Conference Summary

'The Business of Off-Grid Lighting in India'

Organized by Centre for Development Finance-IFMR

Chennai, November 22, 2013

Background

Providing reliable access to electricity is a priority for all countries whether industrialized, middle income or low income. In the Indian context, the intermittent power supply situation poses a challenge to about 700 million people[1], roughly more than half the population of the country, who are suffering the backlash of this problem. This is especially true in the case of rural areas which still depend on expensive fossil fuels such as kerosene and candles to meet their lighting requirements. These sources are known to be energy inefficient and polluting in nature.

Two decades ago, the electrification alternatives available to rural communities were restricted to: grid extension, diesel-powered mini-grids, and mini-hydropower generators. However, with various small-scale, renewable energy–based technologies approaching commercial maturity in conjunction with the development of innovative service delivery models, service provision through off-grid technologies has emerged as a viable option for enhancing electricity access, especially in rural areas. Moreover, the escalating fuel prices have further augmented the economic appeal and viability of these technology options. Yet, the long-term prospects of off-grid electrification are contingent upon facets more than technology. Effective prioritization and planning, appropriate infrastructure and sustainable financing play key role in successful deployment and dissemination of these technologies[2].

The Centre for Development Finance - Institute for Financial Management and Research (IFMR) convened a cross-disciplinary group of stakeholders - government officials, utility, business and finance representatives, researchers and renewable energy companies, to strategize about the basic design principles and sound practices required for sustainable transition to renewable based off-grid rural electrification. This note provides the key highlights from the conference.

Objectives

- Showcasing the prospects of off-grid solar PV applications for rural electrification in India
- Highlighting business and financing models, associated challenges and discussing approaches for scaling up off-grid lighting primarily through three broad categories of solar PV technologies: lanterns, solar home lighting systems (SHLS) and power plants for village-level micro-grids.
- Networking and information exchange among stakeholders and Business-to-Business (B2B) linkages of manufacturers and local suppliers of solar based PV applications

[1] http://www.economist.com/news/asia/21582043-villagers-enjoy-sunlight-after-dark-out-gloom
[2] http://siteresources.worldbank.org/EXTENERGY2/Resources/OffgridGuidelines.pdf

Scaling up rooftop solar installations in the country calls for technological intervention and innovation towards overcoming storage issues in battery operated systems. Proper implementation of net-metering for rooftop deployment and introduction of RECs for off-grid power generation would also provide the much needed impetus for this sector. Emerging opportunities in the rural market are significant, owing to the fast growing incomes and aspirations.

Mr. Sudeep Jain, IAS delivering the key note address (L) and Dr. Anoop Singh on the solar PV business in India (R)

Introductory Session: Overview of Off-Grid Lighting in India

Speakers

- Mr. Sudeep Jain, IAS, Chairman and Managing Director, Tamil Nadu Energy Development Agency
- Dr. Anoop Singh, Associate Professor, Energy, Infrastructure and Finance, Indian Institute of Technology, Kanpur
- Dr. Balachandra Patil, Principal Research Scientist, Department of Management Studies, Indian Institute of Science, Bangalore

The need to address the challenges of India's rural electrification with minimal impacts on the environment and climate has been widely recognized by policymakers and practitioners alike. This has become more evident from the emergence of enterprises that are operating in the rural energy space, leaning on clean technology options. As pointed out by the keynote speaker Mr. Sudeep Jain, IAS, the need for innovation is significant in order to further the reach of off-grid energy access, especially through the solar route. While outlining the various policy initiatives of the Government of Tamil Nadu towards encouraging rooftop solar installations, he acknowledged that the issues surrounding the

storage of solar power through batteries would have to be overcome through suitable technological interventions. Enhancing the role of net metering as an effective incentive under government schemes would also be essential to scale up rooftop solar deployment.

From a policy perspective, as outlined by Dr. Balachandra Patil, the government's agenda for energy access is well drafted. However, the gaps in grid connectivity and actual supply are yet to be effectively bridged. While provisioning of power infrastructure was not originally viewed as a private initiative, the absence of sound revenue generating and participatory mechanism in the country has created a large unmet demand from sections not covered by the formal grid network.This also includes urban pockets of the informal economy. This represents the demand not for energy alone, but energy *services* as well. Entrepreneurs eyeing this space would have to build a mechanism that takes into account livelihoods and sustainability, in addition to profitability. Delivering packaged solutions of this kind is necessary to address the `base of pyramid' issues as well as tap the huge market potential that rests with the energy deprived demographic of the country. Another key driver of successful business models addressing this market segment is the identification of derived demand for off-grid solar products, typically from small informal businesses. This way, a consistent revenue stream is ensured, as the solar product itself generates business to the user.

