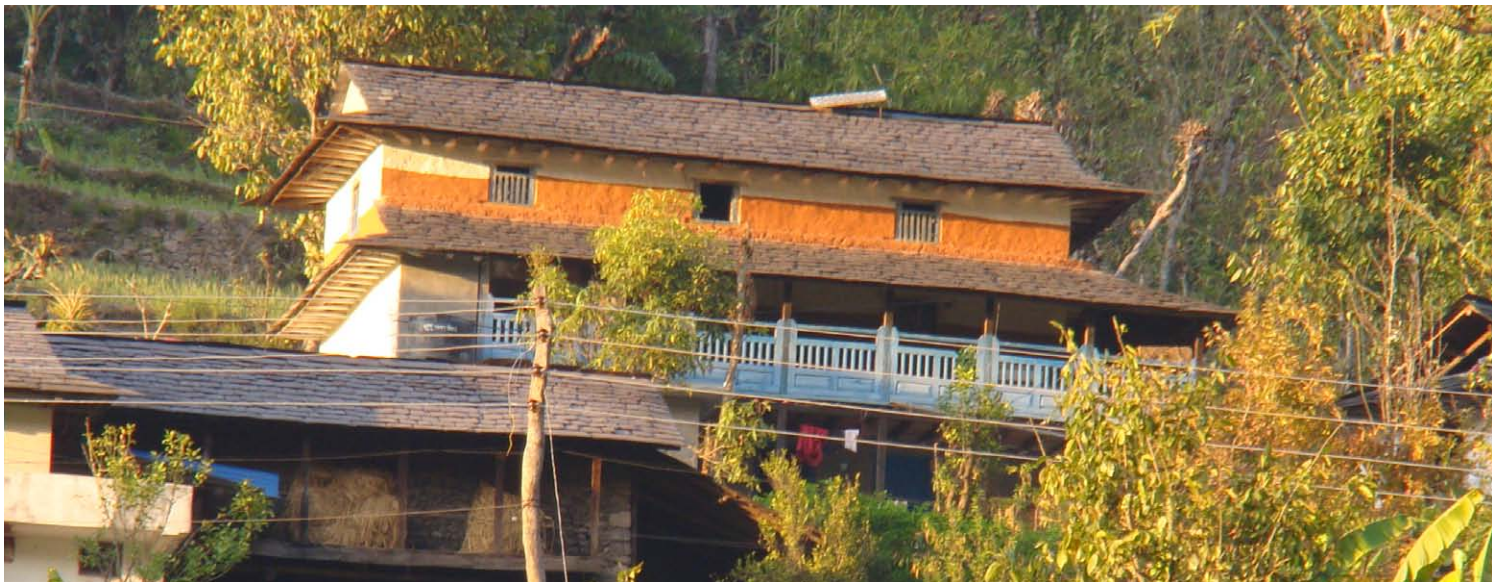
POVERTY REDUCTION
SCALING UP LOCAL INNOVATIONS FOR TRANSFORMATIONAL CHANGE

United Nations Development Programme

In Partnership with Special Unit for South-South Cooperation



Scaling Up Decentralized Energy Services in Nepal

SNAPSHOT OF THE RURAL ENERGY DEVELOPMENT PROGRAMME (REDP)

The Rural Energy Development Programme (REDP) introduced decentralized renewable energy services to the most remote populations of Nepal, which has one of the lowest rates of per capita electricity consumption in the world. By building micro-hydropower systems and providing improved cooking stoves, the programme effectively provided reliable, low-cost electricity to rural communities and contributed to decreasing indoor air pollution. Its decentralized approach not only strengthened local governance but also supported the development of rural economies and livelihoods.

Launched as a pilot project in five remote hill districts in 1996, it is now widely recognized as a successful model for rural development benefiting more than one million people. The REDP's development benefits include:

- Average increase of US$121 (8 percent) in annual household incomes due to electricity access;
- 40 new businesses created per district following the installation of a microhydropower system, compared with only 4 established prior to electricity access;
- A reduction of average annual household spending rates on energy to US$19, compared to US$41 spent by non-electrified households;
- Average of 11 health workers per 100,000 people in electrified areas, compared to 2 health workers per 1,000 people in non-electrified areas; and
- Electrified households spent twice as much on education than non-electrified households.

SCALING UP SUCCESS

Investing in a countrywide scaling up of the micro-hydropower programme in Nepal to its full capacity of 150 MW (reaching an additional 6.3 million rural people) for a relatively small overall investment of about US$435 million would yield significant economic returns and accelerate progress towards reaching the MDGs:

- The total benefits attributable to electricity amount to about US$150 per year for a rural household. Assuming an average household size of 6.5 people and a 15-year lifespan for a micro-hydro system in Nepal, the total over-the-lifespan development benefits would be US$345 per beneficiary, significantly larger than the one-time installation cost of a microhydropower system of US$85 per beneficiary.
- The potential cumulative benefits of expanding installed micro-hydropower capacity to 150 MW could amount to about US$217 million per year – and considerably more as new productive activities are undertaken.

REDP also provides a particularly strong example for other countries to adopt not only in terms of its sustainability and transferability but also in its depth of policy impact. Related costs would vary depending on the country context.

FOREWORD

Scaling up local development innovations is key to achieving sustainable and equitable development, especially when these innovations are driven by national and local governments and actors. In order to best support countries to scale up proven local successes and achieve transformational changes, the UNDP Poverty Practice of the Bureau for Development Policy (BDP) works to build a solid knowledge base and to uncover systematically the enabling environment and drivers for scaling up. In this context, together with the Special Unit for South-South Cooperation we have jointly initiated a series of case studies of "scaled up" development cases. Learning from these country cases, we aim to identify key policy, institutional and political enablers and drivers for a successful scaling up process, and to inspire development partners to transform innovations into sustainable development results.

These cases demonstrate how countries, ranging from middle income countries (such as China, Costa Rica and Mexico) to low income and least developed countries (such as Mongolia and Nepal), were able to drive these processes. Their success, built on leadership and vision, was mainly relying on their own resources and human capacities. Each country story showcases a different development challenge and response—the Mexico story describes the national cash transfer scheme to address inequalities and vulnerabilities, and the China case showcases an agricultural extension programme that spurred rural entrepreneurship. The Costa Rica study addresses an employment creation effort through biodiversity preservation and eco-tourism, and the Nepal story describes the national initiative to supply small scale energy to support rural employment and basic services delivery during and in the aftermath of conflict. Finally, the Mongolia case outlines the successful transformation of Mongolia's XacBank from a non-bank financial institution to a commercial bank, and its ascendance as a leader in providing innovative and socially responsible services to Mongolian citizens.

