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New partnerships and business models for facilitating energy access

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ABSTRACT

Twenty years since the Rio Summit, the global community is still struggling to develop a world with universal access to sustainable energy services. The discussion on energy and its linkages with sustainable development is at the heart of the debate in achieving the Millennium Development Goals (MDGs). This paper discusses the role of innovations in terms of partnerships and business models to enhance energy access, especially for those living at the so-called bottom of pyramid. The role of innovative energy options and policy choices that enable overall operationalization of energy access in developing countries as well as new forms of partnerships and innovative mechanisms that are based on established success, replicability and potential for scaling up has been examined through two case-studies, namely the Lighting a Billion Lives project and India's National Rural Electrification Programme. This paper suggests the need for new forms of public and private sector partnerships, especially the pro-poor ones that are effective in enhancing energy access.

1. Introduction

Energy is an essential need for individual and economic development and is central to achieving the developmental goals. The discussion on energy and its linkages with all the three pillars of sustainable development (economic, social and environmental) is at the heart of achieving the Millennium Development Goals (MDGs). While the conventional models of providing energy access (i.e. grid extension) have had limited success in reaching out to remote communities, there have been innovative technological and institutional solutions that have shown an alternative path to providing energy access in a reliable and successful manner. However, absence of sustainable partnerships and viable business models, that can effectively provide access and spur development, has hindered the scale up of these innovations. This paper discusses the role of innovations in terms of partnerships and business models to enhance energy access, especially for the bottom of pyramid (BoP) population.

This paper first discusses the magnitude and scale of the challenge towards delivering energy access, primarily based on literature search, elaborating the challenges related to affordability, technology, business models, institutions and capacities. Subsequently, the paper examines the role of partnerships in addressing the challenges to deliver energy access in the context of innovations in technological, institutional and business models by taking two case studies from India; one from off-grid solar lighting initiative by an NGO and the other from grid based rural electrification programme of the national government. In its concluding remarks, the paper suggests that new form of partnerships that are pro-poor, show the potential of delivering energy access in a manner that is effective in addressing the MDGs.

2. Energy access–size and scale of the challenge

To understand the sheer magnitude of the energy access problem, the paper delves into some statistics on energy access. Nearly 1.3 billion people in the world do not have access to electricity (IEA, 2011) (coincidentally, the number estimated to be below the new poverty line definition) and 2.7 billion people still use traditional energy to meet their cooking requirements. In some Asian regions, people may have access to electricity but they often lack access to modern fuels. For example, in East Asia, less than 182 million people lack electricity access (IEA, 2011), but almost 1.1 billion people rely on solid fuels for cooking (UNDP, 2009). Moreover access varies widely across regions and the situation is dismal in the LDCs (least developed countries) and Sub-Saharan Africa. More than 80 percent of people without electricity access live either in sub-Saharan Africa or in South Asia. When one accounts for not only lack of access to modern sources of heating, cooking, and lighting, but also productive energy, mechanical power, and mobility and transport, the number of those confronting energy poverty grows even more significant (Sovacool et al. 2012).

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Facilitating access to energy has been an important policy agenda of several developing countries, especially in the South Asia and Sub Saharan Africa, however the efforts have not translated into concrete outcomes. The challenges in delivering access have been numerous and daunting. The following section highlights the key challenges encountered in delivering access to energy to the households and communities.

2.1. Affordability and financing

The ability to pay for improved energy services in rural areas is a major challenge, where the population is predominantly engaged in agriculture and allied activities and the income streams are often seasonal and not steady throughout the year. Most of the population depending on subsistence level agriculture or other activities can barely meet the capital expenses of an electrification project; leave alone the cost of operation, maintenance and repair (Barnes 2005; World Bank, 2008; Urmee et al., 2009; IEA 2010). The affordability issue can be illustrated here with a few examples. In Indonesia, all electrification schemes required an initial down payment and subsequent monthly payments until the total amount had been paid off and the ownership of the system could be transferred to the user. It was found that consumer loans that featured high down payments and short maturities limited the electricity access only to high-income groups among the poor (Karekezi et al., 2006). Similarly the ESCO (Energy Service Company) model in Zambia wherein PV systems were installed by private companies also faced challenges in terms of high costs of systems where several farmers and entrepreneurs had to withdraw from the scheme owing to this issue (Lemaire, 2009). It is increasingly being recognized and widely acknowledged that the only way to convert the "vicious" cycle into a "virtuous" cycle is to focus on productive uses in addition to basic uses such as lighting, cooking etc.