Summarising important concerns related to the solar photovoltaic business in the country, Dr. Anoop Singh highlighted the prospect of grid connectivity as well as the dynamic market profile of rural India, where aspirations are rising in tandem with growing incomes. While the market for standalone solar products like lanterns and home lighting systems would remain as backup solutions, the sustainability of mini-grid installations is the key concern. A suitable framework to integrate systems with the national grid as well as involving distributing companies in the off-grid business would be required over and above any state-supported programme. RECs awarded to off-grid installations could be considered as a means of supporting this endeavour. Efforts to increase the scalability of the businesses operating in this space would increase the reliability of supply, which is a pre-requisite to achieving greater complementarity of solar with conventional sources of energy.

Information asymmetries are prevalent both at the business (demand uncertainty and scalability) and consumer (costs with and without subsidies) ends. These need to be addressed in order to assess the cost of finance more accurately. Scalability of business plans, even those with longer capital recovery periods, is the most important criterion to attract finance. Innovative business financing and dedicated soft funds can result in the delivery of more affordable clean energy services.

Dr. Jessica Seddon moderating the discussion on financing across the supply chain (L) and audience interaction (R).

Panel Discussion 1: Financing Across the Supply Chain

Moderator: Dr. Jessica Seddon, Founder and Managing Director, Okapi Research & Advisory
Panelists

- Mr. Gaurav Kapoor, Infrastructure Finance Advisor, Private Sector Team, DFID India
- Ms. Bhairavi Ponnuswamy, Manager, Field Operations, Milaap
- Mr. Bidyut K. Rath, Assistant General Manager, Circle Office, Nagpur, Canara Bank
- Mr. Govind Shivkumar, Investment Manager-India, LGT Venture Philanthropy
- Mr. Saravanan Nattanmai, Investment Professional, Nereus Capital

The players in the off-grid lighting business in India are diverse in terms of their mandate, geographic focus and revenue models. Similarly, the financing options available to them are of various forms, like equity, debt, corporate social responsibility (CSR) funds, philanthropic funds, grants, international programmatic funds etc. The bundling of technical and business support with finance is also a common feature in some of the programmatic funds available in the market. Hence it is important to explore the

role of each of these types of financing, and whether there is a significant interplay between the stage of organizational growth and the financing mode chosen.

Financing institutions in this space range from banks, microfinance institutions to venture capital, impact investment and private equity funds. A critical barrier to financing as identified by the industry representatives was the absence of a strong scalability plan in the proposals received for funding. A financier is more likely to approve plans that clearly chalk out a vision to scale up the business, even if the capital recovery period would be longer than expected. Another key concern expressed was the need for better regulation of capital inflows into the country, in order to reduce the cost of funds. Given that financing institutions are willing to introduce a wider range of options, the ecosystem would have to pave the way for the roll out of well-designed products. Financial products are being designed keeping in mind the interests of the investors, entrepreneurs, government policies or perceived customer preferences. However, there is significant information asymmetry prevalent in the market. Imperfect information, coupled with the inability among end users as well as decision makers to calculate actual financial costs, especially in a subsidy regime, could well lead to inefficient outcomes.

A discussion of the financing requirements of businesses revealed that growing decentralized distributed generation initiatives (specifically power generation and product manufacturing) are in greater need of equity funding and patient capital, similar to the support lent to large scale infrastructure projects. On the other hand, those in the distribution business require consumer financing and working capital. Consumer financing, especially through soft funds dedicated to clean energy products, was another important link towards scaling up the business with cost-effective solutions. Other key pointers that emerged were the need to take into account demand continuity for the wide range of off-grid solutions, given that the usage spectrum covers all applications from solar lanterns to proper grid connectivity, and the need to address information asymmetries in the market. Many questions, however, remained unresolved highlighting the need for continued dialogue. It was suggested that future efforts should address the financing issues facing independent power providers as distinct from those of household products.

Strategic partnerships with local bodies and government institutions can achieve enhanced last mile distribution and effective post sales service through awareness creation and capacity building. Such coherent efforts also assist in creating a medium to help user feedback reach product developers regularly, thereby reducing gaps in understanding consumer preferences.

Mr. Subodh Agarwal moderating the discussion on solar lanterns and home lighting systems (L) and audience interaction (R).

Panel Discussion 2: Solar Lanterns and Home Lighting Systems: Consumer Perspectives, Delivery Mechanisms and Financing Models

Moderator: Mr. Subodh Agarwal, Programme Executive, FNF South Asia
Panelists

- Dr. Ranganayakulu Bodavala, Chairman and Managing Director, Thrive Solar Energy Pvt. Ltd.
- Mr. D.T. Barki, Chairman and Managing Director, Noble Energy Solar Technologies Ltd.
- Mr. Vinay Jaju, Co-Founder and COO, ONergy
- Ms. Dhairya Dholakia, Area Convenor, Lighting a Billion Lives (LaBL), The Energy and Resources Institute
- Mr. Ajith Gopi, Joint Technical Director: Solar PV Programme, ANERT, Kerala

Businesses and institutions engaged in delivering standalone solar products, such as lanterns and home lighting systems, were brought together to discuss critical issues in product development, dissemination and financing. Some of these players are faced with the common challenges of having to compete with the government support in the form of the kerosene subsidy, after sales service provision, maintenance, and awareness creation regarding alternate energy products. This segment comprises of a mix of

organizations, including traditional business ventures, social entrepreneurs, government bodies and technical experts.

