Microfinancing decentralized solar energy systems in India: The stage set for diversification to irrigation

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Abstract

The microfinancing scheme for solar home lighting system introduced by rural banks in India turned out to be a success. Having learnt from this programme, the government introduced a subsidy linked bank credit programme to upscale and mainstream the programme. Initially the programme met with only a limited success as it had too many loose ends. Later, with a number of modifications, the programme gradually took off and is now making steady progress. Later, NABARD developed group based products for isolated and inaccessible communities, which were implemented through partner agencies like NGOs and civil society organizations. Agriculture is a major power consuming sector in India. However solar irrigation pump sets have not taken off in India. This paper looks at the possibilities of mainstreaming the financing of solar irrigation pump sets in the light of experiences of some state governments and the new scheme launched the Government of India.

Keywords: microfinancing; agriculture; irrigation; solar water pumps.

Problem, background, challenge of the project

To address the problems of access to energy in India, one of the missions started by the government of India was the Jawaharlal Nehru National Solar Mission (JNNSM). The mission envisages deploying 20,000 MW of solar power by 2022 of which 2000 MW would be through off-grid applications. A major part of the off-grid applications would be through solar lighting and heating systems supported by bank finance. Modeled on the initiative taken by a regional rural bank in northern India and facilitated by the apex bank for agriculture and rural development-the National Bank for Agriculture and Rural Development (NABARD), the government launched a capital subsidy-cum-refinance scheme for installation of solar off-grid (photo-voltaic and thermal) and decentralized applications. The scheme had undergone several changes to improve its implementation which included changes in the pattern of subsidy, financing modalities etc. Later the central bank of the country-Reserve Bank of India was persuaded to include financing of solar home lighting systems also as a part of priority sector advances. Further on the suggestion of NABARD, the government has accepted the proposal to include cooperative banks also in the scheme. The main product in focus has been the solar home lighting system. (Pillarisetti, 2014)

Though further action is needed in terms of training and sensitizing the bankers as well as users to upscale it, the programme is now set to take off on an even keel, with nearly 250,000 units financed by banks so far, and a large number in the pipeline. Under the Mission, the main emphasis till date has been on financing Solar Home Lighting Systems. Apart from this type of subsidized bank finance, NABARD has also supported various initiatives for Solar Home Lighting Systems which include group based financing for stand-alone lanterns, mini grids in remote and inaccessible areas, solar lanterns through the charging station model, etc. In most of these innovative products, support of facilitating institutions like NGOs has also been enlisted. The design and evolution of these innovative products has already been documented. (Pillarisetti, 2014)

However, India has reached a stage in the system of renewable energy, when it has to look beyond solar home lighting systems. Lack of electricity creates challenging situations for the vast agrarian population in India. The increasing mismatch between the demand and supply of energy in general and electricity in particular is posing challenges to farmers located in remote areas. The scarcity of electricity coupled with the increasing unreliability of monsoon rains is forcing farmers to look at alternate fuels such as diesel for running irrigation pump sets. However, diesel is not an acceptable alternative, both in view of the costs involved and the damage to environment. The need, therefore, is to look at environment friendly, low maintenance, Solar Photo Voltaic (SPV) pumping systems providing new possibilities for pumping irrigation water. Hitherto, these alternatives were not considered seriously.

Approach

The first signs of market for Solar PV Water Pumping system to India became visible between 1993 and 1995. The Ministry of Non-Conventional Energy Sources felt that Solar PV water pumping was technology proven product and could be suitable for replacing diesel powered pumps at unelectrified locations provided the ecosystem for delivery of systems was strengthened. Consequently Ministry of New and Renewable Energy (MNRE) initiated the programme for deployment of 50,000 Solar PV Water Pumping Systems for irrigation and drinking water across the country. The key aspects of the programme were commercialization of Solar PV Water Pumping systems over a five year period for strengthening the production base and creating the required institutional infrastructure for marketing and after sales support. The programme was based on the assumption that the economies of scale and technology upgradation would drive down the cost of SPV water pumping systems making the system economically viable. The

implementing agencies were Indian Renewable Energy Development Agency (IREDA) and the State Nodal Agencies (SNAs). The implementing intermediaries were mainly Non-Banking Finance Companies (NBFCs) which procured the systems from manufacturers and channelized the financing capital and interest subsidies from IREDA for the end users.

