

POLICIES TO SPUR ENERGY ACCESS: EXECUTIVE SUMMARY

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Technical Report

NREL/TP-7A40-64460

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About this Report

This report was written to support policymakers who want to accelerate energy access by engaging private sector participants in developing countries or regions. It focuses on **electricity access**; for the purposes of this report, the term “energy access” refers to access to electricity and related services rather than cooking fuels or technologies. The report focuses on the use of **distributed** (or decentralized) electricity options rather than grid extension. While its primary focus is off-grid energy access, it also offers policy information for including distributed electricity as part of the grid.

These policy issues are complicated and many issues are interrelated. The authors would like to remind readers that the Clean Energy Solutions Center offers governments access to expert assistance on these and other clean energy policy issues at no cost. More information is available at cleanenergysolutions.org/expert.

The report consists of an executive summary and two volumes that cover three types of information. The volumes can be read in conjunction with each other, or they can be read separately. The executive summary covers both Volume 1 and Volume 2.

Volume 1: Engaging the Private Sector in Expanding Access to Electricity

Section 1—Basics of Distributed Electricity Access

Intended to provide background to those new to off-grid energy access, Section 1 of this volume provides a brief rationale for why governments should consider prioritizing distributed electricity access. It discusses the benefits of accelerating access and the role that small and medium-sized enterprises (SMEs) can play in providing those services. After highlighting barriers that SMEs face in engaging in energy access, this section introduces the role of government in opening these markets.

Section 2—Policies for Decentralized Energy Access Markets

Drawing from a wide range of existing programs and reports, this overview describes the key policies that countries are using to enable the development of the off-grid energy access market. Experience has shown that a holistic policy approach is most successful in fostering small and medium-sized enterprises to provide energy services to rural customers. This section addresses the government’s role in each element of the market—from energy regulations to finance options and from business support to worker training. It also discusses the role of various ministries in expanding energy access and approaches for integrated actions across agencies and levels of government. Policies in this section are highlighted with real-world examples and emerging good practices, drawing on the case studies presented in Volume 2 and other examples from the literature.

Volume 2: Case Studies of Public-Private Models to Finance Decentralized Electricity Access

Volume 2 uses case studies to examine five different models for off-grid energy access around the world, including Bangladesh, Ethiopia, Mali, Mexico, and Nepal. Each study examines a program, policy, or innovations in a market, and each case study assesses the policy decisions that led to the current market and their impact on SMEs in distributed energy access.

Executive Summary

Policymakers in developing countries face a range of obstacles and options to promote universal access to electricity for all citizens. Distributed (or decentralized) electricity technologies can often provide a quicker, more cost effective path to electricity access.¹ Where policies enable markets for distributed electricity services, they offer an opportunity to engage the private sector. Governments can leverage their use of public funds to attract private sector investment, especially at the local and national levels.

This report provides an overview of the variety of policies that can spur electricity access through the engagement of private enterprises in an energy access market. Areas of focus include establishing an enabling policy environment, catalyzing finance, building human capacity, and integrating electricity access with other development programs. The report includes five case studies of distributed electricity access in developing countries, with a particular emphasis on the policy decisions that fostered each program.

Access to sustainable, reliable electricity is a daily challenge for one in four people on Earth. As of 2014, 1.2 billion people had no access to electricity and another 800 million had no access to reliable grid power that was able to meet their basic energy needs (Desjardins et al. 2014). Eighty percent of these people without access live in rural areas in Asia and Africa (IEA 2011).

Providing access to modern energy services has implications for every aspect of sustainable development. Lack of electricity affects health care, education, irrigation, and a range of economic opportunities, including mobile phones and computers. The International Energy Agency projects that while current and planned investments in energy access will lead to an increase in the number of people with access to electricity, in some areas such as sub-Saharan Africa, these gains will be offset by population growth. As such, 1.0 billion people in developing countries are still expected to lack access to basic electric services such as modern lighting in 2030 (IEA 2014).

In years past, universal access was approached primarily as extension of the electricity grid. But, a convergence of issues has created a major opportunity for affordable, replicable electricity access through distributed energy. Dramatic cost reductions in clean energy technology, particularly in solar electricity and batteries, coupled with new advances in energy-related wireless and information technologies, have created a burgeoning opportunity for enterprises to deliver energy services directly to the market (Desjardins et al. 2014). Providing energy access in a distributed manner, as opposed to relying solely on grid extension, can speed access to many and can often provide more realistic options to those in remote areas where grid power is costly to install and maintain.

