

## **Aryavart Gramin Bank, India**

**NK Joshi**

### **Bank helps customers to buy solar home systems**

#### **Summary**

Uttar Pradesh (UP) is one of the poorer states in India. For centuries, people have been subsistence farmers, growing rice, wheat, lentils and mustard seed. Some cash crops like sugar cane, potato and mentha are now also cultivated on large scale. Buffalos are reared for milk and meat. Over the years, the farms have become smaller as the land is divided between children.

Many rural areas of UP have no grid electricity and even where the grid is available there are frequent power cuts. Some shops provide a battery-charging service, so that people can run d.c. lights and small appliances from car batteries. Photovoltaic (PV) solar-home-systems (SHS) can be very effective at providing power for lighting and small appliances. However in many parts of India, and other developing countries, the main obstacle for rural families who want to have an SHS is finance.

Throughout India there is a well established network of Regional Rural (Gramin) Banks, which were set up from October 1975 to make banking facilities available in remote rural areas, and to make small loans easily accessible to farmers and other rural people. Mr NK Joshi, Chairman of the Aryavart Gramin Bank, thought that a rural bank should aim at providing light in the lives of its proven customers by enabling them to purchase SHS. The Aryavart Gramin Bank had good experience of PV. It had solved its own problem of running computer systems in branches with unreliable mains power, by using PV-powered backup systems. In 2006 Mr Joshi had also run a pilot consumer loan scheme for SHS in the former Avadh Gramin Bank. The Aryavart Gramin Bank therefore decided to launch a major programme to promote SHS, by bulk-ordering the PV systems through the main dealer of Tata BP Solar and providing loans to customers.

The bank programme provides two standard sizes of SHS, through the dealers of Tata BP Solar. The most popular is the smaller system based on a 35 Wp PV module which can run two lights and a small appliance. The bank will provide solar loans only to its own customers, who have already established a track record of reliable credit repayment. Bank customers are invited to 'credit camps' where SHS are demonstrated and explained, and usually 1,000 or more customers sign up for SHS loans at each camp. The bank offers a finance package through which purchasers of the 35 Wp system make a down-payment of IRs 2,520 (£32) and the bank provides a loan of IRs 11,000 at 12% p.a. interest, which is repaid with monthly instalments of IRs 245 (£3.10) over five years. These repayments are cheaper than the previous IRs 280 (£3.50) monthly cost for eight litres of kerosene, which is the average household use in the villages .

The Aryavart Gramin Bank has developed an innovative way of providing maintenance for the SHS, which also brings employment to rural areas. Part-time 'business facilitators', trained by TATA BP Solar and its dealers, are each paid a monthly fee to keep check on 100 SHS, with the incentive of a larger bonus at the end of the year if all their systems are working well.

To date 10,103 customers have signed up for SHS loans, and 8,007 systems are already installed, bringing their owners the benefits of safer, brighter lighting, phone-charging, radio, TV and fans. There is real potential for making solar PV mainstream in the rural areas of India, through the wider network of Gramin Banks.

## **The organisation**

The Aryavart Gramin Bank (AGB) was established by Government of India Notification F No. 1/4/2006-RRB dated 03-10-2006, as a result of the amalgamation of three smaller Regional Rural (Gramin) banks. It currently has 289 branches in rural areas of Uttar Pradesh, around Lucknow, and has plans to open 17 more. The Aryavart Gramin Bank Chairman, Mr NK Joshi, was committed to offer the benefits of solar electricity to his customers, and set up the ambitious programme of providing loans for solar home systems. In 2008 the bank held customer deposits of £285 million.

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## **Context**

Uttar Pradesh (UP) is one of the poorer states in India. For centuries, people have been subsistence farmers, growing rice, wheat, lentils and mustard seed. Some cash crops like sugar cane, potato and mentha are now also cultivated on large scale. Buffalos are reared for milk and meat. Over the years, the farms have become smaller as the land is divided between children.

