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OPINION: OFF-GRID ENERGY SOLUTIONS: OPPORTUNITY TO END EXTREME POVERTY

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South Asia is the second largest home to the extreme poor people (400 million people on less than $1.25 a day) in the world after sub-Saharan Africa[1]. Pakistan has 50% of its population (92.5 million people out of 185 million) living below the international poverty line (2$/day) and 12.7% (23.5 million) in extreme poverty. Eradicating extreme poverty from the country by 2030 would not be possible without eradicating energy poverty.

The first target of the seventh Sustainable Development Goal (SDG) calls for providing universal access to energy and modern energy services by 2030. This universal energy access target had not been explicitly included in the Millennium Development Goals (MDGs). Why was this goal included in the SDGs? Energy access not only means having electricity but it leads to access to modern energy services in health, education, infrastructure and other areas. However, 1.1 billion people do not have access to electricity and 2.9 billion do not have access to modern energy services[2]. So what happens to the lives of those not having access to modern energy services? Just to mention one of the negative effects of not having access to modern energy services, around 4.3 million people die prematurely every year due to indoor pollution resulting from inhalation of toxic fumes from cooking and heating from inefficient fuels such as animal waste, according to the World Health Organization (WHO)[3]. Most of these people live in developing countries.

How these premature deaths perpetuate and exacerbate the vicious cycle of poverty? Poverty is multi-dimensional. Sickness is one of the main causes of poverty. As most of the extremely poor are employed in casual, daily wage labour, sickness for them can be costly. Not only can it result in loss of income but also hunger for the bread winners and their dependents. Thus, sickness can trigger a vicious cycle of poverty. Other than being a basic need, socio-economic development is directly linked to sustainable access to energy. Access to energy, and modern energy services need to be taken seriously, in order to be able to provide clean water, quality education, healthcare and sanitation services, as well as to boost the incomes of productive enterprises to end extreme poverty by 2030.

The question arises whether developing countries have resources to connect the off-grid places with the main grid. The answer clearly is no, and particularly for those communities living in remote locations where it is too costly to connect them with the main grid.

Of the developing countries, such as Mexico, where 97% of the population have access to electricity connected with national grid[4], solar energy solutions are used to light some of the houses out of the remaining 3% that are without electricity. Most of these are rural Mexicans living far away from town living in poor conditions and it is too expensive for the government to connect them with the national grid.

The Smart Villages Initiative

In view of this such situation, an initiative namely "Smart Villages Initiative" (SVI)[5] was started in 2014 by a team based at the Universities of Cambridge and Oxford in the United Kingdom with the support of the Cambridge Malaysian Education and Development Trust (CMEDT). The aim of the initiative is to focus on remote off-grid villages, where local solutions (home- or institution-based systems, and mini-grids) are both more realistic and cheaper than national grid extension. The title 'Smart Village', takes its inspiration from the much widely known 'smart cities' phrase. A smart city means a city equipped with basic infrastructure to give a decent quality of life, through clean and sustainable environment among other things. So a smart village means a village having access to affordable, reliable, sustainable and modern energy services among other things.

Starting in 2014, SVI serves six world regions, namely East and West Africa, South and Southeast Asia, and Central and South America, by bringing together a diverse set of stakeholders, including scientists and engineers, entrepreneurs, villagers and civil society organizations, policy-makers and regulators at country-level workshops. SVI addresses key issues such as to create the framework conditions necessary for entrepreneurs; leverage public and private sector investment; integrate energy access with other development initiatives; and work with a community level approach to meet the off-grid energy challenge. I attended one such workshop in October 2015 held in Islamabad. Following are some of the insights regarding opportunities and challenges to benefit from this initiative in the context of Pakistan.

Pakistan's Experience with SVI

The Islamabad workshop provided insights from the country's experience of off-grid energy provision to remote rural communities through the deployment of micro-grids among other renewables. In particular, the workshop brought together some of the actual beneficiaries of micro-hydro power projects implemented in remote areas with the financial and technical support of different Rural Support Programmes and the Rural Support Programmes Network (RSPN), the partner organization of SVI in Pakistan.