From solar lighting to minigrids, decentralized energy can provide energy access at increasing tiers of service. These tiers can serve as a ladder to systematically increase access for the underserved to higher levels of service, and the highest tier can provide services equivalent to grid connection.

¹ In this report, “distributed energy” and “decentralized energy” refer to electricity generation that occurs on-site or near the load it serves. A decentralized market utilizes distributed energy technologies to provide electricity services on an individual or small-group (minigrid) basis. Distributed energy may refer to a wide range of energy technologies, and it can refer to both off-grid and grid-connected technologies.

Renewable technologies can provide a cleaner path forward for energy access, but they also can offer lower lifetime costs and greater reliability than non-renewable options for distributed energy.

Some of the most effective models for providing distributed energy services in a replicable and reliable manner are to engage small and medium-sized enterprises (SMEs). With proper support and financing, these enterprises can understand local markets and nimbly provide services that meet customers' needs. In developing a robust market, the SMEs engage financiers, create local distribution channels, and develop support services for their energy products. Often, they build upon existing business expertise and networks to expand into new services. All of these are vital to the long-term success of distributed technologies. Engaging local enterprises creates employment and economic opportunities while providing electricity options for those who currently have none.

Despite the potential advantages of SMEs, a range of barriers stymies new enterprises trying to engage in this market. While any new business faces a range of hurdles to start up, those in the energy sector face even greater barriers from traditional monopoly roles for the provision of electricity, additional regulatory burdens on electricity sales, and a lack of workforce or investor experience with the technologies. SMEs are faced with the double challenge of trying to start a business and creating an entire market.

Developing country governments have an important role in delivering basic energy service to their citizens. The IEA has concluded that public funds and donor organizations do not have enough resources to tackle this problem alone. Hence, increasing private sector investment in energy access will be a prerequisite to reach universal access in the near term (IEA 2011). That is the driver of this report.

Policies for Decentralized Electricity Access

Developing government policies are one of the most important factors in engaging the private sector in the distributed energy access market. Policy uncertainty and regulatory barriers can keep investors from engaging in the market. However, the case studies that accompany this report show that robust policy frameworks—addressing a wide range of market issues from regulations to financing to business support and training—can lead to rapid transformation in energy access.

Policies for electricity access include but go beyond traditional regulatory and tariff decisions. They encompass a range of policies to engage and catalyze finance networks, to build market and workforce capacity, to enable flexible business models, and

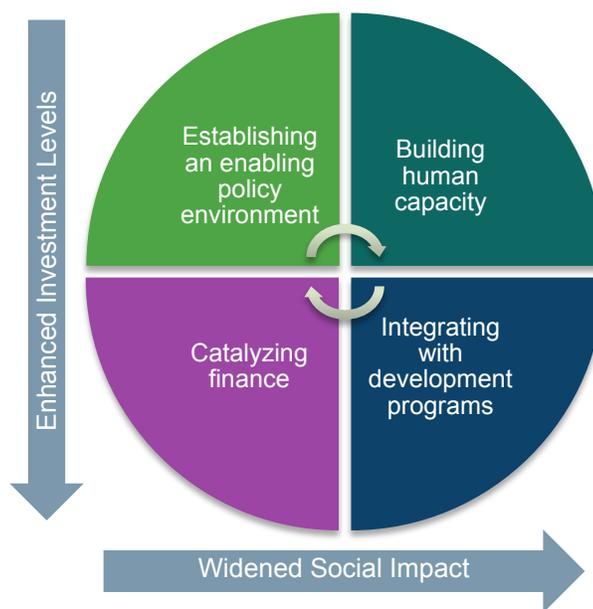


Figure ES-1. Government roles to accelerate energy access

All four areas are interrelated and must be addressed in concert with a coordinated effort.

to streamline services to enable a broader range of actors in the electricity market. Policies also reach beyond the scope of traditional energy policy and integrate with development policies on economy, health, agriculture, education, and environment.

This report provides a quick look at the full breadth of policy issues that impact the development and expansion of a market for decentralized electricity services. Together, these policies can increase the investment opportunities available to this market and thus expand the social benefits. The report also highlights examples of these policies in action in developing countries. We categorize policies into four interrelated categories as shown in Figure ES-1. These are described in the following sections.

