ADB Knowledge Showcases

Affordable Pay-As-You-Go Solar Power for India's Energy-Poor Homes

Highlights

- India lacks access to energy more than any other country in the world. Energy-poor households, mostly located in rural areas, are forced to use hazardous and expensive sources of energy that pollute the environment.
- A new technology delivers off-grid and decentralized solar power to homes where people can pay for electricity in small increments using the mobile phone's short messaging service.
- The Asian Development Bank's $2 million equity investment into Simpa Networks is expected to provide over 63,000 rural households with access to electricity by 2015 while lessening carbon dioxide emission, health issues, expenses, and risks from using hazardous energy sources.

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ENERGY-POOR INDIA

South Asia is home to 41% of the world's energy-poor, with over 400 million people having no access to electricity.[1] Many of these people live in India, where 75 million rural households are not connected to the electrical power grid and another 80 million are underserved by electrical utilities.

These households pay roughly $9 or more every month for lighting and other energy needs, and 31% of them use kerosene as the only source of lighting. Energy-poor households in India spend over $2 billion annually on kerosene alone, of which $1.8 billion is spent by rural households.[2]

At a monthly expenditure of $9 for lighting and other energy needs, India's rural households spend half of their money to electrify their homes, the average monthly rural per capita consumer expenditure being $19.[3]

Along with kerosene, India's energy-poor also use charcoal, firewood, paraffin, candles, and disposable batteries. These are not only inefficient, hazardous, and expensive but also generate pollution and have serious health and environmental implications.

There was a need to electrify these scattered rural households using clean yet affordable energy, and to make that energy available to base-of-the-pyramid consumers using a decentralized and flexible payment system.

SOLAR POWER AT ONE'S FINGERTIPS

In January 2013, the Asian Development Bank (ADB) approved a new $2 million investment that will provide India's energy-poor households with solar energy on a pay-as-you-go basis.[4]

Simple yet Radical Technology. The technology to be used is simple—a solar home system (SHS) and a low-cost prepaid meter connected to cloud-based software.[5]

A Simpa solar home system is installed in a rural household in India.
Photo by Mike Barrow

An SHS consists of a module, a battery, a charge regulator, and compact light-emitting diode lamps. A metering device or controller will lock the energy flowing out of the battery connected to the SHS. The consumer can unlock the controller to the extent needed by purchasing energy credits through a simple recharge process using short messaging service on a mobile phone. The controller is a small electronic device with a keypad for inputting data, such as recharge codes, and has a simple liquid crystal display showing the energy credit balance available for use.

For this venture, ADB has partnered with the technology's proponent, Simpa Networks, or Simpa for short. ADB's $2 million equity investment in Simpa will allow the company to expand operations in India and raise capital from other private equity firms in the next 3 years. Through ADB's representation on Simpa's board, the company will benefit from ADB's knowledge in the energy sector as it scales up operations and develops further energy solutions which could be introduced to other countries.

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[1] ADB. 2011. *Energy for All: Asia's Night Skies Reveal Growth and Gaps in Electrification*. Manila. www.adb.org/publications/energy-all-asias-night-skies-reveal-growth-and-gaps-electrification?ref=sectors/energy/publications

[2] Thomas Pullenkav. 2012. *Desk Review of Market Potential for Solar Home Systems and Mini Grids in India: A Report for the Asian Development Bank*.

[3] The Economic Times. 2012. *60% of Rural India Lives on Less than Rs35 a Day*. http://articles.economictimes.indiatimes.com/2012-05-04/news/31559329_1_rural-areas-mpce-nsso-survey

[4] ADB. 2012. *Project Data Sheet: Project 46931-014, Off Grid Pay-As-You-Go Solar Power*. Manila. www.adb.org/projects/46931-014/details

[5] Cloud computing is the use of hardware and software to deliver a service over the internet.

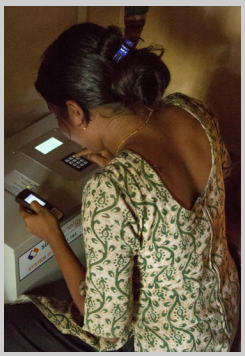
The transaction was completed quickly—it only took 6 months from initial contact to due diligence and finally to the investment itself.

Equity investments are not uncommon in ADB. This investment is different, though, in that it marks the first time that ADB has ventured into small-scale equity investments. Yet, despite its small scale, the development impact of the transaction is potentially higher than some of the bank's bigger investments. ADB hopes that this move would attract more venture capital funding to similar business models providing goods and services to those at the base of the economic pyramid.

Pay-As-You-Go Scheme. A quality SHS sells for $200–$400 and typically includes a solar panel, battery, charge controller, three or four lighting points, a mobile phone charging port, and power for charging or powering small direct current devices. This is admittedly an expensive outright purchase for most people in rural India, but Simpa's payment system allows consumers to purchase the SHS on an installment basis.

Simpa's customers make an initial downpayment of 10%–30% for the SHS, after which the system is installed on the customer's premises, typically on the roof of the house. Using a mobile phone's short messaging service, the customer chooses how much energy credit to purchase, which can be as low as $0.88 or 50 rupees. A portion of this payment goes toward repayment of the capital cost of the SHS, while the rest goes to Simpa as profit and to cover operational costs. The higher the recharge amount, the higher the proportion of the amount allocated for repayment of the capital cost of the SHS. Once fully paid (typically after 2–3 years), the system unlocks permanently and continues to produce electricity for free, and the consumer gets to own the SHS outright.

Utilizing the Mobile System. The scattered nature of off-grid rural customers in India makes the use of the mobile phone key to the reloading and micropayment for the service. India has a well-developed telecommunications network with more than 906.6 million mobile phone subscriptions and 14 mobile network operators as of December 2012.[6]



A customer recharges her solar home system using a mobile phone (right photo).
Photo by Mike Barrow

BRIGHT FUTURE

The future of Simpa's pay-as-you-go solar energy offering is sunny. By 2014, Simpa aims to have sold 20,000 SHSs.[7]

Other Indian markets being targeted by virtue of their high number of rural households with no electricity are Maharashtra (3.4 million unelectrified households, $6 monthly average expenditure on lighting) and Uttar Pradesh (19.4 million unelectrified, $5 monthly lighting expenditure). Simpa's operations are also targeted for expansion in the states of Andhra Pradesh, Kerala, Gujarat, Madhya Pradesh, and West Bengal by 31 December 2014.

By 2015, Simpa intends to reach over 63,000 rural households and small and medium-sized enterprisess in India with clean, reliable electricity.

Related Links

- PDS: Project 46931-014: Off Grid Pay-As-You-Go Solar Power
  www.adb.org/projects/46931-014/details
- RRP: Proposed Equity Investment: Simpa Networks
  www.adb.org/projects/documents/proposed-equity-investment-simpa-networks-grid-pay-you-go-solar-power-project

[6] Data from Informa WCIS. http://mobithinking.com/blog/100-million-club

[7] Source: Simpa Networks.

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