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Hydropower is the leading renewable source for electricity generation globally, supplying 76% of all renewable electricity. It has the potential to provide climate change adaptation services through its ability to store water, contributing to flood control and drought alleviation in some circumstances. In many of the remote locations in northern Pakistan, the micro-hydro projects are not only providing electricity for domestic consumption but also for productive enterprises, such as saw mills and farming. The Aga Khan Rural Support Programme and the Sarhad Rural Support Programme have both received the Ashden Award in recognition of their work in the micro hydro sector in northern Pakistan.

Surprisingly, these micro-hydro projects have been sustained for over a decade in most of the cases. Through a three-tier approach of social mobilization followed by the Rural Support Programmes, i.e. fostering Community Organization, Village Organization and Local Support Organization, communities are motivated to take charge of their development by contributing a portion of the cost of these micro-hydro project. In addition, communities provide their input in terms of land, labour, capital, skills and knowledge, referred to as 'sweat equity' (time and labour) contribution, that remains modest in most of the cases, and creates ownership and sustainability. Financial and technical support is provided by the executing agencies. Once the external support to the project is over, the project is maintained by the communities, and its benefits remain available to many future generations.

Local communities are part of the decision-making to set up domestic and commercial tariffs. The collected tariff is used for further strengthening of the local organisation and the power plant. Local committees are made to ensure recruitment of technicians and maintenance of the power plants. Involvement of communities and lower cost of maintenance helps to keep the tariff low and thus affordable to everyone.

One must appreciate the provincial government of Khyber Pakhtunkhwa for partnering and supporting the Rural Support Programmes in the establishment of micro-hydro projects in the province. The Board of Directors of Pakhtunkhwa Energy Development Organization approved the construction of 356 micro-hydel stations with a power-generation capacity of 35 megawatts in 2014[6]. These projects are spread all across the province including Abbottabad, Mansehra, Batagram, Tor Ghar, Kohistan, Malakand, Buner, Swat, Shangla, Dir (Upper/Lower) and Chitral. This energy access will particularly benefit women as they suffer from drudgery of fuel-wood collection; pay the price of traditional, biomass-based energy systems; and suffer the health consequences of cooking, smoke and small-particle pollution.

Opportunity for Pakistan

Taking the example of Pakistan, off-grid electrification is the only feasible solution to provide electricity to 3 million households residing in 8,000 villages, according to the Alternative Energy Development Board (AEDB) of Pakistan[7]. Since 2008, the people of Pakistan have been facing a huge energy crisis. In particular, the people living in rural areas connected to the national grid have been facing 12 hours a day of load shedding. Although urbanization is taking place, 60% of the country's population lives in rural areas. Out of the total, 30% (56 million people) of the population do not have access to electricity, most of them live in rural areas. Connecting all of these areas with the national grid would be too expensive for the government.

What needs to be done to further leverage from SVI?

A number of challenges require the attention of the government, private sector and the academia to further expand the SVI. As a regulator, the AEDB needs to establish a framework for facilitating and backing the off-grid energy solutions. The National Power Policy (2013) does not provide details of the initiatives to be taken by the government for providing energy to off-grid areas. Unlike neighbouring Bangladesh where the government has taken lead to introduce solar-home systems, most of the initiatives to connect off-grid areas have been undertaken by community-based organizations. Secondly, much needed research and development is required for innovating and manufacturing a low-cost long life battery for energy storage. In case of Balochistan, where solar energy is the source for providing energy to the remote rural communities, consistent energy supply can only be ensured with energy storage. However, unavailability of low-cost long life batteries remains one of the main hurdles for achieving this. As in many developed countries where tertiary educational institutions take up national challenges as their research agendas, the federal government must take lead to task engineering universities of the country to innovate such a battery. AEDB, Higher Education Commission (HEC) and, chemical and engineering research institutions must come forward and develop linkages with other relevant institutions in the world engaged in such projects. One such project is in progress at the University of Cambridge where lithium-oxygen batteries are designed to replace the typical lithium-ion batteries. The Higher Education Commission can also play a role by offering a research grant for developing a low-cost long life battery. The engineering universities of the country and the private sector can also jointly invest their skills and capital, respectively, to develop such a battery. Time to act is now.

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