2.2. Technology management

Technology related issues have also been found to hamper the success of many off-grid electrification projects. A study undertaken on the functional status of micro hydro projects in Nepal emphasized that despite much work on manuals, standards and training, faulty engineering and associated errors, close to 30% of the installations were not working owing to host of reasons including poor site selection, poor installation, neglect of civil works etc. (Khennas and Barnett, 2000). Similarly Palit and Chaurey (2011) observe that biomass gasifier technology found limited success in rural India mainly due to the absence of standardized technical specifications to ensure quality products and also due to non-creation of proper after sales network to service the systems. In addition, the suitability of technologies itself was questionable in some cases. The improved cookstoves programme is a case in point. Studies have pointed out that improved cookstoves failed to take off in a big way in developing countries except China and Cambodia, because they are not need based and necessitated change in user habits, cooking and life-style changes leading to low motivation (Slaski and Thurber, 2009; Rai and McDonald, 2009).

2.3. Viable business models

Even in case of projects which have moved beyond the technology demonstration phase and have been successful in providing electricity within a given area there has been a general failure to capitalize on that success and translate it into a replicable model for rural electrification (Zerriffi, 2007). Number of examples show that even when the technology worked, there was no effort to create and demonstrate a viable model for further diffusion or the necessary structure for maintenance, financing and continued operation (Martinot et al., 2002). The set of solar home system programs funded by Global Environment Facility (GEF) is a case in point. While these projects implemented in individual countries have been successful in providing solar home systems to thousands of households, they have not become self-sustaining and replicable, despite some resources being put towards institutional strengthening. Each additional set of installations requires international donor funding and coordination, and the scale of installations remains small compared to the need (Zerriffi, 2007). Here again one can learn from the ICS programmes, whose success has been found to be limited, as a consequence of poor or ill-conceived business models and inattention to financing realities, rather than any fundamental problem with the concept. For example in Nepal, the limited success was largely ascribed to the fact that there was insufficient promotion, education, monitoring and follow-up (UN, 2010).

2.4. Community ownership, capacity building and training

One of the major limitations of several energy access projects (in particular electrification projects) has been the lack of community involvement in the operations and management as it requires time and information in education, training and trust-building of the communities (Valencia and Caspary, 2008). Even when they are involved for day-to-day operations and management, lack of capacity building and proper training inhibits the projects to have a substantive impact. The Village Energy Security Project of India suffered from these very challenges delivering mixed results (World Bank, 2011). However, there is now a realization that community buy- in and their active involvement right from the planning stage is pivotal to ensure the success of any project. The Alternative Energy Promotion Center (AEPC) in Nepal has been implementing various mini-grid and off - grid renewable Rural Electrification projects, where the contribution of the community is as high as 50 per cent of the project cost. This has increased the sustainability of the project as the members of the community set the tariffs, manage the project, ensure O&M, and also undertake other development work in the village from the funds created under the project (Iyer et al., 2010).

2.5. Institutional arrangements

Another significant challenge encountered in several energy access projects is the absence of robust institutional mechanisms (Barnes 2005; Aldover, 2007). The VESP project of Government of India highlighted several institutional shortcomings in delivering the energy services to remote locations. Another interesting observation has been made by Patil B (2010), who says that rural energy access or rural energy development in India does not have any exclusive institutional support. The past and current energy access programs are managed by the energy-supply focused government institutions, whereas energy access is a demand side problem (Patil B, 2010). Further, the main activities, objectives and priorities of the institutions such as nodal Ministry for Power (MoP) or Ministry of New and Renewable Energy (MNRE) are not on expanding access but rather are on the supply of energy systems or technology, the maximization of sale of energy or the dissemination of technologies, adding new capacities, etc.

2.6. Convergence with livelihood and other rural development programmes

Energy as such is of limited relevance to the communities and the population at large. Rather, people are interested in the