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Enabling frameworks for deploying micro-grids: Lessons from Pakistan

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Abstract

The Smart Villages Initiative, supported by the Rural Support Programmes Network, Pakistan organised a workshop in Islamabad, Pakistan on 6 October 2015 to consider Pakistan's experience of developing enabling frameworks for the dissemination of micro-grids. This briefing note for policymakers and other stakeholders summarises key points emerging from the workshop.

Pakistan has substantial experience of deploying micro-grids based on micro-hydro systems in rural areas. The high-level of grass roots mobilisation and buy-in is one of the key enabling factors in the development of micro-hydro power projects catering to remote rural communities. Non-governmental organisations like the Aga Khan Rural Support Programme and the Sarhad Rural Support Programme have been working with local communities over a substantial period of time. This long-term engagement has contributed to the success of distributed micro- and mini-hydro based power generation and transmission projects in the northern areas of Pakistan.

Other factors that have ensured the success of hydro-based distributed power projects include:

- Communities have invested in the success of micro- and mini-hydro power plants. They contribute time and effort during the construction phase of power plants by providing 'sweat equity', i.e., time and labour resources, as these communities often do not have access to cash and other liquid assets. Financial resources and equipment are provided by donors through executing agencies such as NGOs including the Aga Khan Rural Support Programme and the Sarhad Rural Support Programme.
- Communities are also actively involved in setting electricity tariffs for domestic and commercial consumers. For micro-hydro power plants, operations, and maintenance also fall under the purview of committees comprised of members drawn from local communities. Plant operators and technicians are selected from within the local community and are paid through the tariff collected from consumers.

Challenges to micro-grid deployment

Despite the success of micro- and mini-hydro projects in Pakistan, a number of challenges remain. One of the main challenges is the lack of institutional support and buy-in within the public sector for distributed generation and supply projects, including micro-grids. The lack of policy and institutional frameworks hinders the development of off-grid energy projects in the country. In the cases where policies are in place, their implementation remains lax, which contributes to the challenges of developing distributed energy projects aimed at rural consumers.

"The lack of policy and institutional frameworks hinders the development of off-grid energy projects in Pakistan.

A number of other factors adversely affect the deployment of micro-grids. These include:

- The lack of access to finance and capital inhibits the growth and deployment of distributed energy systems like micro-grids. Access to finance needs to be accompanied by efforts aimed at attracting skills and expertise from the private sector. Currently, public sector organisations appear to develop regulatory mechanisms in isolation without input from other stakeholders including NGOs and the private sector.

"The lack of access to finance and capital inhibits the growth and deployment of distributed energy systems like micro-grids.

- While there has been substantial progress in the development of micro- and mini-hydro power plants, for other technologies, especially solar, progress has been far more limited. There have been a number of failures of solar-powered micro-grids in southern areas of Pakistan. These failures can be attributed to both problems with the equipment as well as a lack of consumer knowledge.
- A major problem facing the adoption of renewable energy technologies, in particular solar energy, is the quality of products available. In the absence of quality standards, there has been a high level of wastage as consumers have stopped using these systems. To counter these issues, the government agency responsible for developing Pakistan's renewable energy resources, the Alternative Energy Development Board, has developed and implemented equipment standards for solar power. Equipment that meets the quality standards can be imported duty free.

"Local communities need technical support and expertise from external sources to ensure reliable supply.

Recommendations

The following recommendations were made by workshop participants to improve the enabling environment for the deployment of micro-grids:

- Stakeholders need to raise awareness about the concept of micro-grids providing electricity to a cluster of villages for productive enterprises and lighting. It is appropriate to focus on clusters of villages because project economics should be better than electricity provision to a single village.

- To get consumer buy-in, it is important to ensure reliable electricity supply. Local communities need technical support and expertise from external sources to ensure reliable supply. It is also necessary to impart technical training to locals. Rather than one-off training exercises, continuous training programmes must be implemented.

- Despite a long history of community-led development projects in the Pakistan, especially in the northern areas, internal conflicts within the community can hamper the development of micro- and mini-hydro power projects. External stakeholders like NGOs have an important part to play in this context as they can overcome the coordination issues that exist within the communities and can facilitate a dialogue. Compensation mechanisms need to be developed at the project planning stage to ensure that community members are willing to provide land for the deployment of micro-grids and micro- and mini-hydro power projects.

"For more remote villages, access to subsidised capital resources from donors or the public sector is vital to enable electricity access.

- There is a need to improve coordination between the various stakeholders involved in off-grid energy projects. These stakeholders include donors (multi- and bilateral), the public sector, NGOs, and local communities. Access to subsidised capital is important at the early stage of micro-grids' development. Improved coordination can ensure better use of limited financial resources. Government guarantees could also be valuable in helping to alleviate capital and financing constraints.

- Sources of finance and the cost of capital may depend on the villages' locations. Villages near urban centres or markets, and where there is more scope for the growth of village enterprises, could be more attractive for private investors wishing to invest in distributed energy projects. For more remote villages, access to subsidised capital resources from donors or the public sector is vital to enable electricity access.

Productive use of energy

Electricity can be a catalyst for development, but providing lighting is not enough. Efforts to deploy micro-grids need to be strongly supported by project components that contribute to increased income generation at the village level. Such project components have to be incorporated at the planning stage to have maximum impact, rather than during or after implementation of energy access projects. A strategic analysis of development interventions is vital for the success of micro-grid projects involving a cluster of off-grid villages.

Promoting rural entrepreneurship and productive electricity use requires investment in the necessary infrastructure that can facilitate rural producers' access to markets. Stable electricity access has the potential to contribute to the development of local enterprises and industries, especially those related to the processing of local agricultural produce. Households can also benefit from energy access by investing in cottage industries that manufacture local handicrafts.

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Concluding comments

Pakistan has been facing a substantial energy shortage that has had a debilitating impact on the country's economic growth. At the same time, it has failed to achieve universal electricity access and a substantial portion of the population based in rural areas does not have access to electricity. The workshop highlighted some of the successful efforts to promote off-grid energy access in Pakistan. It also brought to the fore some of the failures in off-grid energy projects. The workshop identified future developments that are necessary to ensure that off-grid electricity initiatives, like micro-grids, can contribute fully to electricity access and to economic development in the future. Lessons from Pakistan's experience could provide useful examples to other countries in the region seeking to deploy micro-grids.

Notes

We aim to provide policymakers, donors, and development agencies concerned with rural energy access with new insights on the real barriers to energy access in villages in developing countries—technological, financial and political—and how they can be overcome. We have chosen 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. Our concern is to ensure that energy access results in development and the creation of 'smart villages' in which many of the benefits of life in modern societies are available to rural communities.

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