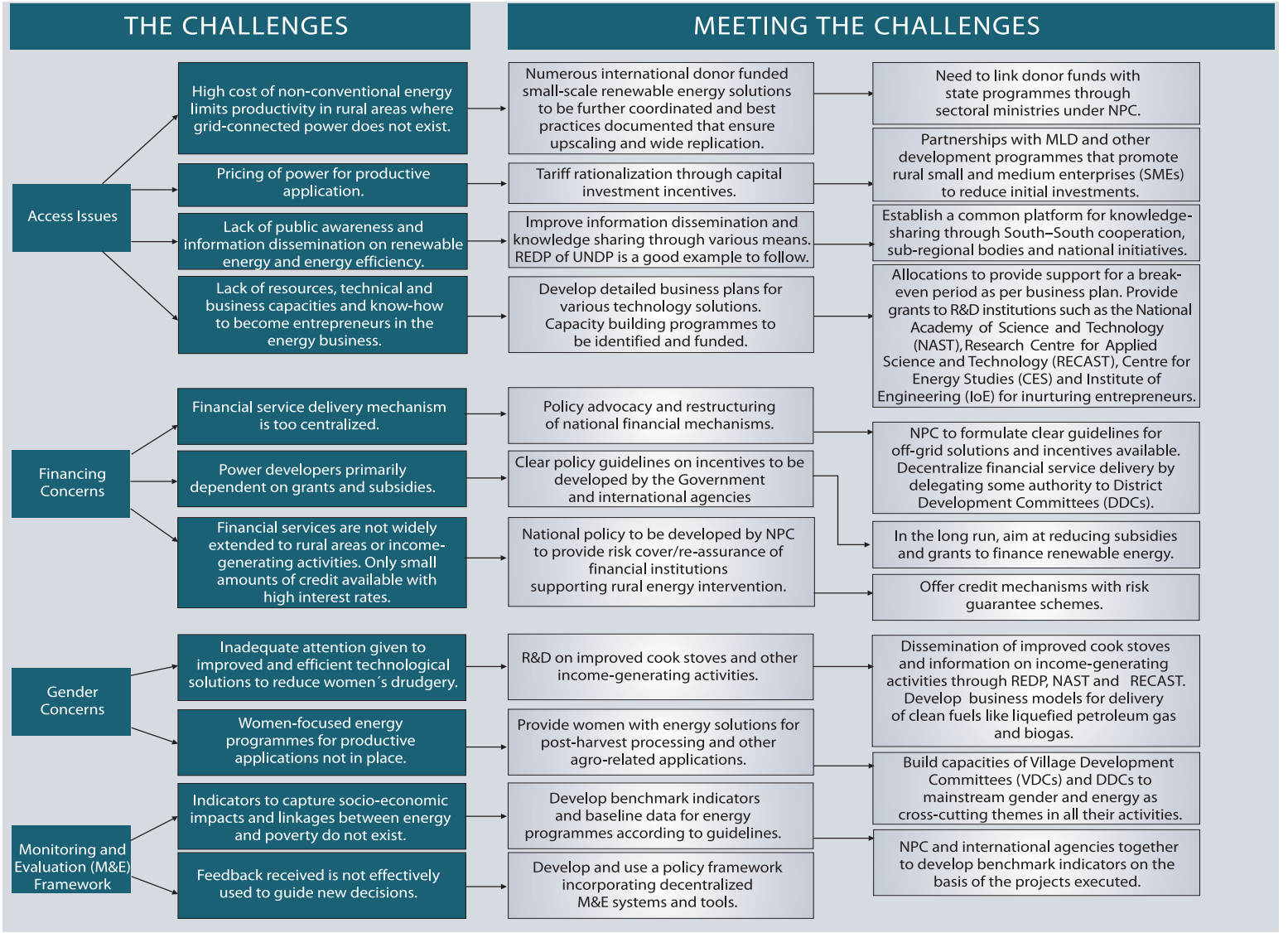
### *Long-term measures*

- Help poor people step up on the energy ladder by providing cleaner energy for meeting household needs at affordable price.
- Create an enabling environment for income generation for poor people by providing institutional framework conducive to energy-based enterprises.
- Achieve single-digit donor dependency in the energy-sector financing by mobilizing internal revenue and credit.

## Schematic representation of challenges and modalities to meet the challenges



## Schematic representation of challenges and modalities to meet the challenges (continued...)



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The UNDP Regional Energy Programme for Poverty Reduction (REP-PoR) aims to affect broad-based interventions in the energy sector, focusing on Asia Pacific countries. The emphasis is on harnessing energy effectively to meet developmental targets laid out in the Millennium Development Goals. As a first step to achieve the objectives of REP-PoR, this publication reports on Nepal's energy sector and its linkages to poverty concerns, gaps therein and modalities for overcoming the same. It aims to facilitate the inclusion of a strong energy component into the Nepal's socio-economic development programmes.


US$ 5