Establishing an Enabling Policy Environment

Policymakers that want to support a decentralized energy market need to prioritize these energy options into broad policies for **planning and coordination**, such as national electrification plans, energy policies, and development goals. Providing policy clarity is important to inform potential actors in the market and provide a stable platform for market development. Examples of policy clarity are directly addressing decentralized energy options in electrification plans and providing clear, detailed plans for grid extension. Coordinating electrification plans with climate, renewable energy, and other development goals can also increase the resources and priority given to the decentralized. Whenever they are possible, policies based on current technology and market data will lead to more realistic solutions.

Often, the **regulatory environment** for electricity is not specifically designed to accommodate remote or decentralized electricity projects or related businesses. To avoid major and unintended obstacles for these projects, regulations should be reviewed and updated to ensure they allow flexibility in technology, types of projects, and business models. Policymakers can balance consumer protection with reduced regulatory burdens by establishing a threshold for the size and type of projects that must comply with regulations. In parallel, regulators can adopt quality standards for certain systems to improve the reliability of energy products in the market. Allowing tariffs that reflect the cost of service is important to enable viable business models that can attract financing. Policy clarity can reduce project risks, especially when it is related to concessions for the right to provide electric service within a certain area, granted authority for non-utility enterprises to provide electricity service, interconnection requirements, and transparent provisions for cost recovery and the disposition of assets when grid extension impacts a remote energy project.

Enabling policies also encompass the requirements for **doing business** within a country. The process to create and operate a business can involve basic licensing and registration requirements associated with any small business. But when those SMEs are in the energy business, they encounter an additional range of policies and restrictions associated with the utility and banking sectors. By establishing streamlined and flexible processes, energy access SMEs can reduce their time and resources spent navigating various agencies and requirements. Some countries have even adopted “one-stop shop” programs specifically to help energy access SMEs handle business and regulatory issues. Flexibility can be essential to enabling an efficient access market. Where regulations allow flexible business models such as pay-as-you-go financing, business to business networks, lease-to-own agreements, or fee for service arrangements, the market can adopt innovative practices that meet user needs.

While the case studies in Volume 2 of this report review specific programs, each of the five also addresses the enabling policies that underpin the energy access market. Each policy discussion in the report includes specific examples drawn from the five case studies.

Catalyzing Finance

Providing stable and transparent policies and government support is particularly important to **attract private sector investment**.² Because energy access markets deal with lower-income and remote populations, they are less likely to gain a foothold without government support to catalyze financing. Even with enabling policies, energy access projects can face financing hurdles. In many cases, the projects are too small, the perception of risk is too high, and the returns on investment are often too low for traditional financing options to move the market forward on its own.

When policymakers **understand the financial needs** of all actors involved in the energy access market, they can increase the effectiveness of financial policies for access. This includes energy enterprises—manufacturers, suppliers, service providers—and the end users of the services such as households. It also encompasses local financial institutions that will be engaged in the market. Gaps in access to capital at any stage of the market can inhibit the entire market from functioning as intended.

Governments have a role to play in creating the financial infrastructure and networks to **enable investment** in energy access. When a government enables private sector investment in energy access, markets can draw on more sources of funding and can develop more sustainably. In particular, engaging local in-country private financial resources can provide the basis for a long-term sustainable market. An important step is to engage the finance ministry in the market to leverage a wider range of financing tools and engage the banking sector. Because large investors do not typically operate at a scale of finance that relates to the funding needs of actors in the energy access market, several governments have established financial intermediaries to leverage donor support and government funds to enable funding at the appropriate scale needed by market actors. These financial intermediaries often oversee other market activities such as training or incentives. Through regulation of the banking sector, governments can create requirements to open banks to finance actors in the energy access sector.

In many cases, government financial support will be required to engage businesses and consumers in a new market. Policymakers can **target financial support** to offset the costs and barriers faced by those forging a new market and accelerate private sector participation. Fiscal policy can support energy access markets through a range of mechanisms including subsidies, concessionary loans, and reduced taxes and import duties, but rules and incentives should be clear and reliable to improve investor confidence.

² Private sector investment can involve a range of investors from citizens using their savings to startup businesses to financial institutions at the local, regional, national, and international levels. It also includes funding available at the national and international levels, such as private equity, venture capital, angel investors, and social enterprise funds focused on energy access.

