

STRATEGIES TO TARGET RURAL PV MARKET IN DEVELOPING COUNTRIES – A PERSPECTIVE

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ABSTRACT

The objective of this paper is to describe the Solar PV market with regards to products like solar lanterns, home lighting systems, power packs especially in the rural context of developing countries. Steps taken by some companies in trying to reach the rural market with solar PV product for matching the needs of the rural regions in India are described. In the study of rural PV market two divergent views exist, providing a mass-manufactured product at very low prices and the other of customized solutions supported by soft-financing options through rural banks. While mass produced solar PV products (SPP) may deliver economies of scale bringing down costs, does it guarantee quick sales and user benefits? On the other hand delivering customized solutions to the user may guarantee sales, financing the solution is a difficult and a long-drawn process, casting a doubt on its ability to scale up. An alternative strategy is developed that targets the rural rich rather than the traditional bottom of pyramid users. Its rationale is explained.

Key words: Rural PV market, India, Solar lantern, Solar home lighting system

INTRODUCTION

Rural population still accounts for more than half of the global population. On global scale [1] about 3.3 billion people or about 50% of the total population lives in rural regions, much of whom live in developing nations. Why are they an important market to target? This study is based on solar product assemblers [2] targeting Indian rural PV market.

To give an Indian perspective, of the 200 million or so households more than 100 million are in rural areas. 83 million households still use kerosene for lighting their homes

when dark [3]. IH Rehman, 2005 [4], estimates these households buy part of the kerosene from the government established Public Distribution System (PDS) and part from the black market. Contrary to the popular belief that the kerosene is used for cooking, people use almost all their kerosene to light up lamps. People in villages use readily available biomass in their surroundings for cooking. On an average each household spends between Rs. 90 and Rs. 120 per month for 4 – 6 litres of kerosene. This translates to about \$2 billion market for just basic lighting. Many of the states of India have power cuts in excess of 15 hours per day, which is even extended to 22 hours a day in rural areas. Their current alternative is an “Inverter” (typical term used for battery-cum-inverter system) which, due to load shedding, doesn’t get enough power to charge its batteries. Solar power packs are the solution for this problem. It is another lucrative market with about 1.5 million units sold annually and growing at about 12% CAGR. Here the rural market is described with possible products that may find immediate demand. It is estimated that the major PV application market is in home-lighting and power pack systems in rural area [5]. However the strategy to target the rural PV market is not discussed in the literature. This paper looks at the solution for penetrating the rural solar PV market. The pros and cons of the distribution network are discussed from the perspective of users and manufacturers. Based on the experience, a strategy is suggested to target the rural PV market.

THE RURAL PV MARKET

The current set-up and market alternative

The size of the rural PV market although huge nationally, it usually boils to the fact that the companies generally target the rural region closest to its area of operation – a convenient and obvious choice. The question is what product to sell and at what price? A preliminary survey with interviews and documentation reveals that the primary need is lighting and fans given the users’ meager resources and

the large number of students these areas have. The alternative is an “inverter” – a popular stand by for lighting. Those who can afford it, buy it. It is a device with an inverter, battery and 2 CFLs manufactured locally. The battery is generally charged by electricity stolen from the grid. Bigger systems can run fans, tubelights and TV for a longer hours. But the hitch is the energy needed to charge the bigger battery, so even some of the wealthier people prefer to use the small CFL-Inverters.

The basic inverter costs Rs. 2,000 as against Rs. 4,500 for the CFL based Solar Lantern which is expensive way to illuminate only one room. However, the latest LED lanterns (with solar panel of about 0.5 Wp to 3 Wp) range between Rs. 700 to Rs. 2000, illuminating only one room. Calculating willingness-to-pay may only give an indication that a premium is placed on the reliability of the Solar product and the independence it provides, but it may not reveal how much of a premium. Chances are that the premium has to be just marginally above the inverter, say about 25% more and for illuminating at least 2 rooms for 5 hours per day.