Each story identifies key principles, approaches, elements and methodologies that could ultimately contribute to answering the question, how is it possible to scale up a pilot/seed initiative to achieve larger and sustainable development impact? It describes the process of scaling up, capturing the key milestones in the evolution of the scaling up, and distilling the main drivers for success such as the political vision and commitment, internal and external 'catalysts,' and political, financial and policy enablers, as well as institutional arrangements and human capacities. The findings of the case studies will be further utilized in the UNDP guidance note on scaling up local development innovations for poverty reduction, as well as the ongoing UNDP efforts of strengthening an integrated approach for local development.

Every country case presented in the series also demonstrates how each innovation has spurred, or bears the potential to spur, a sound South-South collaboration and learning platform, and in some cases, South-North knowledge exchange. A South-South capacity and knowledge exchange initiative will follow the wide dissemination of the case studies during the upcoming South-South Expo.

The partnership expresses its sincere gratitude to the UNDP Special Unit for South-South Cooperation (SU-SSC) and Mr. Yiping Zhou, Director of SU-SSC, for their strong support to this initiative. Without their vision and commitment, this work would not have materialized. We also gratefully acknowledge country offices that have facilitated this work, peer reviewers who helped improve the quality of the case studies, and authors of each country case. Their contributions are acknowledged in each case study. Lastly, in addition to facilitating this initiative, UNDP Poverty Group colleagues have also compiled and edited all the case studies.

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Summary

This case study analyzes the key enablers that facilitated the expansion of REDP from a pilot project in five remote hill districts in 1996 to a widely recognized and popular model for rural development benefiting more than one million people. It highlights the pivotal role played by the national government in providing strong leadership and commitment with vision of scale, catalytic support, and enabling policies. The programme's community-based approach and strategic investments in capacity development also ensured sustainability and local ownership. Finally, the scaling up process was also enabled by the programme's effective use of partnerships and innovative funding mechanisms.

In addition to contributing to the knowledge base on scaling up local development innovations for poverty reduction, this case study also attempts to promote South-South cooperation by highlighting key lessons learned as well as examples of how the programme has already fostered South-South learning and knowledge exchange. REDP provides a particularly strong opportunity for South-South learning not only in terms of its sustainability and transferability but also in its depth of policy impact.

Introduction

Close to three billion people lack modern fuels for cooking and heating, while 1.4 billion people still live without electricity. Some 80 percent of those without electricity live in South Asia or sub-Saharan Africa. It is estimated that two million deaths annually are associated with the indoor burning of solid fuels in unventilated kitchens.[1] Access to affordable and sustainable sources of energy, especially in rural and remote areas of developing countries, has strong links with poverty reduction and achieving the Millennium Development Goals (MDGs). This is particularly the case in terms of energy and its effects on household income, health, education, gender and the environment. It has been widely recognized that affordable energy services are necessary for poverty reduction and MDG achievement. Modern energy services — mainly provided by liquid and gaseous fuels, as well as electricity — are essential for economic development, particularly in building enterprises and creating jobs.

Even the smallest increases in energy consumption have been associated with dramatic improvements in quality of life, particularly for the world's poorest people. A recent report produced by the United Kingdom's Department for International Development (DFID) highlighted the strong correlation between energy consumption and welfare and economic growth.[2] Increasing access to modern energy services for poor men and women is a cross-cutting issue that contributes to poverty reduction efforts, food security, gender equality, and improvements in health and education. Developing energy sources such as hydropower, wind power, geothermal power, and liquid biofuels can also reduce the dependence of developing countries on oil and natural gas and decrease their vulnerability to price fluctuations.[3]

Nepal's Rural Energy Development Programme

Nepal is a small, landlocked, mountainous country located between the world's two most populous countries, China and India. It has a population of 30 million, with roughly 25 percent of the population living below the poverty line. Currently, Nepal's Human Development Index is 0.428, with a ranking of 157th of 187 countries. The economy is dominated by agriculture, which provides a livelihood for over 80 percent of the population and accounts for 41 percent of the Gross Domestic Product (GDP). Almost 85 percent of the population lives in rural areas.

Despite enormous hydropower potential, more than 80 percent of total energy consumption is from traditional biomass. Only 12 percent of energy consumption comes from commercial energy sources, such as petroleum and electricity, and electricity represents nearly 2 percent of the total energy consumption. Only about 56 percent of population has access to electricity, including both on-grid and off-grid. As to be expected, urban areas have better access to electricity relative to rural areas (93 percent versus 49 percent). About two-thirds of households use firewood as their main source of fuel for cooking. The heavy reliance on such traditional fuels for cooking has a negative

1 "Energy services" can be defined as the benefits resulting from the use of energy supplies such as lighting, heating, cooking, motive power, mechanical power, transport and telecommunications. These services can be generated from a variety of primary energy sources including oil, gas, coal or renewables. They can be delivered by different energy carriers and systems for the transformation and transportation of energy, ending with the delivery of energy services within the operation and regulation of energy markets.

2 U.K. Department for International Development (DFID), Energy for the Poor: Underpinning the Millennium Development Goals, London: 2002.

3 These investments can also be justified from an economic point of view, as they are more affordable than an energy system dominated by fossil fuels.

impact on the surrounding environment, the family health due to indoor air pollution, and poses additional burdens on women who are tasked to gather the fuel. Nepal's greenhouse gas (GHG) emissions are low, with total emissions estimated to be about 3.4 million tons carbon dioxide equivalence (CO2e) per year, of which about 3.2 metric tons of carbon dioxide equivalent (MtCO2e) are from energy utilization carbon intensity of the economy and per capita emissions exhibited a somewhat stable trend during the past decade, while total GHG emissions increased.

History and Development

In response to this need, the Rural Energy Development Programme (REDP) was launched as a small pilot initiative in five remote hill districts in 1996. The United Nations Development Programme (UNDP) provided financial and technical assistance to this programme that focused on providing energy services (particularly micro-hydropower systems and improved cooking stoves) through decentralized, off-grid approaches, which proved to be particularly efficient in reaching the poor in remote and rural areas.

Following successful piloting, the programme was subsequently scaled up to a total of 10 districts by 1998 and 15 by 2000. These successes also facilitated the enactment of the Hydropower Development Policy of 2001, which superseded the Hydropower Policy of 1992, to address the shortcomings of the previous policy, particularly regarding private sector involvement. It highlighted the government's strong commitment to rural electrification, explicitly stating that "developing hydropower has the pivotal role in the development of rural electrification, supply of domestic energy, creation of employment and in the development of industrial enterprises." Its stated objectives were to: (1) generate electricity at low cost by utilizing the water resources available in the country; (2) extend reliable and qualitative electric service throughout Nepal at a reasonable price; (3) tie-up electrification with economic activities; (4) render support to the development of rural economy by extending the rural electrification; and (5) develop hydropower as an exportable commodity.