Many rural areas of UP have no grid electricity, and even where the grid is available there are frequent power cuts. Some shops provide a battery-charging service, so that people can run d.c. lights and small appliances from car batteries. Photovoltaic (PV) solar-home-systems (SHS) can be very effective at providing power for lighting and small appliances. However in many parts of India, and other developing countries, the main obstacle for rural families who want to have an SHS is finance.

The former Prime Minister, the late Mrs Indira Gandhi, launched the social banking system in India. This aimed to provide banking facilities in rural areas, and to make small loans accessible to farmers and other rural people, by increasing the network of branches. The network of Regional Rural (Gramin) banks (RRBs), established from October 1975, is regulated by the Reserve Bank of India (RBI) and National Bank for Agriculture and Rural Development (NABARD). The RRBs were very effective at bringing services to rural customers, and currently

account for a quarter of bank branches in rural areas. However, their small size gradually became a barrier to efficient operation. From 2005 onwards the RBI and NABARD were tasked by the Indian Government to re-organise the RRB setup. Groups of two or more RRBs were amalgamated, creating 45 larger Gramin banks and another 43 stand alone RRBs which still operate in specific small geographical regions. As part of this streamlining, the Avadh Gramin Bank, Farrukhabad Gramin Bank and Barabanki Gramin Bank were amalgamated into the Aryavart Gramin Bank on 3 October 2006. The Aryavart Gramin Bank operates in six districts of UP around Lucknow, through 289 branches employing 1,445 people. It provides loans for agricultural activities, including cattle, machinery and inputs for cash crops.

The introduction of computers makes it easier for branches to meet the growing demand for services and increase productivity. Wireless communications which allow high-speed data transfer between branches and the head office can reduce operating costs. However, it is challenging to run a modern, computer-based bank in a place with unreliable mains power. In 2006 the Aryavart Gramin Bank decided to install photovoltaic (PV) systems at five of its branches, to provide back-up power during mains power cuts. The PV modules generate d.c electricity in sunlight, which is stored in rechargeable lead-acid batteries. When the mains fail, the batteries are used to run an inverter, which converts the d.c to a.c at mains voltage and frequency, to power essential loads like computers.

The bank was very impressed with the benefits it gained from a reliable supply of PV electricity. It also knew that many of its rural customers had no access to electricity at all, and through a pilot scheme in the former Avadh Gramin Bank, had seen the potential for supplying electricity through PV solar home systems (SHS). The Aryavart Gramin Bank therefore decided to initiate a major programme to provide loan finance for customers to purchase SHS.

<b>Statistical Information for India</b>	
Population (2005)	1134.4 million
Urban population	28.7%
GDP per capita US\$ (2005)	\$736
- at purchasing power parity	\$3452
Population living on less than \$1 a day (2005)	34.3%
Population living on less than \$2 a day (2005)	80.4%
Population with access to grid electricity (2005)	56%
Annual electricity consumption per person (2004)	618 kWh
Annual CO <sub>2</sub> emissions per person (2004)	1.2 t
Population undernourished (2002-2004)	20%
Population with access to an improved water supply (2004)	86%
Source: <i>UNDP</i>	

## **Technology and use**

Solar-home-systems (SHS) are small, stand-alone electrical systems. They consist of a PV module, which generates electricity from sunlight; a rechargeable battery, which stores electricity so that it can be used during both day and night; a charge controller, which prevents the battery from being over-charged or deep-discharged; fluorescent lamps; wiring and fixtures.

The Aryavart Gramin Bank programme provides two sizes of SHS. The more common Venus I package has a 35 Wp (TBP 1235) PV module; a 12 V, 40Ah tubular lead acid battery; two 9 W compact fluorescent lamps (CFLs) which include reflectors to enhance the light output; a charge controller (MCR 1210 L) and a mounting assembly for the module. This is larger than the basic systems offered by many NGOs in India, because it was thought that people would really benefit from the extra power. The larger Venus II package has a 70 Wp (TBP 1270) PV module; a 12 V 110Ah battery; four 9W CFLs; and the charge controller (CI 10) and mounting assembly. The PV modules are made from polycrystalline silicon and manufactured in Bangalore by Tata BP Solar. The batteries, charge controllers and CFLs are all produced in India by various manufacturers under contract to Tata BP Solar.