MNRE subsidized the capital cost of the solar pump and interest costs. Apart from channelizing this financial assistance for end users, IREDA provided financing for the unsubsidized portion of the system costs from its own resources. In case of SNAs channelizing MNRE's financial assistance, the IREDA financing was not available to the end user. From 1993 to 2000, the programme was implemented by IREDA using NBFCs as intermediaries. The later took advantage of the availability of capital subsidies, low cost financing and 100 percent depreciation in the first year in order to provide the end users the system at a concessional rate. However, after 2000, the programme was mainly implemented through SNAs. These agencies were able to bring in the component of subsidy from the respective State Governments. The subsidy component received through the SNAs was reduced after the initial stage from Rs.135 per WP to Rs.100 per WP. The programme worked with 9 empanelled vendors. In the first year, the programme was considered as a demonstration programme with a target of 1000 SPV pumping systems. However, less than 500 systems were installed during the first year. From 2004, the programme was modified. It became applicable only for community drinking water projects. The Solar PV Water Pumping for irrigation was no longer applicable under the programme. With the launch of JNNSM in 2010, the Solar Water Pumping Programme of MNRE was clubbed with the off-grid and decentralized component of the Mission. The key aspects of the programme were commercialization of Solar PV Water Pumping Systems. These pumping systems were eligible for financial support from MNRE through a capital subsidy of 30 percent. Currently the financial assistance available is 30 percent subsidy subject to a benchmark price of Rs.190 per Watt Peak (WP). The farmers are free to procure the systems from any of the empanelled manufacturers who have agreed to supply the pumps as per the rates approved by the programme. Several states have taken up initiatives to implement this water pumping programmes under financial assistance available in the solar mission and using the funds from the respective State Governments' budgets. Initiatives from the State Governments have been more remarkable in the case of Rajasthan, Bihar and Punjab.

The state government in Rajasthan was looking at alternatives for conventional energy in agriculture sector, as there were long waiting lists for new electric connections needing substantial investments by farmers. The government first started with the solar pump programme at 14 government farms during 2008-09 under a central government sponsored scheme-RKVY. A pilot project of 50 solar pumps at farmers' fields was first taken up in 2010-11. The project included extensive training for all stakeholders including farmers. In the year 2011-12 the programme was taken up in 16 districts with a target of 1600 pumps. The selection of the beneficiary was based on the adoption of water harvesting systems, protected cultivation/drip irrigation systems and orchard farming. The farmer was to have 0.5 ha of land and should be an adopter of hi-tech agri-horticultural practices. The assistance pattern of the scheme was up to 86 percent of total cost with 30 percent coming from JNNSM and 56 percent from RKVY. The farmer was to bear 14 percent of the cost.

The state government was positive on solar pumping systems as it is turning out to be economically viable even for the government's budget. The government invests Rs 24,500 per year on per ha of land in case of regular grid electricity, whereas in case of solar it works out to be Rs 14,000 per ha. When solar and electric pumps (5 hp) are compared in terms of total life cycle subsidy costs spread over a life span of 25 years, solar pumping system is cost effective (Rs.0.73 million) as against electric system (Rs 1.22 million) The solar irrigation pump programme undertaken by Rajasthan government has been running successfully in low depth wells as well as tube wells and diggies upto a bore well depth of 170-270 ft. The discharge of pumps is between 5,400 and 10, 000 ltr/hr. All the beneficiaries were using water saving devices and were satisfied with the performance of the pumps. The programme has taken water access to unelectrified/remote areas and is a good substitute for 5-7.5 hp electric connections/diesel pumps. It is also enabling the judicious use of irrigation water through micro-irrigation and integration with renewable energy sources. The state government is of the view that widespread replication would bring down costs within the reach of farmers, with gradual withdrawal of subsidy. (GoR, 2014)

In Punjab the Punjab Energy Development Agency (PEDA) facilitated the installation of nearly 2,000 solar pumps in Punjab for agricultural purposes. They used a mix of MNRE subsidies, soft loans from IREDA, state government subsidy support and the 100 percent depreciation benefit through lease financing of the asset. This facilitated that farmers could avail the system at 10 percent of the actual equipment cost. The Bihar Renewable Energy Development Agency (BREDA) has a programme of installing 680 units of 1,800 WP solar water pumping systems in 10 blocks of 6 districts in Bihar using budgetary allocations. Beneficiaries are expected to pay 10 percent of system cost with balance 90 percent being provided through JNNSM and by the state government.