To avoid market distortions, government can **target subsidies** to support the development of a private sector market rather than to providing giveaways or negative incentives. Subsidies can be used to reduce lending costs for investors, to offset higher costs of early SMEs in developing a market, or to bring down initial costs for end users who are unable to afford energy services at commercial rates. Policymakers can also assess the negative impacts of existing subsidies on a clean energy market such as those for fossil fuels.

Other financial tools can increase participation of local financial institutions or businesses. These can include **concessionary loans** and lines of credit for on-lending. Direct financing by government institutions can also provide initial capital into a market. Governments can also **reduce risks for investors** in the market using tools such as loan guarantees, foreign currency protection, or aggregation of small projects. Reducing uncertainty of investments can increase participation by traditional commercial investors and local financial institutions.

Policymakers can also leverage **tax and import policies** to support the market. For basic parity, tax policy should be reviewed to ensure energy access SMEs are not paying more than comparable businesses in grid electricity or traditional energy products. Specific tax incentives, such as investment or production tax credits or accelerated depreciation on larger systems can stimulate these markets. Many governments have increased participation in their energy access markets by reducing taxes and duties on imported clean energy technologies. Reducing import duties and tariffs can reduce downstream costs and provide more affordable products and energy services.

The case studies on Bangladesh, Ethiopia, Mali, and Nepal all discuss specific financing programs for energy access, including the policy and program decisions that shaped those programs.

Building Human Capacity

Sustainable energy access markets must go beyond the installation of discreet projects. Market development requires the availability of local capacity to support projects and consumers. Without a supportive environment of market participants, these energy options can be perceived as less reliable or unworthy of investment.

Programs that focus on the people involved in the market can be as important to the success of that market as the technologies themselves. Building the **business capacity** at all market levels is critical—from operations, sales and marketing, finance, servicing, research and development, to community involvement. Technical assistance programs have shown success, as have efforts for business development and networking.

A robust market can provide an immense opportunity for new enterprises and jobs. Building training mechanisms to **develop the workforce** to fill these jobs is another critical element to a sustainable market. In addition, programs that **educate market participants**—from policymakers and utilities to financial institutions to communities and end users—can support sound decisions and realistic expectations.

The case studies each outline elements of these capacity building efforts. For example, the Bangladesh case study outlines an effort to train and support partner organizations in the market. The case study on Mali outlines the use of a central agency to streamline minigrid regulations and financing. And, the Mexico case study includes a discussion of centers for technical education and community involvement.

Integrating Energy Access with Development Programs

Development programs, often led by non-energy ministries or sub-national governments, can be valuable partners in implementing energy access programs, attracting funding, and leveraging existing community programs and partnerships. Governments around the world are **engaging across ministries** to use energy access to alleviate poverty, improve health and education, support greenhouse gas emission reductions, prepare for and respond to disasters, and expand agriculture.

Because energy access furthers a variety of development goals, there is potential to **leverage funding** for electrification programs with those for domestic development and climate programs. Coordination of these programs can increase the attractiveness to international donors and innovative funding sources. The Mexico case study outlines the experience of a private company that has worked with both energy and development ministries to provide energy access to areas deemed too remote for the electricity grid.

Policies that integrate energy access efforts across development programs provide the opportunity to **learn from experience** in existing development networks for community engagement, training, and capacity building. Opportunities also exist for partnerships between development non-governmental organizations (NGOs) and energy service providers to reach a broader market, accelerate development goals through access to clean energy, reduce unintended market distortions from overlapping programs.

Overall, governments can use a wide range of policy tools and financial mechanisms to foster a distributed energy access market that engages the private sector. As summarized in Figure ES-2, this report outlines key actions and opportunities to attract private sector participation and investment in expanding energy access.