Through the electricity generated by the micro-hydro plants, beneficiaries were able to have clean and better lighting, as well as develop agro-processing mills and rural enterprises such as a rural bakery, thangka painting, incense stick making, rural soap making, poultry farming, a computer institute, and recreation centres. Other important end uses and benefits include the added facility of irrigation and drinking water, improved health and sanitation, and well-managed greening of the surroundings.

By 2003, REDP-I had supported communities in 100 Village Development Committees (VDCs) to install 120 micro hydro schemes, 1,524 solar home systems, 2,953 toilet attached biogas plants and 7,200 improved cooking stoves (ICS). More than 10,000 new rural households were provided access to electricity. Phase I successfully demonstrated the use of rural energy as an effective entry point for sustainable development for poverty reduction, and reinforced the need for a holistic development approach. Based on the successes of REDP-I, REDP-II was launched in 2003, with the World Bank joining as a partner organization to provide financial assistance for expanding REDP activities to an additional 10 districts,[4] bringing the total number of districts covered to 25, accounting for one third of the total number of districts in the country. By 2006, the programme had 250,000 beneficiaries with micro hydro power supplying electricity for lighting and mechanical power for agro-processing and other productive activities, and 580,000 people with access to improved cooking stoves.

To date, the programme has not only connected 59,172 households to micro-hydro but also installed 317 new micro-hydro plants, 5,747.2 KW of micro-hydro capacity, 14,743 improved cook stoves, 7,041 toilet attached biogas plants and 3,238 solar home systems. The primary beneficiaries were the rural communities, with particular attention to vulnerable communities like women, Dalits (often viewed as the lowest social caste, or the untouchables) and indigenous people. Main stakeholders included local bodies such as District Development Committees (DDCs) and VDCs, private sector companies, government organizations, local non-governmental organizations (NGOs), academia, international donors and other organizations working in the renewable energy sector.

Based on lessons learned at all levels – community, district and centre – over more than a decade, the programme supported the GoN in the formulation of the National Rural Energy Policy in 2006. These lessons learned were also incorporated into the formulation of the government's rural energy plan in the Tenth Five Year Plan (2002-2007). REDP entered into Phase Three of operation, effective from 1 September 2007, as a joint programme of the GoN, UNDP and the World Bank. In this phase, the REDP is supported by the GoN to implement the Rural Energy Policy 2006 in all 75 districts by 2012. It has brought modern energy services to almost a million people in remote rural communities in Nepal — 250,000 reached by micro hydro power supplying

4 The additional 10 hill districts were Darchula, Bajhang, Doti, Humla, Mugu, Dhading, Solukhumbu, Sankhuwasabha, Panchthar and Taplejung.

electricity for lighting and mechanical power for agro-processing and other productive activities, and 580,000 people with access to improved cooking stoves (see Figure 1). By December 2009, REDP had installed 267 micro-hydropower systems (equivalent to 4,453 kW) in addition to 5,440 toilet-attached biogas plants, 2,410 solar PV home systems and 11,757 improved cooking stoves.

Recognizing the positive impacts of REDP, the GoN has set a goal of increasing the share of renewable energy from less than 1 percent to 10 percent of the total energy supply, and to increase the access to electricity from alternative energy sources from 10 percent to 30 percent within the next 20 years. Similarly, for the next three years, the GoN has set a goal of generating 15 percent of electricity from micro-mini hydro plants. Complementing these goals, the government also envisages investments of US$1,076 million in the rural energy sector by 2020, which will include support for hydropower, solar PV and biogas technologies. The current Three Year Plan sets an ambitious target of providing electricity to an additional 7 percent of the rural population through renewable energy.

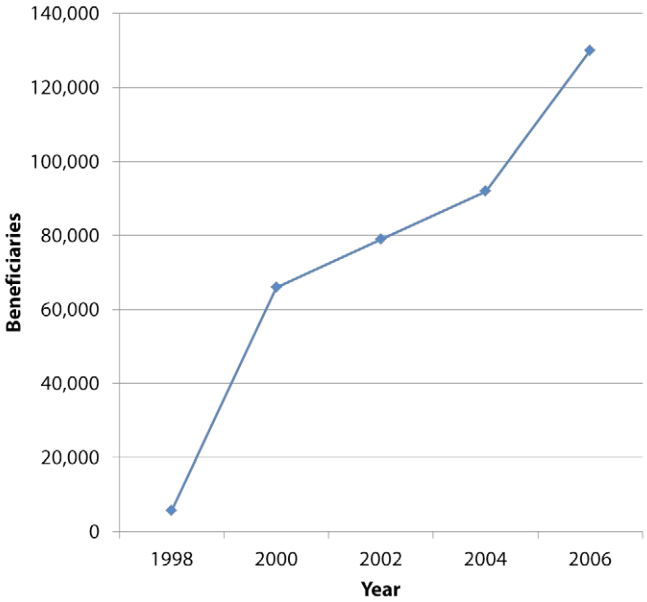
REDP's success has been recognized by several national and international awards, including the Energy Globe Award in 2000 (Austria), the Global 100 Eco-Tech Award in 2005 (Japan) and the Pearl of Knowledge Award in 2005 (UNDP Regional Centre in Bangkok).