Both systems are specified to provide lighting for four hours per day with autonomy of three days (i.e. continue to supply power for two dull days after one sunny day) although in practice up to eight hours of light is often possible. The systems can also support a mobile phone charger, a DC fan and/or a black and white TV.

The systems are installed by the qualified mechanics of local dealers of Tata BP Solar, or by the business facilitators trained by the bank (see below), and the cost of installation is included in the system cost. Some PV modules are mounted in such a way that they can be moved indoors at night because of the fear of theft. The Bank is exploring the possibilities of insuring the PV module at nominal cost through a Public Sector Insurance Company. Local business facilitators engaged by the Aryavart Gramin Bank, assist the dealers with installations, and teach the new owners how to use the SHS. The facilitators also supply other dc appliances, like mobile phone chargers, TV or fans, and follow up installed systems to check for any problems.

The bank also has a programme to provide loans for solar water heaters, as well as larger PV power systems for businesses.

### **How users pay**

£1 = 79 Indian Rupees (IRs) [April 2008]

The Aryavart Gramin Bank negotiated a bulk supply deal with Tata BP Solar, so that it could make available a Venus I system for IRs 13,520 (£171) and a Venus II for IRs 27,040 (£342) including 4% VAT which has been levied by the UP State Government from January 2008.

The bank will supply SHS only to its own 'Kisan (farmer) Credit Card' (KCC) customers, who have already established a track record of reliable credit repayment. The KCC is a loan scheme for farmers offered by all the Banks in India. Under the scheme a loan limit is worked out for every farmer borrower for a period of three years, based on the area of the farm, the proportion used for different crops, and the independently-assessed cost and yields for each crop in the particular district. The farmer is then able to withdraw up to the loan limit at any time. The KCC scheme of the Aryavart Gramin Bank is currently used by 293,000 farmers.

The bank offers its KCC customers a finance package through which Venus I purchasers pay IRs 2,520 (£32) upfront and are provided with a loan of IRs 11,000 (£139) @12% interest p.a, which is repaid with monthly instalments of IRs 245 (£3.10) over five years. For the Venus II package the down payment is IRs 5,040 (£64) and the instalments are IRs 490 (£6.20) per month. Using this standard repayment scheme simplifies the bank's paperwork and reduces the cost of running the credit scheme. The repayments are deposited through the customer's

existing bank account, and the branch manager is responsible for keeping a check on payments. No subsidies are involved.

To promote the idea of the SHS, the Aryavart Gramin Bank branches hold 'credit camps' in villages. Speakers from the bank and solar industry demonstrate the SHS and explain how it works. They also explain the details of the finance package, and invite participants to sign the contract agreement for a SHS. Because the scheme is for existing customers, the bank can easily check credit history, so there are no time-consuming and costly credit checks. The aim is for 1,000 people to sign up at each camp, but demand is sometimes much greater. At a credit camp at Haidergarh village in February 2008, which the visiting Ashden judge attended, an impressive 1,621 people signed agreements.

The bank then organises the supply of the required number of SHS from Tata BP Solar to the local dealer, under the terms of the bulk supply agreement. When the systems are installed, the bank credits the dealer's account with the total cost. The dealer arranges for this to be transferred to the main Tata BP Solar account, and then collects commission for the number of systems installed. Both the Aryavart Gramin Bank and Tata BP Solar keep detailed records of all installations.

Solar loans are also offered to women's self-help groups. For example a group of three or four women may apply for a loan for a SHS so that they can develop a handicraft business.