Designing a product for the rural market

The light running on solar power should be as bright as the CFL, they should run for at-least 5 hours a day and should have low replacement cost and long replacement cycle. Only an LED based lighting system can satisfy all these criteria. It can provide comparable lux level at the task area, low power consumption and long-life brings down the system cost. An LED-lantern, home lighting or power pack, guarantees lower panel cost, but the trade-off is in using expensive LEDs instead of cheaper CFLs and also its unavailability in rural areas, in case of mal-function. Solar power packs usually involve only PV panels, battery, charge controller and inverter to run AC light and fans. If DC LEDs and fans were to be bundled with the power pack, then the system promises to be cheaper and seems like it provides a more holistic solution. But the LEDs don't provide bright light and therefore not demanded by the rural rich who can afford it. Sometimes the demand is only to charge the batteries from people who already have invested in the Inverter, but don't get enough electricity to power their batteries. For them the solution seems to be just providing with a solar panel that charges their battery and charge controller.

Penetrating the rural PV market

Most consumer electronic products in rural areas are generally sold through a dealer or retailer network. The dealers/retailers demand margins of about 20 – 25% to sell solar products. The distributor undoubtedly demands about 35 – 40% gross. Once these margins are added, the price to the user becomes beyond interest. To keep prices within the reach of the user after adding dealer-distributor margins the manufacturer would have to reduce it to very low levels. Unless the product is manufactured in very large scale, it stays unviable for many. Some companies; notable among them d.light Design, Greenlight Planet; have manufacturing plants in China, catering to only the rural market and targeting only kerosene lamp users. Their products cost less than Rs. 1000. The light output is good enough to replace maybe 1-2 kerosene lamps. They may have margins that don't justify the requisite internal rate of return. Their primary stream of revenue seems to come from sale of potential carbon credits gained from replacing kerosene in these areas. Their major clients are world social bodies like the UN and international NGOs. In India, such companies have tried to reach the users through the networks of the Micro-Finance Institutions (MFIs) such as SKS India with mixed results. More data would be needed to outline the right ingredients required for a successful marriage between MFIs and such companies.

Direct marketing usually involves having a store in a given location, say the sub-district centre. However, very few government sponsored shops have managed to set-up. This type of marketing assumes that enough pre-launch marketing has been done to attract users to look for the shop and come and buy the system. The shop-owner can be a franchisee or a manufacturer's points-man at that geography. There are few manufacturers with such a set-up. One private company (Orb Energy) which has such a set-up has franchisees in district headquarters. They usually cater to the solar inverter and water heating systems in the sub-urban regions of those districts. But it seems as the market evolves and costs come down, even the rural users would buy from these shops. The company assembles its solar PV products in India. Direct marketing has been used by another industry veteran, SELCO India, to provide customized lighting solutions complimented with soft loans provided by the co-operative banks in the region. Sometimes it literally involves individuals approaching households to sell their products; usually followed by very small scale operators in very concentrated regions.

TERI, (The Energy and Resource Institute), a leading Indian NGO has devised a rental model to replace kerosene lamps. TERI teams up with local grass-root level NGOs to provide solar lanterns on rental basis. The condition being that only kerosene lamp users should be provided with lanterns. The set-up is like this; the grass-root NGO looks for willing solar entrepreneurs usually those who have a village level electrical hardware shop. The solar charging station, usually a batch of 50 CFL or LED lanterns, is set-up at his shop/home. The lanterns are charged at his place. During the evening registered users from the village take the lantern for use and bring back in the morning to the entrepreneur for recharging. The entrepreneur collects the monthly rent of about Rs. 90. This is well within the range of kerosene users. The difficulty in scaling this technique is the fact that the rent collected by the entrepreneur is not shared with the NGO that has effectively donated the system. Since there is no compulsion to reach revenue targets this model is a charity based system to the Solar Entrepreneur. The lessons learnt during the government subsidies programme of after sales services have been incorporated in the contract between the national and the local NGO, which takes the responsibility of maintaining the systems. The loss in additional revenue makes the entrepreneur compelled to maintain the system.