Development Benefits of REDP

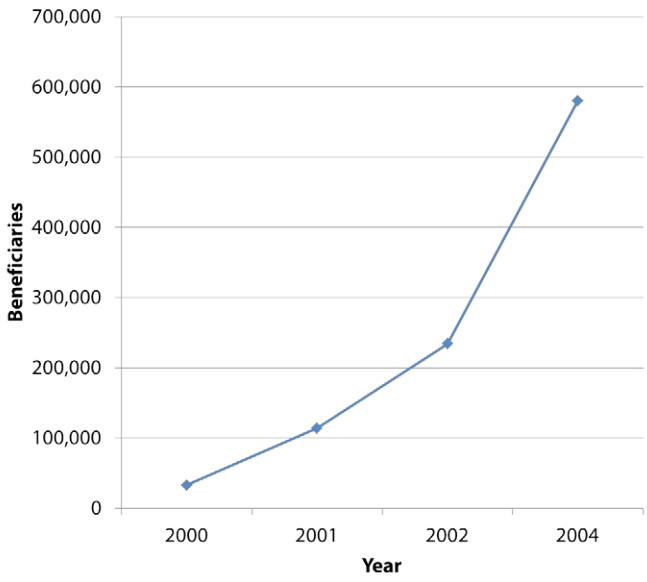
REDP enhanced rural livelihoods through the promotion of rural energy technologies, primarily through the promotion of community-managed micro-hydropower systems (MHSs) as the entry point for holistic development and poverty reduction. While the REDP was launched in 1996 before the formulation of the MDGs in 2000, a comparative analysis conducted by Winrock International and a joint study conducted by UNDP and Alternative Energy Promotion Centre (AEPC) both revealed the holistic approach of REDP in making clear linkages to a number of MDGs. The UNDP and AEPC found that the cumulative development benefits of installing a micro-hydropower system far outweigh its investment costs. According to this study, through skills enhancement that support the development of income-generating activities that make productive use of newly available electricity, a household could experience a US$912 additional increase in annual income, thereby boosting economic growth in remote rural areas. Both studies concluded that REDP produced multiplier benefits for the beneficiary households and made substantive contributions to several MDGs, particularly by promoting income generation activities in rural households, increasing school enrolment rates (particularly for girls), promoting women participation in all activities, improving child and maternity health, and preserving the environment. Box 1 highlights some of the programme's most notable contributions to the achievement of the MDGs.

Figure 1. Beneficiaries of REDP

Beneficiaries of hydropower installed by REDP, 1998-2006



Beneficiaries of improved cooking stoves installed by REDP, 2000-2004



***Source**: UNDP and AEPC, Capacity Development for Scaling Up Decentralized Energy Access Programmes: Lessons from Nepal on its Role, Costs and Financing, New York: UNDP, 2010.*

Box 1. Selected REDP's contributions to the achievement of the MDGs

MDG 1. Poverty Reduction

- Increase of US$121 in household income, representing 8 percent of the average annual income of electrified households (average yearly household income in newly electrified communities was US$1,530, which is US$136 higher than the average of US$1,213 in similar communities without electricity);
- Decrease in percentage of households below US$637 annual income from 59 percent to 54 percent;
- Decrease in proportion of people with an annual income of below US$127 annual income from 15 percent to 12 percent;
- 40 new businesses created following the installation of a micro-hydropower system, compared with only four established prior to electricity access, with average annual net profits from new productive enterprises of US$912 (ranging from US$32 for sewing or knitting to US$2,667 for poultry or farming) in each district; and
- Average annual household spending rate on electricity reduced to US$19 (US$11 for electricity and US$8 for kerosene and batteries), compared to US$41 by non-electrified households for kerosene and dry-cell batteries.

MDG 2. Primary Education

- Average of 17 fewer students per teacher in primary schools with electricity than those in areas without electricity – 70 percent of the difference in the student-to-teacher ratio attributable to electrification;
- Decrease in number of children/youth between the ages of 6 to 14 without primary level education from 25 percent to 7 percent;
- Decrease in average boys/girls ratio of school enrolment from 1.20 to 1.13;
- Decreasing trend of dropout rate due to domestic problems;
- Overall improvement of the educational status of the villages due to REDP activities, according to 90 percent of respondents; and
- Households with electricity spent twice as much on education compared to households without electricity (average increase attributable to electricity is about 26 percent of electrified households' average school expenditures).

MDG 3. Gender Equality and Women Empowerment

- Decrease in average travel distance to collect from nearly 400 meters to 1675 meters;
- Increase in engagement by men in agricultural work;
- Decrease in the number of hours spent on chores such as "firewood collection" and "agro processing" for both men and women;
- Increase in men's participation in such chores as "cleaning," "agro processing" and "cooking";
- Significant increase (nearly doubling) of social involvement of both men and women;
- Increase in participation of women (up to 48 percent) in community life and political decision-making decisions;
- 0.25 days of schools missed by girls living in electrified communities, compared to 0.7 days for girls living in non-electrified communities (Girls living in electrified communities are 2.2 times more likely to be in grades 4 or 5; are 7 times more likely to be in grades 6 or 7; and are 15 times more likely to be in grade 8 or higher);
- More women than men were beneficiaries/consumers of new productive activities (234 women compared with 145 men);
- 155 hours saved per year for women and 85 hours for men on time spent on agro-processing activities through the use of electrical mills instead of manual agro-processing; and
- Increased access to television for women (78 televisions in electrified communities versus 1 in the non-electrified ones).

MDGs 4, 5 and 6. Reduce Child Mortality, Improve Maternal Health and Combat HIV/AIDS and Other Diseases

- decrease in child and maternal mortality rates;
- Increase in diagnosis of diseases;
- Increase in toilet users from 40 percent to 70 percent;
- Increase in access to tap water from 58 percent to 82 percent;
- Number of visits to electrified health facilities more than doubled in comparison to those without electricity; and
- Average of 11 health workers per 10,000 people in electrified areas, compared with only two in non-electrified health posts in non-electrified areas.

MDG 7. Ensure Environmental Sustainability

- Significant decrease in the use of kerosene for micro-hydro power (MHP) activities;
- Reduction in firewood consumption;
- Increase in use of biogas and ICS installations due to REDP activities, which has installed 932 biogas plants and 1300 ICS in 20 project sites;
- Reduction of firewood demand due to REDP activities, according to 64 percent of respondents;
- Increase in "greenery" in localities;
- Prevention of the emission of 4 tons of CO_2 per kilowatt installed per year, or 517 tons of CO_2 per year; and
- 80 percent reduction in the likelihood of using dry-cell batteries or kerosene, therefore limiting environmental damage related to disposal of used batteries, and air pollution and greenhouse gas emissions associated with burning kerosene.

Key Enablers for Scaling Up

Scaling up of decentralized energy services in Nepal was made possible by a number of enablers. The process benefited from strong, long-term commitment of the national government, which not only provided catalytic public investments but also enacted policies that further boosted the process of scaling up. Furthermore, the programme implemented capacity development efforts at all levels: national to create an enabling environment through policy and strategies, local to improve energy service delivery, and community to empower beneficiaries and promote local governance. Finally, the programme's innovative partnerships and financing mechanisms, such as through public-private partnerships and a community-based approach, further ensured sustainability and cost-effectiveness, as well as delivered multiplier benefits for rural populations.