### **Training, support and quality control**

Tata BP Solar manufactures all products to recognised international standards. This has always been required, since much of its production is exported. It is registered to ISO9001 (Quality Management Systems) and ISO14001 (Environmental Management Systems).

Tata BP Solar gives warranty on the PV modules for ten years. The batteries will last for about four to five years, provided that they are properly used, but overloading a battery will shorten its life.

PV systems still need checks and occasional maintenance, even if they are manufactured and installed to high standards. The Aryavart Gramin Bank has developed an innovative way of providing this continuing supervision, which also brings employment to rural areas. Branch Managers identify and engage young people with reasonable education in each village (mainly men) to become part-time 'business facilitators'. These facilitators are trained by the local Tata BP Solar dealer in system installation, maintenance and repair, and the company provides them with a basic tool kit and a mobile phone. Each facilitator is allocated 100 SHS customers, and helps the Tata BP Solar engineer to install their systems. The facilitator then trains the customer in the use of the system, answers any questions, and is available to solve basic problems. If any more serious problems arise, or spare parts are needed, then the facilitator can contact the local Tata BP Solar dealers.

The payment structure for facilitators is simple and cost-effective to operate, and provides a real incentive to keep systems maintained. Facilitators are each paid a fixed fee of IRs 500 (£6.30) per month for keeping check on 100 systems, with the incentive of a IRs 4,000 (£51) bonus at the end of the year if all their systems are working well. The total annual payment to the facilitator is less than 1% of the loan component of the 100 systems maintained, and is absorbed by the bank through the interest charged on the loan. A facilitator can earn a further IRs 100 (£1.30) for assisting a dealer with installing an SHS.

## **Benefits**

Each SHS serves a family of five people, on average. To date (April 2008) 10,103 customers have signed up for solar loans, and 8,007 families have already been supplied with SHS. This means that over 40,000 people are benefiting.

### **Direct benefits to families**

The Venus solar-home-systems provide power for at least four hours and sometimes as much as eight hours per night with three days autonomy.

Solar lighting enables school and college-going children to study for longer and in brighter light, without the fumes and fire-risk of kerosene. With a kerosene lamp, they would study for no longer than two hours in the evenings. With a SHS, pupils preparing for higher school examinations are now working for up to four hours in the evening and two hours in the morning. Group study sessions are organised in schools, and ten or twenty pupils do homework and examination preparation together in the school by solar light. This also avoids eye-strain from inadequate light. Improved lighting has made it easier for people to have more social interaction. Neighbours visit each other more often and enjoy watching TV together, especially cricket. People have started pooling solar lights with their neighbours when organising social functions like marriages to save on cost of hiring diesel generators.

Previously most people used kerosene lamps, and a household consumed on average eight litres/month of kerosene. At the subsidised rate of IRs 10 per litre, this costs IRs 80 (£1.00) per month. However, much of the subsidised kerosene is bought in the towns and re-sold at IRs 35 per litre in the rural areas, so most rural people actually pay about IRs 280 (£3.54) per month for kerosene. The monthly repayments on a 35 Wp system are about IRs 245 (£3.10) including interest, so most SHS owners are paying less than before, for far greater service.

### **Environmental benefits**

The replacement of kerosene reduces the emission of greenhouse gases. A typical household using eight litres/month of kerosene would have produced about 240 kg/year CO<sub>2</sub>. The total saving for the 8,007 systems installed up to the end of April 2008 is therefore about 1,900 tonnes/year CO<sub>2</sub>. The target of 25,000 systems by October 2008 will save about 6,000 tonnes/year CO<sub>2</sub>.

### **Economic and employment benefits**

Solar home systems have enabled people to work in the evenings and earn more, which is particularly useful to women. The main cottage industry in the area is fine embroidery (Chikan work), for which bright light is a real benefit. One family of nine female tailors and embroiderers has seen their earnings increase by about IRs 450 (£5.50) per month each, as a result of the PV lighting. PV power has also enabled small IT-based businesses to grow. For instance, a photographer who uses two SHS to run lights, computer, printers and photocopier has doubled his earnings, and also saves time from taking a battery to be charged each day.