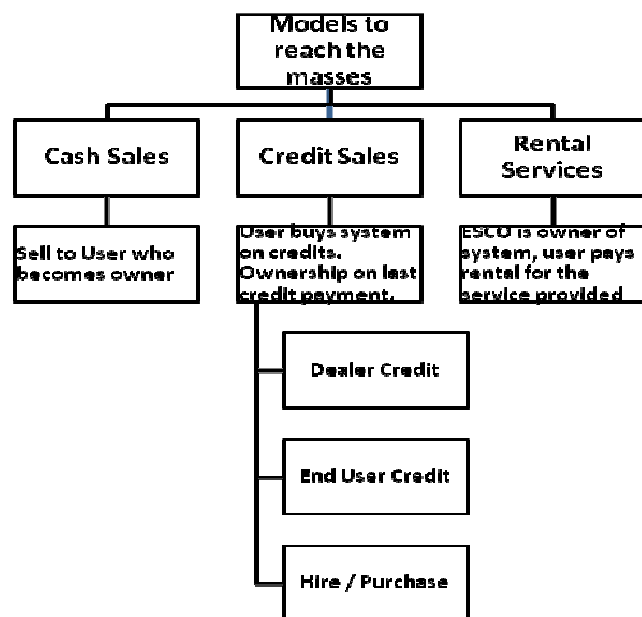


Fig 1 Describing the strategies/models to reach the user
[6]

These models have been in use in some combination around the world for some time now and the target consumers have been the bottom-of-pyramid kerosene users. The products, especially lanterns have been the focus of all major new entrants. Home lighting systems and PV AC power packs have been targeted at semi-urban users, with modest numbers and limited success.

EXPERIENCE FROM THE RURAL PV MARKET

Direct marketing has done well when the prices are very low – sub - Rs. 2000 for mass produced systems. Since also much of such systems are bought wholesale by institutions such as the UN and GEF (Global Environment Facility), the profitability of the company is secured. One is unsure how exactly have the actual users benefited because of lack of documented data. Using the MFI route has also led to some success, but some of the MFI experts are divided on the viability of the model since the onus is now on the MFIs to collect the installments from the users. Lanterns have also been distributed through traditional retail networks. However, low margins have caused less interest from these nodes. Low price point makes for no incentive to invest in maintenance or repair infrastructure. With warranties that generally take time to service, it generally puts off the users. If they have invested in the products through credit, they find it unreasonable to pay for products that don't last as long they are promised. The number of such disgruntled users is unrecorded and therefore too early to claim their success or failure. However, standard and inexpensive LED based PV lanterns seem to have gripped the imaginations of major fund houses and many start-ups. It stays to be seen how much of success has the proposed model been in replacing kerosene.

Provision of customized solution using the banking network seems to solve the financing problem and collecting the installments. Higher margins and the social angle of these enterprises have led them to invest heavily in service and maintenance infrastructure. Users are generally satisfied with the performance of the product and the prompt service delivered in case of any defects. They have also increased employment in their own small way in the region they operate. On the face of it, the model has all the ingredients of developing a given location. The trouble, however, is its potential to scale up and profitability. Seemingly, some solace can be taken from the fact that the automobile manufacturers have also used a similar model to sell cars. The challenge may yet be in the form of offering customized

solutions – usually with the idea that the PV lighting system is used to increase the users' productivity and income.

The rental model is good so far as the village level entrepreneur is concerned, since the charity was for him. Users are benefited and the initial response has been encouraging with almost 100% of the lanterns being taken for usage. However, it is unlikely to be commercialized as a preferred way of reaching the users since the investing company may only breakeven after 3 years – an unattractive proposition for financiers.

Users have been ready to accept the technology since it caters to their needs. Price seems to be the only hindrance. Their benchmark is the basic inverter. If the premium on solar lighting system is high they expect to use at least a fan for some hours during the day. On the other hand if their income is increased by buying the solar product and finance provided by banks or MFI, the users do prefer to buy bigger systems that are a few multiples of their monthly income. The installments are paid by from fraction of the additional income they make by using these products.