1. National Ownership and Commitment

A Dedicated National Agency with a Vision of Scale

The programme was nationally driven, with strong, long-term commitment of the GoN from the very beginning. The government established AEPC as the dedicated agency to lead and coordinate rural energy programmes[5] within MoESt,[6] and the REDP was brought under the AEPC in 2001. The establishment of a dedicated national agency, as well as the way in which it designed and managed programmes, indicated a "vision of scale" for implementing and scaling up the pilot projects. These programmes were established based on decades of experience: the development of MHSs had been underway in Nepal since the 1970s, and programmes to promote the use of ICS were first rolled out in the 1980s. The lessons learned from these programmes were already incorporated into the pilot programme with a vision for scaling up, thus reflecting a "learning by doing" culture[7] that valued adaptation and flexibility. From the start, the GoN gave high priority to the promotion of rural and renewable energy technologies, particularly micro-hydro, solar, biogas and ICS in its development plans and programmes. The promotion of energy services in Nepal followed the government's decentralized approach of delivering services at the local level directly through local bodies called DDCs and VDCs. These local bodies accorded top priority to promotion of energy services and accordingly apportioned a substantive amount of matching funds to support renewable energy schemes from overall district development budgets and community contributions. In addition, the DDCs took full responsibilities of programme administration and management at the local level, while the project engineers mainly provided technical inputs required for district energy planning, site selection, and design and installation of an energy scheme. Energy schemes, such as micro-hydro plants, were delivered as components of the overall district development plan, and not as a separate donor funded project.

AEPC in collaboration with UNDP also maintained a rigorous monitoring and evaluation system that ensured a continuous learning process for improvement and necessary adjustments. For example, all activities had well-audited cost data, available over suitable timeframes for the analysis of capacity development costs and their relationship to overall programme costs and outputs, which further facilitated the scaling up process. The illustration of the social, economic, and environmental benefits and impacts of rural electrification programmes presents the much-needed evidence and justification for further financing and investment to scale up a programme. REDP rigorously documented the development benefits of providing decentralized energy services, which allowed for the evaluation of the long-term cost-effectiveness and sustainability of these interventions, and subsequent participation of additional donors and organizations to scale up these programmes.

Enabling Policies and Laws

Global experience shows that strong political commitment to decentralization and local empowerment is also a critical enabler of the scaling up process. In Nepal, political commitment also

5 AEPC was established in 1996 with the mandates of promoting the use of renewable energy technology and the efficient use of energy, reduce environment impacts, develop commercially viable alternative energy technologies, and raise the living standard of the people, particularly in rural areas. AEPC is a semi-autonomous government body under the MoEnv and was formed under Clause 3 of Nepal's Development Board Act 2013 BS, and is currently operating under the mandate given by the Alternative Energy Promotion Development Board Formation Order (Fifth Amendment) 2063. The process to expand mandates of AEPC and the establishment of the Alternative Energy Promotion Board (AEPB) through the promulgation of a new Act has started. The AEPB would be an autonomous agency with powers to raise grant and loan funds locally and internationally to develop RE, maintain a separate fund; provide support to local bodies, NGOs and community based organizations (CBOs); and promote public-private partnerships (PPPs) in Rural Electrification (RE) development.

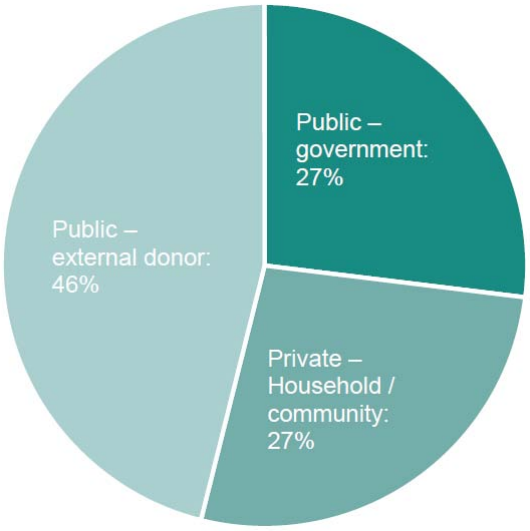
6 This is now re-organized as the Ministry of Environment (MoEnv). It also established a National Steering Committee (NSC) comprising of representatives from the National Planning Commission (NPC), Ministry of Local Development (MoLD), Ministry of Finance, District Energy Network (DENET), Association of District Development Committee of Nepal (ADDCN) and the National Association of VDCs in Nepal (NAVIN) to guide programme activities.

7 Korten, D., Getting to the 21st Century: Voluntary Action and the Global Agenda, West Hartford: Kumarian Press, 1990.

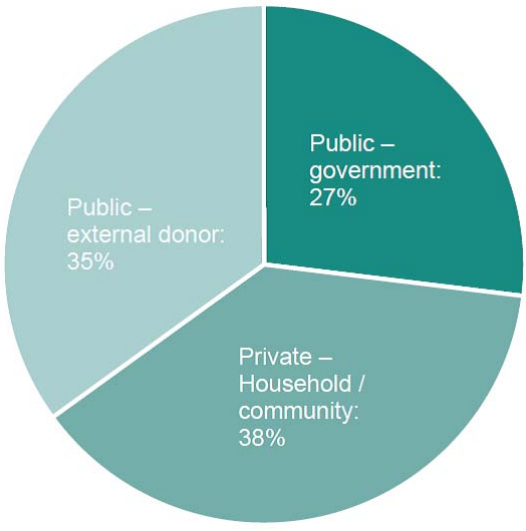
led to the enactment of enabling policies and laws in support of scaling up. With AEPC playing a pivotal role, the Rural Energy Policy (2006), the Subsidy Policy for Renewable (Rural) Energy (2009), the Renewable (Rural) Energy Subsidy Delivery Mechanism (2010) and the Delivery Mechanism of Additional Financial Support to Micro/Mini Hydro Project (2011) policies provided guidelines on institutional mechanisms, subsidy criteria and delivery mechanisms, including the setting up of a Renewable Energy Fund (REF). The subsidies, usually co-financed with donor funds under specific projects or programmes, were primarily aimed at providing energy to low-income rural households. Other enabling measures included the establishment of national, district, and community rural energy funds, as well as tax and duty concessions and exemption of mini, micro and pico hydro projects from royalties and licensing requirements.