Lessons learned

Apart from the efforts of the State Governments, there had not been any significant private sector innovations as all these programmes have been linked to the MNRE subsidies. In the initial years of the Solar PV Water Pumping programme, the systems were being financed through a complex scheme of subsidies, low cost

financing and tax benefits, utilizing 100 percent depreciation available for renewable energy technologies in the first year. The aim was to provide the system to end users at an affordable rate. Later all programmes for Solar PV Water Pumping systems have been financed mainly through capital subsidies from MNRE and State Governments. Besides these subsidies there were no specific financing schemes for supporting for acquisition of the Solar PV Water Pumping Systems by the farmers. However, there is an immediate need for the schemes which are similar to the Solar Home Lighting Systems to finance the Solar Water Pumping Systems because unless the subsidy systems are decentralized and the banking finance is available at the grassroots level, there is no possibility of the scheme taking off in a big way.

The solar water pumping systems adoption depends upon the ease of access to subsidies and mechanisms to bring the cost of acquiring Solar PV Water Pumps at par with the cost of conventional pumps. The subsidy should be based on market price and not benchmark price and the time lag between the installation and release of subsidy should be minimized.

There is also need for developing a well-designed loan product at reasonable rates of interest and repayments linked to savings from diesel / income from selling of crops. Small smart business finance for SMEs has to be provided to facilitate the entry of multiple players to manufacture the system in the sector. There is low level of awareness among farmers and other stakeholders about the existence of a solar power option for irrigation or they perceive them to be very expensive and hence there is low demand for solar water pumps. As such there is need to take up awareness campaigns to inform farmers, financial institutions and other stakeholders about Solar PV being a competitive option and its benefits vis-à-vis diesel powered and other conventional irrigation pump sets

It is only now in the financial year 2014-15 after lot of efforts and persuasion, the Government has come up with the scheme of financing of Solar Water Pumps linked with subsidy on lines similar to the financing of Solar Home Lighting Systems. The main features of the scheme are the financing part being done by the banking sector and subsidy being routed through NABARD to the banks as in case of the solar home lighting systems. The scheme will be in operation for a period of two years and was originally aimed at installing 10,000 units. A modification is on the anvil which will extend the scheme to 30,000 units. The SPV water pumping system would consist of PV array, a DC/AC surface mounted/submersible/floating motor pump set, and electronics, if any, interconnect cables and an on-off switch. PV array is mounted on a suitable structure with provision of tracking. Electronics could include Maximum Power Point Tracker (MPPT), Inverter and Control/Protections. Presently the benchmark cost for Solar Pumping System with DC/BLDC Motor Pump set is Rs 190 per WP and AC Motor pump set is Rs 161.50 per Wp. Subsidy at 40 percent of indicative cost will be available. The borrower will have to bear 20 percent of the total financial outlay as margin. The balance would be provided as a bank loan. Banks are expected to finance only those units that conform to the conditions/stipulations laid down for individual models, including the technical specifications laid down by MNRE. The repayment period is 10 years with a minimum lock in period of 5 years. Interest rate is as per the bank norms and not subsidized. Based on previous experiences the beneficiaries have been broad based to include groups of individuals, SHGs, JLGs, NGOs, Farmers' Clubs and Farmers' Producers' Organizations. It is expected that with the implementation of this scheme, the mainstreaming of financing for solar water pumps for irrigation will be accelerated in a manner similar to the process which has taken place in case of solar home lighting systems.

With the mainstreaming of financing of solar water pump sets in India the irrigation requirements of land holdings for small and marginal farmers can met. This requires the active involvement of main stakeholders viz. banks, government, farmers and NABARD. It would also be necessary to avoid some of the missteps taken in the solar home lighting scheme which delayed the implementation process. A system of awareness and capacity building should be a part of the scheme implementation. Technical support during installation and after sales service should be available almost on–tap. If all such loose ends are tied up the scheme can implemented smoothly and mainstreamed as a regular activity for banks.

Research demands

The solar water pumping systems in India are at present at a take off stage, as far as the mainstream financing programme through banks is concerned. But earlier projects financed by state governments especially in the states of Rajasthan and Punjab have now completed 2 to 3 years of operations. These projects need to be studied with regard to their financial benefits to the farmers and governments, the operational benefits to farmers vis-à-vis the traditional pumping systems and technical quality of the pumping systems. These are the areas in which researchers in renewable energy could focus.

Note

In the paper Rs is notation used for the Indian Rupee. In 2013-14 the exchange rate varied between Rs 60 to Rs 64 per 1 US $.

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