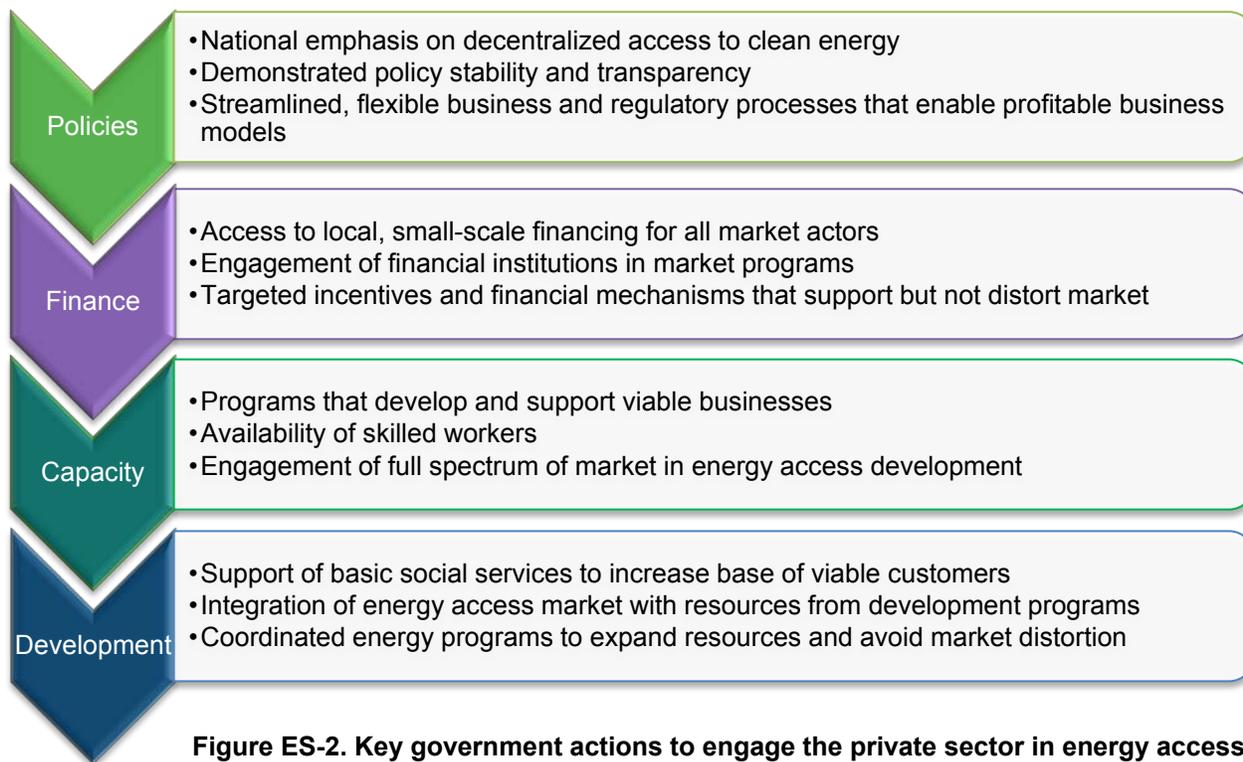


Figure ES-2. Key government actions to engage the private sector in energy access

Case Studies of Public-Private Models to Finance Decentralized Electricity Access

While each market will require its own unique solutions, policymakers can learn from energy access policy decisions and program design in other countries experiencing similar circumstances. Five such country case studies are presented here for Bangladesh, Ethiopia, Mali, Mexico, and Nepal. Each case study examines a specific energy access program or entity. As part of this examination, each identifies key actors and context, assesses the associated policy decisions, and reviews the energy access impacts of these efforts.

Bangladesh: A Case of the Infrastructure Development Company Limited

A government-owned financial institution, the Infrastructure Development Company Limited (IDCOL), was set up to encourage private investment in infrastructure and renewable energy in Bangladesh. This case study explores how IDCOL's solar home system program leverages donor and public funds to engage private stakeholders and households in expanding energy access. With three million units installed as of 2014, the program has grown to be one of the largest off-grid electrification initiatives in the world. IDCOL's solar home system program combines price support with quality assurance, installation, and after-sales support. The case study includes a separate explanation of Central Bank of Bangladesh regulations that channel finance for renewable energy investments. The case study draws key lessons from the IDCOL experience, including:

- The model of selecting and empowering partner organizations to implement the program can build a strong network of providers and financiers.
- A strong policy foundation and holistic, integrated financing model can create opportunities for all stakeholders in the value chain.
- Factors such as transparency, accountability, and demonstrated demand for services can increase support by donors.
- While a phased approach to subsidies and concessionary credit can lead to a long-term sustainable financing structure, grants and subsidized credit continue to be crucial to making products accessible to the very poor.