Figure 2. Total programme costs (in 2005 constant dollars), 1996–2006

Costs for REDP's micro-hydropower programme: US$14.3 million



Costs for REDP's improved cooking stoves programme: US$1.5 million



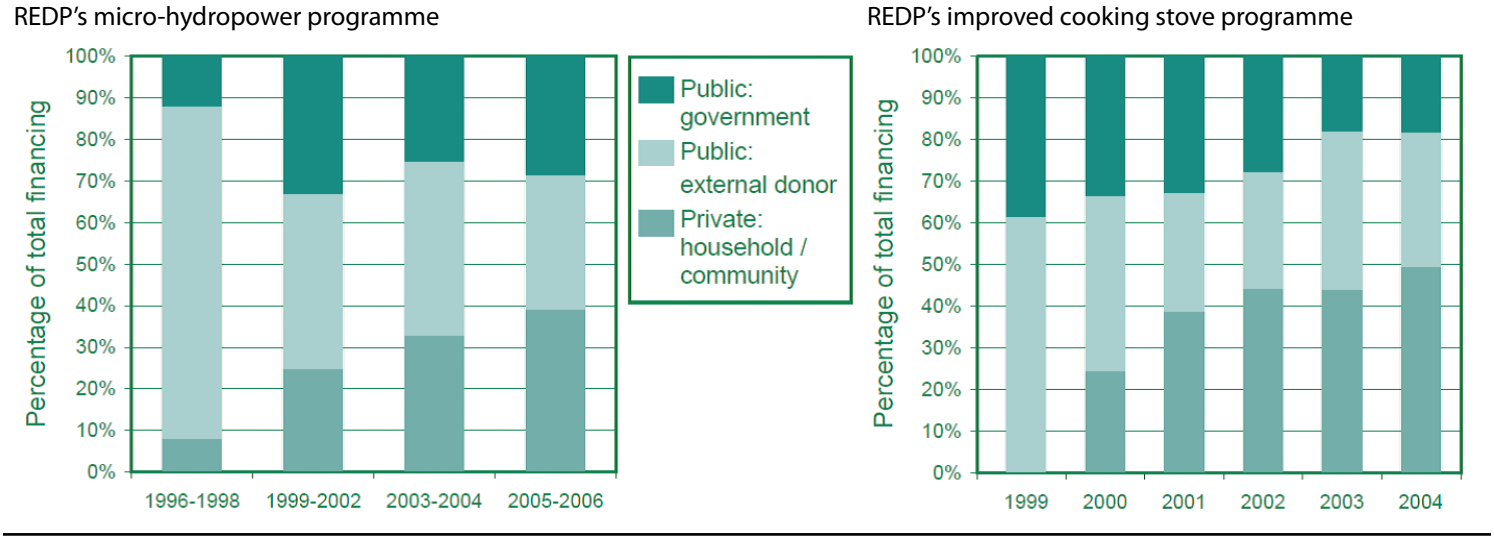
***Source**: UNDP and AEPC, Capacity Development for Scaling Up Decentralized Energy Access Programmes: Lessons from Nepal on its Role, Costs and Financing, New York: UNDP, 2010.*

2. Shared Financing

Simultaneously, the government also provided upfront public financing that proved to be catalytic in mobilizing resources as the programmes grew. The government (via the Nepal Electricity Authority) made a commitment to provide up to 80 percent of the capital investment required in rural electrification construction costs, while communities were responsible for contributeing at least 20 percent of the total cost of the grid extension via labour, household donations, bank loans, etc. The apparent strong commitment from the government in turn attracted long-term commitments from donors and partners including the Danish International Development Agency (DANIDA), the World Bank, UNDP and various NGOs, as well as from local governments, who contributed financing under subsidy provisions and for capacity building. These upfront public investments and the subsequent donor investments played a dominant role in not only building the capacity of local and national level actors, but also catalyzing fund flow from banks in the form of loans. This facilitated the subsequent significant contributions by communities and households to implement rural energy systems and pay for the energy services. Communities provided cash, took out bank loans and gave in-kind contributions, such as by digging channels and collecting sand, stone and wooden poles for MHSs. These contributions made up a significant share of the overall financing needed for setting up MHSs.

In fact, while funding from public sources was dominant at the outset (well over 90 percent), community contributions increased over time to reach almost 40 percent of investments in 2006. (See Figures 2 and 3). For the two programmes included in a UNDP study conducted in 2010, funding from public sources made up well over 90 percent of the programmes' budgets at the very beginning, but gradually declined to about 50 percent at a later stage. This decline suggests the pivotal role of public investments in attracting local community contributions (who invested in cash loans from banks) as well as in developing national and local capacities. Indeed a key factor for the success and scaling up of MHSs was due to the fact that total costs were greatly shared by

Figure 3. Sources of financing, 1996-2004



***Source**: UNDP and AEPC, Capacity Development for Scaling Up Decentralized Energy Access Programmes: Lessons from Nepal on its Role, Costs and Financing, New York: UNDP, 2010.*

the local communities and the households through cash and kind contributions, which would not have been possible without upfront public financing.

3. Capacity Development at All Levels

A common challenge in scaling up processes arises from the lack of adequately trained human resources, as well as the fact that the lessons learned from pilot projects are often lost because they are not consistently applied through quality training. Capacity development not only helps to transmit procedural and technical expertise and organizational values to new staff, but also ensures that these critical lessons are not diluted in the scaling up process. REDP recognized the importance of capacity development in enhancing the development benefits of electrification. This could only be done through the integration of micro-hydropower projects to rural development in a holistic approach, which required capacity development at two levels: 1) the national level to create the necessary framework and policy environments for scale-up and replication of cost-effective solution, and 2) at the local level to enhance the ability of community members to plan, implement, manage and maintain new energy technology systems and ensure effective service delivery.

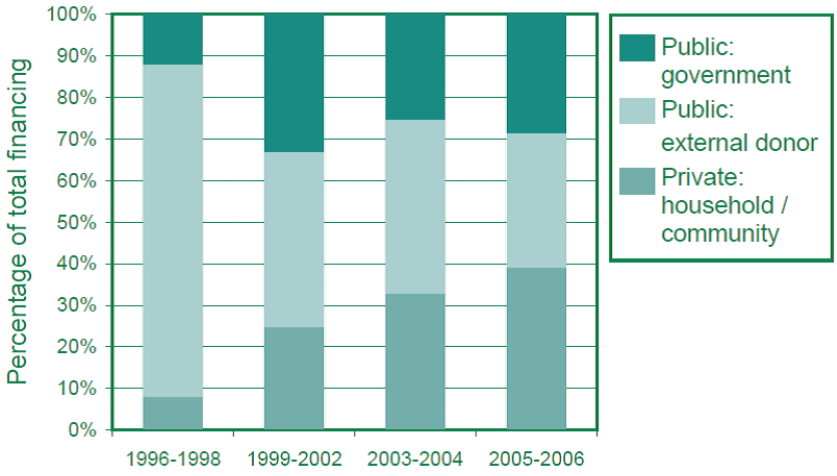
The success of REDP was thus marked by intensive capacity building and community mobilization efforts in all areas of organizational development, skills enhancement, capital formation, technology promotion, environmental management, and vulnerable community empowerment. UNDP employed its Capacity Assessment Framework to contextualize, dissect and categorize the capacity development activities undertaken by REDP in Nepal. It then identified key functional and technical

Box 2. UNDP focused its support in building the functional capacities of local and district development officers to:

1. build planning, oversight and monitoring skills to devise strategies and actions for successful implementation and human resources management;
2. develop, propose and advise on policies and regulations, and promote financial support to facilitate the establishment of an energy programme and its implementation;
3. undertake and guide studies and in-depth situation analysis of the geographical, political, socio-economic and technological context, including energy needs of local communities;
4. facilitate stakeholder dialogue, communication and community mobilization for advocacy, knowledge sharing and data collection;
5. create and enhance institutions and facilities that are necessary for effective implementation and services delivery;
6. train community members and programme implementers; and
7. effectively implement and manage a programme on site.