48 part-time business facilitators are now working for the Aryavart Gramin Bank, each paid up to IRs 10,000 (£127) per year for checking that 100 systems are working properly. This is equivalent to about one quarter of the salary of a casual primary school teacher, so a reasonable rate for a very part-time job. Further income can be earned from helping with installations.

### **Potential for growth and replication**

In many parts of India, and other countries, the main obstacle for rural families who want to have an SHS is finance. Banks are cautious about providing personal loans to purchase SHS. In addition, solar dealers have to take out commercial loans to buy stock, and this restricts their rate of growth. Having a bank which actively promotes solar is therefore an enormous benefit. The Aryavart Gramin Bank is convinced of the benefits of SHS and is confident that loans will be repaid, because it has set the standards for systems quality and maintenance, and is lending to its own customers with an established credit history. By bulk-supplying stock and using existing dealers as installers, the bank has also saved the dealers from having to take out commercial loans.

The bank set an ambitious target to sign up at least 1,000 new loan customers per camp, and to reach at least 25,000 households by the festival of Diwali in October 2008. Each of the 289 bank branches has a target of at least 100 loans for SHS among its customers. The SHS are proving very popular, and demand is high. Credit camps sign up more customers than they targeted, and customers of other banks sometimes come in the hope that they might get an SHS loan. During the months of May and June 2008, four mega credit camps aiming to cover 3,000 – 4,000 beneficiaries per camp are being organised in Hardoi, Unnao and Barabanki districts. It is expected that at least 14,000 more loans will be sanctioned at these camps. 5,000 installations are scheduled for May 2008. The current limiting factor is the rate at which systems can be supplied and installed by Tata BP Solar and its dealers. Some production earmarked for other states was redirected for Aryavart Gramin Bank customers' use prior to April 2008.

The Aryavart Gramin Bank is also rolling out the use of PV-powered grid backup to 100 branches this year, with larger systems (1.32 kWp) than were used in the five-branch pilot programme. It has also started small finance programme for installation of solar water heaters.

The network of Regional Rural Banks across India was established to provide loans to rural customers, and has a significant amount of resources to provide finance. There is therefore real potential for making solar PV mainstream in rural areas, through this Gramin network. Mr Joshi, the Chairman of the Aryavart Gramin Bank, is promoting the benefits of the SHS loan scheme within the network, and seeking to persuade other Gramin banks to provide equipment and credit facilities for solar home systems. The scheme is also publicised widely, for instance through the bank diaries and calendars for 2008, and also through a specially-produced DVD entitled 'Festival of Sunshine'.

### **Management, finance and partnerships**

The SHS scheme was piloted by Mr NK Joshi in the former Avadh Gramin Bank in 2006. As Chairman of the amalgamated Aryavart Gramin Bank he was determined to bring more benefits of social banking to rural people. The SHS scheme seemed a good new programme to launch, given the success of the pilot SHS programme and also the positive experience of PV-powered mains backup systems within the bank, and a pilot programme of loans for SHS.

Mr Joshi grew up in a poor farming family, and therefore simplified the forms for farmers to apply for loans, which also speeded up the application process for the bank. Running credit camps to promote SHS and sign up customers has enabled the bank to reach large numbers of people, and also makes it easy to pass on bulk orders for 600 to 1,000 systems at a time. The use of local business facilitators is proving an effective way of managing a maintenance programme for a large number of dispersed systems in rural areas.

Mr Joshi acknowledges the support of his Sponsor Bank, the Bank of India for giving him an opportunity to implement such a dream project near the end of his career, and also the commitment of the Aryavartarians (Aryavart Gramin Bank staff) who have followed his vision. Tata BP-Solar has been a key partner.

This report is based on information provided to the Ashden Awards judges by the Aryavart Gramin Bank, and findings from a visit by one of the judging team to see its work in India.

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