Ethiopia: Leveraging Donor Funds to Support Private Sector Development

This case study focuses on how the Development Bank of Ethiopia channels finance through its credit line for investment in off-grid energy production and distribution. The Market Development for Renewable Energy and Energy Efficiency Programme promotes private sector-led development of clean energy products in rural areas by removing financial barriers to private investment. The program uses financial intermediaries and instruments to enhance access to credit, including access to foreign currency and collateral. It is financed by a US\$40-million concessional loan from the World Bank to the Development Bank of Ethiopia. After the first round of funding, several lessons can be drawn from the experience so far with the program. A few of the lessons highlighted in the case study are:

- To promote investment in clean energy products by households and SMEs, policymakers can address specific investment needs such as access to specific types of credit.
- Market development and financial efforts are stronger when they occur in parallel. This includes raising awareness of and ensuring the quality of energy products and developing sufficient capacity, both technical and financial, in the investment landscape.
- Working with established finance and business networks can expand investment in clean energy products. In Ethiopia, the development bank and microfinance institutions have the capacity to mobilize and deliver finance to households and SMEs for energy services.
- Instruments like loans (concessional and market rate loans), revolving funds, and risk management instruments (guarantees) are able to deliver scaled-up and long-term finance for energy access investment. Risk management systems such as group collateral requirements enable the poorest populations to access credit for investment in energy products.

Mali: Programs to Support Private Minigrids for Rural Electrification

This case study highlights actions taken in Mali to promote privately run minigrids and to hybridize diesel-powered systems to include renewable energy. Mali designated the Agency for the Development of Domestic Energy and Rural Electrification as the central authority for rural electrification. The agency has incorporated regulatory reform, concessions and capital cost grants to support deployment of over 160 standalone minigrids. A few key lessons highlighted by the case study include:

- Offering multiple avenues for private sector participation in the mini-grid sector provides flexibility and may provide unanticipated opportunities for expanded participation.
- Capital cost grants can support financial viability and sustainability of minigrid projects.
- Designating a “one-stop” agency to regulate and provide minigrid grants can increase efficiency and make private sector engagement more attractive.
- Allowing minigrid developers to set their own tariffs can support minigrid deployment.
- Support for hybridization of diesel-powered minigrids can reduce operating costs and lower tariffs.

Mexico: Provision of Solar Power for Households in Rural Communities through Iluméxico

Iluméxico, a private company focused on leveraging public funds to deploy solar home systems in rural Mexico, presents an innovative public-private partnership model to address rural electricity access in remote areas. This case study presents key elements of Iluméxico’s business model as well as government policies that have supported Iluméxico in addressing crucial energy access needs in rural Mexico. The Iluméxico case study provides several lessons that can inform energy access efforts globally, including:

- Public-private partnership is critical to support successful energy access outcomes.
- Provision of transparent information on grid extension plans can send a crucial signal for private investment in rural energy access.

- Service and maintenance plans are necessary to ensure long-term system sustainability and successful energy access business models.
- Collaborating with development agencies and subnational governments can provide an opportunity for diversified funding while also leveraging successes and experience gained from work funded by traditional energy entities.

Nepal: The Experience of the Alternative Energy Promotion Centre and the National Rural Renewable Energy Programme

This case study outlines Nepal’s efforts to promote renewable energy access to off-grid rural communities using new financing instruments and delivery channels. In particular, it focuses on the lead agency, the Alternative Energy Promotion Centre (AEPCC), and its flagship initiative, the National Rural Renewable Energy Programme (NRREP), which promotes and delivers all off-grid renewable energy under 10 megawatts (MW) in Nepal. The program uses a blend of subsidy and credit instruments to finance renewable energy investment and involves new financial actors such as commercial banks to channel this finance to rural areas. This interview-based case study looks at the drivers for various elements of program design as well as motivations for investment in renewable energy. Key findings from Nepal’s NRREP are:

- Increasing energy access is a priority that has been articulated by all actors in the NRREP value chain, which shows that that all actors are working toward a shared vision.
- Most actors believe that the use of new financial intermediaries under the NRREP will help leverage additional funds for investment in renewable energy technologies, for example by encouraging banks to provide co-financing by giving them loans at highly concessional rates.
- AEPCC has been successful in increasing rural energy access through several technologies in the NRREP’s first two years, using subsidies as the main financial instrument.

For many beneficiaries, investment in renewable energy technologies is constrained by the inability to access finance. With subsidies accounting for only 30%–50% of the cost of renewable energy technologies, the lack of rural banking services, collateral, or personal co-finance has restricted many of the rural poor from investing in new technologies and benefiting from the NRREP.