

Prospects of Off-Grid Energy Systems in India: Challenges & Opportunities

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“Subham Karoti Kalyanam Arogyam Dharma Sampadah
Shatru Buddhi Vinashaya Dipa Jyotir Namostute”

This Sanskrit Hymn often chanted while lighting a lamp traditionally has equal relevance when it comes to lighting a billion lives across the world.

It says “I fold my hands before the light that brings prosperity, auspiciousness, good health, abundance of wealth and destruction of darkness”.

Indeed the nearly 300 million population of the rural households in India who have no access to grid electricity or less than 4 hours of it would affirmingly acknowledge the powerful impact that light in the form of electricity has over their lives.

Provision of sustained and reliable power to rural households can unlock the keys to the formidable challenge that India faces in rural upliftment by enabling them to prosper by contributing sustainably to the growth story of India. In this direction developing country like India has set itself far reaching yet realistic targets towards achieving complete rural electrification. At the same time India is well aware of its responsibilities and commitments in combating climate change as envisaged in the INDCs submitted to the UNFCCC. India, therefore, will be striving hard to reconcile growth objectives with its own INDCs target.

In order to successfully pursue the goal of achieving 175 GW of Renewable Energy Capacity by 2022, the active involvement of the

private sector is the key, especially when it comes to the nascent off- grid power sector in India.

In fact, it is projected that close to 90% of the renewable energy investment will have to come from the private sector. Overall while multiple initiatives to encourage off-grid capacity have been announced, their implementation has been tardy.

This paper attempts to examine the challenges and opportunity in the Off-Grid Energy (OGE) space in India, emphasising on financial aspects and relevant business models which have been implemented so far.

One of the immediate concerns for the OGE enterprises has been the lack of policy clarity when it comes to grid extension to new areas. Substantial investment would then be difficult to recover in case grid extension is implemented. Thankfully, the new programme announced by the Government of India in form of DDUGJY (Deen Dayal Upadhyay Gram Jyoti Yojana) brings in much needed clarity. It has identified the remaining 18500 villages in India where rural electrification is to be taken up on a mission mode. Crucially, it has also marked 3500 villages as very remote and not feasible for grid extension. This clears the way for OGE enterprises to make long term investments and also encourages financial institutions who were hesitant to finance renewable energy projects before.

Further the scheme has massive outlay in excess of 33000 crore INR for feeder separation and strengthening of sub-transmission infrastructure and developing net – metering systems. Private sector utilities are eligible under the scheme. A significant part of the outlay is expected in the remotest area which shall spur greater investment by OGE enterprises. Currently, equity has been the main instrument of finance for OGEs as most banks are not willing to lend even at prohibitively high interest rates of 13-18%. Though Indian Renewable Energy Development Agency Ltd. (IREDA) refinancing is available for loans made to off-grid solar projects, there is a need to make off-grid energy part of priority sector lending. Reserve Bank of India (RBI) has responded positively by including

renewables under the priority sector lending. The notification by RBI will boost investments from the SMEs sector in renewable space. The current change to include projects of upto 15 crore is a good start. Though the limit needs to be extended, decentralised renewable energy systems stand to benefit in a significant manner. Small private sector players have difficulty in getting empanelled to become eligible for participation. It needs to be noted that some of the SMEs have a deeper rural distribution network and customer trust than the bigger players and are beginning to scale up and expect to have sustained growth.

Further the refinancing option needs to be extended to wind, biomass, microhydel power as well so as to enable OGEs to develop hybridised power systems. In this light the new renewable energy policy of Maharashtra is a welcome change as it has given industry status to wind energy sector. This shall help easier financing through banking channels. Similar changes may be expected as states competitively engage in attracting renewable energy investments. Another issue for the industry is that foreign loan can be used for project finance and not for working capital purposes. Further, RBI approval is difficult and time consuming unless foreign lender is a large institution.

High capital expenditure is involved for upfront investments. Government subsidies though substantial have lengthy timelines for disbursement which is why the OGEs enterprises have expressed a strong preference for long term project finance.

At this juncture, it is worthwhile to explore some of the successful business models adopted by OGE enterprises of the likes of Selco, Simpa Networks, Mera Gaon Power, Naturetech Infra among others. One of the most important strategies that have been recognised is the need to invest in continuous innovation to stay relevant. In order to design technologies for evolving consumers, real time feedback if necessary and needs to be incorporated into the product design aspect of the business model.

Selco has thus divided itself into Selco Private Limited which looks after the sales and services and reports problems to the Selco Foundation which shall develop solutions and pilot implementation. This in turn shall be disseminated widely by Selco incubator. Selco successfully came up with solar powered dryer to help fishermen community in preserving the fish for longer time period.

Another successful business model is that of Simpa Networks which employs the pay as you go model. Basically the consumer pays as per own usage similar to prepaid mobile top up for Solar Home-lighting Systems (SHS). After consumer has made 28 months of payments, he will finally be transferred ownership of the system. The 28 month period allows Simpa Network to prove its credibility and brand to the consumer as small size payments are seen as more convenient.

It may be added however that this model entails of financial risks of non payments from the consumer which can only be overcome by robust way of initial credit, consumer repayment assessment as well as building long term business relationship with consumer.