Figure 4. Potential Future Capacity Development Costs

Potential future capacity development costs for the micro-hydropower system programme



Potential future capacity development costs for the improved cooking stove programme

***Source**: UNDP and AEPC, Capacity Development for Scaling Up Decentralized Energy Access Programmes: Lessons from Nepal on its Role, Costs and Financing, New York: UNDP, 2010.*

capacities that were not only common in the programmes implemented in Nepal but also could potentially be applicable to decentralized energy access programmes in other developing countries.

Through the programme's capacity development activities, local communities gained the ability to implement and manage rural energy systems, enabling the benefits of electricity access to reach even the most rural and poorest households. At the same time, REDP managed to lower per-unit programme costs over time, successfully overcoming the common challenge of increased unit costs when programmes are extended into deeply rural areas. REDP effectively lowered per-unit cost by "piggybacking" on existing capacities. According to a recent study of REDP, that both capacity development activities and overall costs have also significantly reduced. Between 1996 and 2006, MHSs installed by REDP reached more than 130,000 people at an average cost of about US$110 per beneficiary (in 2005 constant dollars). Between 1996 and 2006, REDP's MHS programme installed systems producing 2500kW benefiting more than 130,000 people. The total cost of this programme over that period was about US$14.3 million, of which 56 percent was spent on capacity development activities. The study showed, however, that per-unit programme costs declined by 73 percent between 1996 and 2006, mainly driven by the decline in capacity development costs. (See Figure 4).

4. Community Mobilization and Effective Partnerships

Scaling up requires an idea, an innovation or a model that contributes to the development process. In the case of REDP, community mobilization served as an innovative and essential vehicle for self-governance to ensure active participation of local people at all levels to manage and operate rural systems, primarily micro hydropower and other community development initiatives. REDP's operations built on existing governance structures at the local level, particularly through VDCs and at district level through DDCs, to institutionalize rural energy service delivery. The programmes were designed to place local communities at the centre of the process by implementing a community mobilization process that was based on the four pillars of participation, transparency, consensus decision, and inclusion. These pillars called for community participation at every stage of the development process so that local communities would remain engaged and empowered in the decision making, implementation, benefits sharing and sustainability of the process.

Using a set of six guiding principles of its community mobilization model, REDP effectively promoted the formation of community organizations (COs), which were later encouraged to organize themselves into micro hydro functional groups (MHFGs) based on common interests such as micro-hydropower, income generation,

forestry, biogas and poultry farming. The functional groups consisted of representatives of all community organizations, ensuring representation from men, women and vulnerable groups. In fact, each functional group had to be composed of at least one female CO and one male CO. The MHFG served as the key body at the village level for establishment, operation and management of MHSs. Once the community-managed MHS has been running successfully for at least six months, the community groups could register as a legal entity, such as a micro-hydropower cooperative. For long-term sustainability of the micro-hydro schemes, communities were trained and empowered to operate and maintain the schemes by themselves, and the responsibility of social mobilizers gradually shifted to the community.

Scaling up rural energy services requires "the provision of self-governing institutional mechanisms for inclusive participation and empowerment based on a decision-making process that is transparent and builds consensus".[8] The case of scaling up decentralized energy services in Nepal certainly illustrates how support to local governance was a key enabler in the scaling up of decentralized energy services to rural areas. REDP ensured the participation of both male and female beneficiaries, transparency and consensus based on inclusive decision-making processes. Experience to date indicates that this approach was highly effective in strengthening ownership at the local level and ensuring sustainability and cost-effectiveness of the programme's interventions and activities.

5. Effective Partnerships and Coordination

The case of REDP illustrates how effective partnerships and synergies were built through forging incentives and accountability for partners to buy into the scaling up process. REDP was implemented in parallel with other programmes that installed solar home systems, improved cooking stoves and toilet-attached biogas plants. Since REDP took a demand-driven and decentralized approach, it relied heavily on community based organizations and local partner organizations and their village-level work. It also encouraged the active engagement of local NGOs to act as support organizations and carry out the process of community mobilization. Furthermore, local entrepreneurs were provided with incentives by the government, which gradually increased the role of the private sector. Indeed the main factor behind increased participation of the households in Nepal's rural energy programme was that the programme provided ample opportunities for skill development to the households and to link them with micro-finance services, which were important for running an enterprise at the local level.

These partnerships and synergies between the government, NGOs, community-based organizations, UNDP and other partners were indeed crucial in enabling the scaling up processes. Under the leadership of AEPC, REDP has also recently launched an exercise to develop a single common harmonized programme (US$120 million) of all donors under joint funding arrangements, wherein most of the donors have shown their willingness to support. This initiative also encompasses the programme components of the Scaling Up Renewable Energy Programme (SREP), a US$40 million programme under the Climate Investment Fund.

The lessons learned from the programme have been useful in creating predictable fund-flow mechanisms at national, district and local level for disbursements of credits and grants for capacity building, installation and end use. They have also facilitated the development of incentives for private investors (individuals and firms in collaboration with the local institutions and the community groups under innovative public-private partnership arrangements) as well as the mobilization of substantive resources from the government to reduce dependency on donor funding. Ultimately, the case of Nepal's decentralized rural energy system illustrated how mutually supportive policies, programmes and projects enable the scaling up process.

REDP as an Opportunity for South-South Learning

REDP provides a particularly strong opportunity for fostering South-South learning. It is regarded as an example for other countries to emulate not only in terms of its sustainability and transferability but also in its depth of policy impact. With the expansion of the programme's technology in 40 districts under the decentralized governance frame of the government, the scaling up efforts have moved further up with innovation in effectiveness in the design of the turbines, connecting scattered MHSs into a local grid (with a possibility of connecting to national grid) to provide more reliable source of energy for enterprise, and increasing the average size of micro-hydro plant that was used in 1990s.