STRATEGY TO INCREASE PENETRATION IN THE RURAL PV MARKET

We have seen the traditional approach to sell PV products and the market that most of the players are targeting. Yet somehow, large scale deployment seems elusive. It may still be round the corner as startups seem to suggest – their targets being in the range of 100 million households by 2020. Question is can such numbers really benefit the end user. Without investment in the service infrastructure it seems difficult to provide reliable and top quality lanterns. And with investment in the service infrastructure, it seems scaling up can be a challenge. What then could be way out?

The strategy could be to “follow-the-money”. Greater profits lie in targeting the rural rich and servicing their concerns. The banks have no problem in financing consumption of such creditworthy rural customers. The onus then on the company is to provide proper service and repair infrastructure to support the products for these rich users. These users have no interest in lanterns or simple home lighting systems. They have already invested in a bigger “inverters” to cater to their energy needs. But with longer power cuts they have no power to charge their batteries. AC PV power packs make for an ideal solution for these users. The company can bring down the cost in proper logistics and

invest in servicing these users. The reliability of the product increases and the banks are more sensitized towards the product. The support infrastructure later on can also help rural poor who may opt for simpler home lighting systems or lanterns. The progress along this route increases the profit incentive for the private player, ignores the B-o-P users for the time being but builds on the support infrastructure needed to service their more pressing issues.



Fig 2 The Market Pyramid: Size and Affordability are inversely proportional

Figure 2 implies the trickle-down effect of first targeting the rural rich and then building on the infrastructure to reach the B-o-P users. Mobile phones and automobiles had a similar growth trajectory.

Figure 3 indicates the parameters that a private player has to satisfy to implement the “Follow-the-Money” strategy.

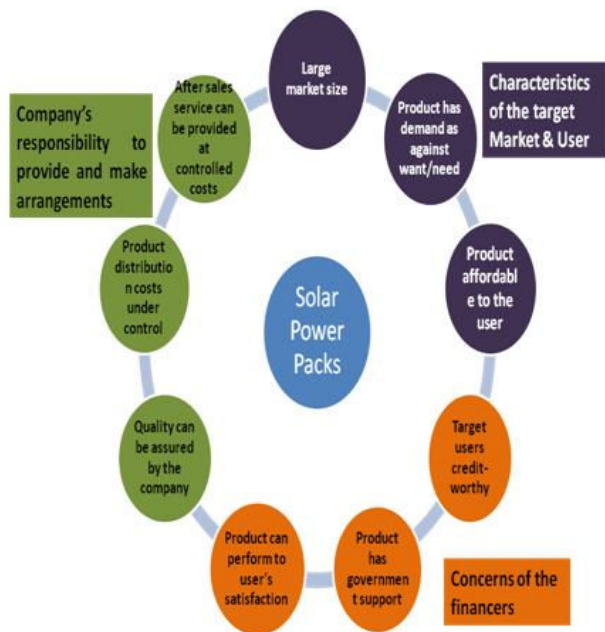


Fig 3 Follow-the-money strategy

Convincing the banker is an important step in increasing PV penetration in rural areas. Product reliability, user creditworthiness and government support seem to attract the bankers. Increased profitability incentivizes in investing in support infrastructure that may eventually help in catering to the rural poor.

CONCLUSIONS AND FUTURE TRENDS

The rural solar PV market has been described. The strategy for targeting the rural solar PV market could be to mass produce the solar lantern product and/or provide customized home lighting systems with soft financing from local cooperative banks. In the former the challenge is in the supposed benefit to the user, where the user pays slightly more for just marginally better light, in the latter the challenge is in building scale. While the kerosene replacement market is the focus of the major players because of the volumes, what may actually give the momentum is the solar home lighting systems & inverter/power pack market – products in the range of 5 – 20 Wp to 100 – 180 Wp systems and more to charge the battery. The low-hanging fruits may be in using the follow-the-money strategy of convincing the rural bankers and the targeting the rural rich. The market is also witnessing increased participation from decentralized PV plants in rural

areas typically in the range of few tens of kilowatts, but the volumes are very insignificant to impact in very near future. However, some players are eyeing it with some seriousness as it has explicit government backing, especially in India. In a few years a visible shift may be observed from individual units to micro-grid rural PV communities.

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