Naturetech Infra Pvt. Ltd. goes further by adopting their Innovative & Ultra Low Cost Solar Microgrid Model. The key features of the Village Electrification Model being 24 hours electricity supply, customers can plug in TV, fan, music systems etc. (up to 100 watt load), smart installations requiring less land foot-print , SMS based prepaid meters and intelligent theft-free power distribution network etc., while providing an opportunity for surplus power for village level micro enterprises as well.

The SHS based clean energy has offset about 39000 tonne of carbon emissions by minimising the use of kerosene which in addition to carbon produces black carbon emissions that have much stronger Greenhouse Effect than regular CO₂. The intervention has caused a paradigm shift in the quality of life in rural households as there is a perceptible change with increased study time for children as well as increase in productivity of rural business from longer hours of electricity. Further there are income benefits to be had from increased economy activities. So far the SHS

segment has seen more success and in the near to medium term, it is likely that SHS will be the main driver of the OGE business.

However, in the longer term, DRE (Decentralised Renewable Energy) systems which can provide electricity to households as well as commercial clients in rural remote areas will become important. DREs have to develop small grid capabilities to monitor electricity consumer to optimise generation and distribution of power based on that data. Microgrids and minigrids will play a major role as the consumption patterns of the rural remote consumer evolve from lower wattage appliances to higher wattage appliances.

Fluxgen Technologies, one of the pioneers in AC-based DRE systems bets big on AC-based appliances as these are much cheaper than the DC-based appliances which typically cater to lower wattage segment. A smart shift to AC-based system would result in higher efficiency overall. The non-homogeneity of the Indian Rural landscape forces the need to develop flexible consumption options.

An important strategy for the DREs will be using commercial enterprises as anchor clients. These commercial enterprises include inter-alia ATMs, mobile towers, petrol pumps among others which requires substantial amounts of uninterrupted electricity.

DRE enterprises can find anchor clients as sources of stable revenues through effective partnerships which can take place via long term purchase agreement. B-2-B market is what will drive the future growth in this segment.

Currently, build only models are most popular due to immediate recovery of capex costs. However Mera Gaon Power (MGP) is different in this respect which follows Build-Operate-Own-Maintain (BOOM) model. Mera Gaon Power operates over 1000 plants with each plant having installed capacity of 240 watt which can provide power to a village of 30-40 households. MGP relies on peer pressure and payment collections inspired by micro finance model. Households make weekly payments in public meeting in front of their group thereby lowering non-payment risks.

MGP is also unique in coming up with easier-to-scale up and quicker to assemble power plants thus helping in expanding to many villages by combining successfully B-2-B as well as B-2-C markets.

Going much further, we propose extending certain interventions from the government which can have multiplier effects on the OGE Space.

Solar double cropping is seen as a valuable strategy that can be adopted by land-owning farmers. Surya Raitha, a pilot- scheme in Karnataka is implementing such a project. Basically Solar Double Cropping involves growing conventional crops alongside installation of solar panels overhead. Extensive agriculture research has pointed out that harmful effects of mid-afternoon solar insolation on crops can be prevented by this method.

In addition, the farmers after using the solar power to draw water can sell back additional power to the distribution utilities for a remunerative price. Currently, this is an on-grid based programme. It would be interesting to see the efforts it can have when extended to off-grid power.

States like Bihar, UP, West Bengal & Odisha have high potential for aquifer exploitation through solar powered pumps. This can reduce the run-off during floods and help exploit the aquifers efficiently.

End user tariff collection and associated default is a significant risk in the off grid energy segment. We propose that Aadhar based payment can be started on a pilot basis where identified beneficiaries are granted entitlement to consumption of limited number of electricity units which can be monitored by developing reliable metering services.

The utilities providing electricity to these beneficiaries can receive payment directly on behalf of consumer from the government agencies through an aadhar based cash transfer mechanism, thus ensuing stability in revenues. Greater microfinance institutions (MFIs) and rural bank penetration makes such experiments easier as seen in the Southern states.

Finally, we have to tackle the issues related to efficient storage technologies in this segment due to the intermittent nature of renewable

energy. High impact Companies like Tesla (which India's PM visited in his recent US sojourn) who currently cater to niche segments in hyper individualistic market in the US would have to be invited to invest on off-grid energy projects. Worries about the viability of the low cost interventions can be gradually overcome by volume of sales that can be generated in a huge market like India.

Tesla's power wall and other similar storage technologies if harnessed diligently in rural India on a large scale can bring about an energy revolution by ensuring super efficient storage mechanism to complement off-grid roof top wall solar power generation.

At the outset, it seems that these are far away propositions. However, there needs to be a comprehensive roadmap on realizing such possibilities, be it through direct investment or exploring technology transfer through climate change funds like Global Environment Facility (GEF) and Green Climate Fund (GCF).

In the wake of COP21 outcomes, there is a renewed thrust for combating climate change by fast tracking transition towards low carbon energy growth and development. The government as well as the private sector are required to look into not only their Sustainable development agenda both in terms of national and global imperatives but also to draw, a mid to long term plan for the effective implementation.