As mentioned earlier, a major hurdle in scaling up the solar products business, apart from the kerosene subsidy, is the need to educate the rural population on the health and socio-economic benefits of switching from kerosene to solar products. As a business, the production and technology deployed are at fairly mature stages, as compared to dissemination and actual realization of sales. In order to achieve last mile distribution and service delivery, strategic partnerships with local networks and/or local self-government bodies are vital.Some of these enterprises also undertake training and capacity building of villagers in order to build a network of *energy entrepreneurs* who can offer last mile access.

On the product development side, such networking also enables a smoother flow of user feedback on technical specifications. It is notable that the market is typically under-served; hence most product designs are of value to end users. However, a credible distribution and dissemination partner could help address gaps in understanding consumer preferences as well. On the financing side, while there have been grant-funded innovations that have grown into business enterprises, the need for working capital financing is critical, especially for distributors, when the release of subsidy by the MNRE gets delayed.

It is evident that there are various players active in this space in an isolated but distinct fashion. There was a felt need for a coherent effort to address common challenges including trust deficits, lack of interest in financing specific proposals from the formal banking system, distribution challenges, distortionary subsidy schemes etc. This would pave the way for a better working environment and invite greater commitment from all actors until universal energy access become a reality.

Design innovations like smart meters and underground cables are making mini-grid systems robust and grid–compatible. Households are willing to pay for reliable grid-like power supply, as long as it entails expenditure that is comparable to or lower than that for kerosene lighting. Investors with varying risk appetites look for an achievable repayment model, standardization of processes and technology, and preferably the presence of a sound pricing plan.

Mr. Nikhil Jaisinghani moderating the discussion on mini-grids (L) and Mr. Gagandeep Bakshi during audience interaction (R).

Panel Discussion 3: Scaling Up Micro and Mini-Grids for Rural Electrification

Moderator: Mr. Nikhil Jaisinghani, Co-Founder, Mera Gao Power
Panelists:

- Mr. Anshuman Lath, Co-Founder, Gram Oorja Solutions Pvt. Ltd.
- Mr. Shyam Patra, Founder, Naturetech Infra
- Mr. Jorge Ayarza, Founder, MinVayu
- Mr. Kunjan Gandhi, Business Development Executive, Gram Power
- Ms. Jyoti Dar, Director, Kuvam Energy Pvt. Ltd.
- Mr. Gagandeep Bakshi, Vice President, Investment Banking Group, Intellecap

Micro and mini-grids represent a significant business interest emerging in the off-grid energy space, with varied business models and technologies being adopted.Financial viability, perceived risks in delivering services, and returns on investment are a few of the key issues that invited greater attention. The impacts of rising rural incomes and aspirations are evident in the evolution of some of the successful mini-grid projects in rural India, including remote tribal regions. These projects have a significant potential to create job opportunities at the base of the pyramid, which could contribute to their success. Interactive systems with smart meters and sound cable infrastructure are a few of the

design innovations that are taking place, also as a way of integrating with the grid in the future. Moreover, the flexibility of resources that can be availed of through hybrid systems makes this a dynamic model to replicate and expand across geographies.

The panel highlighted the multiplicity of business models adopted by various players in this segment. While some build the mini-grid system and transfer ownership to the local community, others build and operate the plants. There are still others that focus on providing additional support services, such as training the local youth to become technically competent. Imparting training and building capacity among the local community also brings benefits of increased trust, acceptance, participation, and reduced theft of equipment and power.

It is significant to note that the rising rural incomes translate into greater willingness to pay. With demonstration of quality service delivery and smart metering that cuts down power theft, field observations point towards increased assertion of consumer preferences as a community. There is also scope for price discovery as long as it is comparable to or cheaper than household expenditure on lighting through kerosene and other means.

While large government funded infrastructure projects are distinct in their coverage and outcomes as compared to mini-grid projects which are isolated and smaller in investment size, grant funding was highlighted as one of the suited forms of financing. Although technology risks are low, bank financing would require demonstration of the viability and scalability of the model.Hence, building a business model that generates a return is vital to avail of bank finance. There is also a huge interest in impact investing and socially responsible businesses that are keen on micro and mini-grids, provided processes and technology are standardized and there is a clear pricing plan. Investors in this space do envision capital recovery in a five to seven year horizon. The prospect of grid extension is not viewed as a credible threat to the mini-grid business.However, it should also be kept in mind that the rural economy in which these projects operate should also be capable of generating and sustaining the expected return.

The discussion exposed the various challenges and opportunities faced by entrepreneurs operating in this space. On the one hand, they have to manage consumer expectations of free provisioning of power (typically by the government), and on the other hand there is scope to cater to potential investor appetite.

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