Furthermore, the programme's success in mobilizing communities and establishing innovative cost-sharing mechanisms to fund the scaling up phase of decentralized energy services clearly

8 Neupane, M. and Sharma, B., Community Based Rural Energy Development in Nepal: Experiences and Lessons from Innovative Approaches, Kathmandu: ICIMOD, October 2006.

demonstrates how a scaling up process can be financially feasible. The experience of Nepal's REDP provides useful lessons regarding the financing of decentralized MHSs installations through a combination of public-private investments. It also illustrates the possibility of capitalizing on already existing government priorities that focus on renewable energy in order to produce multiplier effects for development and MDG achievement. The programme, for example, directly contributed to increaseing women's participation in community life and political decision making processes.

Careful evaluations of the development benefits of the programme have clearly articulated both the development benefits of the programme as well as the feasibility of implementing and scaling up such an initiative. Finally, the capacity development strategies employed by the REDP were designed to not only reflect the needs of the programme itself but also with the view for applicability to decentralized energy access programmes in other developing countries. For these reasons, REDP has already informed several other countries in Asia, including Afghanistan, Bhutan, Cambodia, Mongolia, Pakistan and Tajikistan, in various programmes related to energy and local service delivery. Other countries, such as Kenya, the United Republic of Tanzania and Uganda, have also benefited from three-month on-site trainings by Nepalese micro-hydro power experts to facilitate the replication of the REDP approach.

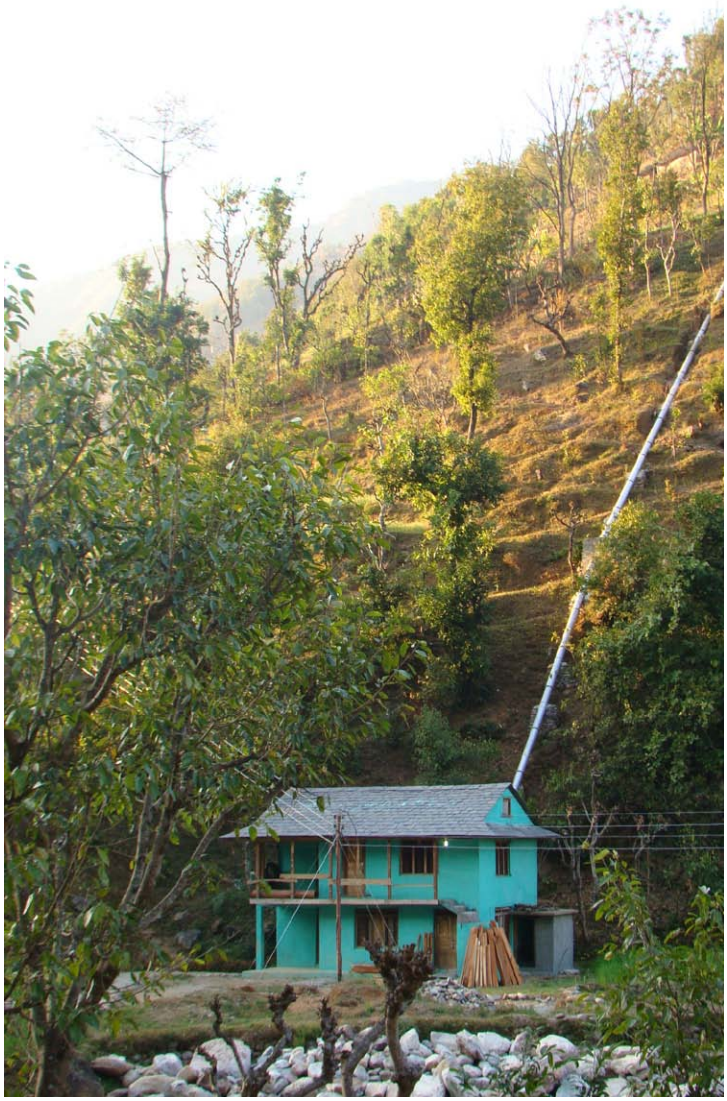
Conclusion

Launched as a small pilot intervention in 1996 covering five districts, the programme has now become a widely recognized and popular model for rural development using energy as an entry point. While the REDP has yet to be fully launched on a national scale, its development from a pilot initiative to a scaled up programme benefiting one million people living in rural areas provides a number of lessons learned to inform scaling up processes of other development initiatives.

Strong and long-term commitment of the government is crucial in scaling up decentralized energy services. In Nepal, the national government played a proactive role in supporting decentralized energy services by providing catalytic funding, developing the necessary infrastructure for these expansions and enacting several enabling policies to facilitate the process.

Scaling up of decentralized energy access programmes is financially feasible, particularly with upfront public investments and active participation of local communities. For the programmes in Nepal, household contributions (both cash and in-kind) and community loans are expected to gradually account for a greater portion of the overall investments, up to 60 percent of future funding needs compared to 30 to 40 percent that has been the average to date. Encouraging greater participation of local communities as well as the involvement of private investors requires promoting productive uses of energy services even more, in order to help raise people's incomes and encourage other activities that yield large development benefits.

A community-based approach in support of local governance ensures the long-term sustainability and feasibility of scaling up rural energy services. By providing self-governing institutional mechanisms for inclusive participation and empowerment based on a decision-making process that is transparent and builds consensus, REDP successfully mobilized communities, built their capacity and motivated and encouraged both male and female community members to participate equally



in the development process. These decentralized institutional frameworks and operational modalities were a key ingredient in ensuring the scaling up of rural energy systems.

Local capacity development is crucial in ensuring the success of scaling up rural energy access programmes. Unfortunately, however, decentralized energy access plan and budgets often do not sufficiently take into account the capacity development activities required for adoption of off-grid energy technologies by poor and rural populations. This is especially true in areas where geographical remoteness and small and/or fragmented markets greatly limit traditional delivery mechanisms, such as central utilities. In Nepal's decentralized energy access programmes, capacity development costs represented a significant portion (more than 50 percent) of overall programme costs, especially in the initial stages, and must be fully taken into consideration during the planning and designing stages. Effective strengthening of both national and local capacities for scaling up rural energy services therefore requires the mobilization of public investment.

Scaling up decentralized energy services for multiplier development benefits requires effective partnerships and synergies across a wide range of actors. In Nepal, REDP worked closely with, and often heavily relied on, community-based organizations, NGOs, the private sector and local governments to empower local communities to build their own MHSs. Implementing programmes in parallel with other complementing programmes was also crucial in ensuring cost-effective and efficient delivery of services for increased incomes and economic growth of rural populations.

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