



CASE STUDY – Bangladesh

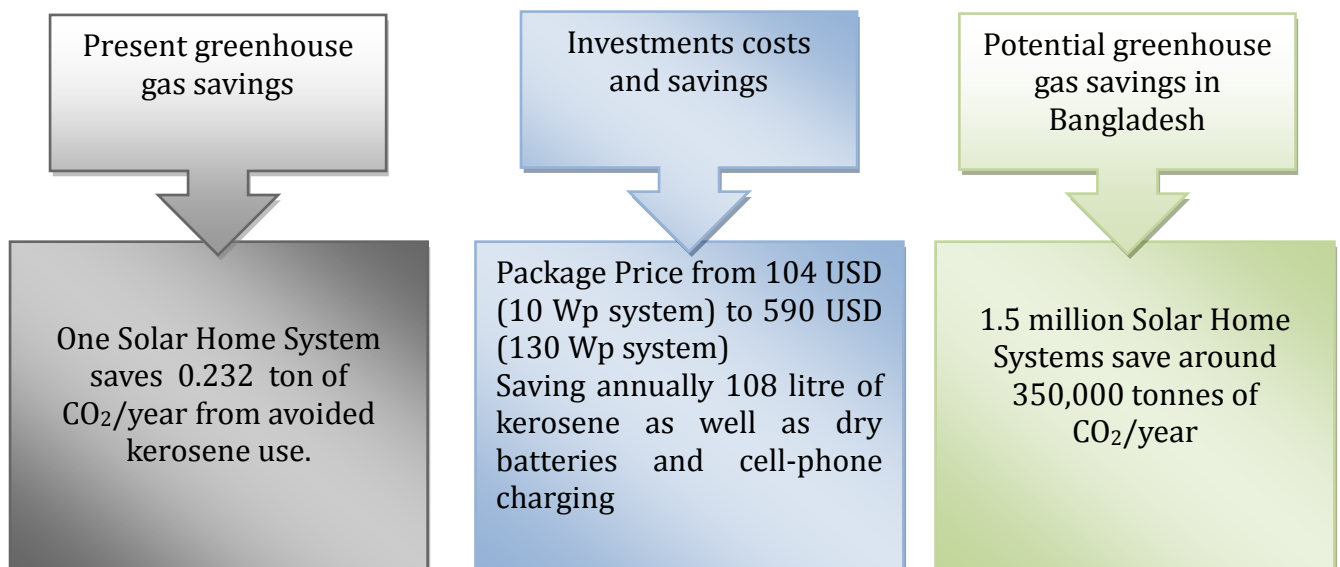
Solar Home Systems with Micro Credits

By Mr. Abser Kamal, Dr. M Shahidul Islam, Mr. Mohammad Mahmudul Hasan, Grameen Shakti

Summary

Grameen Shakti is one of the leading social enterprises in the world. This organization has taken renewable energy solutions to the rural areas of Bangladesh. It has achieved a milestone by improving the rural livelihood through access to green energy. Grameen Shakti has developed successful market-based programs. It has social objectives for popularizing Solar Home Systems (SHSs), biogas plants, and Improved Cooking Stoves (ICSs) to benefit millions of rural people. Grameen Shakti works in all 64 districts of Bangladesh. Its three main programs are Solar Home System, Biogas Program, and Improved Cooking Stove.

More than 1.5 million Solar Home Systems (SHSs) have been installed through a micro-credit system provided by Grameen Shakti in Bangladesh. Around 10 million people are getting benefits from these systems, and over 350,000 tonnes of CO₂ are saved each year. Grameen Shakti also has significant achievements in Improved Cooking Stoves (ICSs) and in biogas production from organic-waste-based plants. However, this case study focuses on the Solar Home Systems (SHSs) installed by Grameen Shakti, a national focal point of INFORSE.



Description, Development and Background Situation

Background Situation

Bangladesh, with 150 million people, and 147,570 km² territory, is one of the most densely populated countries in the world. The Gross National Income is 1010 USD per capita (2013), which is one of the lowest in the world.

Bangladesh is particularly vulnerable to flooding during monsoon periods, as two thirds of the territory is only 5 metres above sea level. Global warming raises sea levels and the frequency of cyclones, which makes the country even more vulnerable.

Over 60% of total households are located in rural areas, where many houses are still not connected to the electric grid. About 60% of the population is now connected to the grid, and Bangladesh is dependent on fossil fuels, especially natural gas, for its electricity generation. Still, 40% of the total population have no access to grid-connected electricity. Consequently, the Government of Bangladesh set a target for generating 5% of its electricity from renewable energy sources by 2015 as well as 10% by 2020.

Grameen Shakti was established as a not-for-profit organization in 1996 by Nobel Laureate Prof. Muhammad Yunus to bring renewable energy services to such households by providing them with renewable energy technologies (Solar Home Systems for electricity, Improved Cooking Stoves and biogas for cooking) at affordable costs on a rural level.

Rural Electrifications with Solar PV System

Rural electrification through solar PV technology is becoming more popular day by day in Bangladesh. Solar Home Systems (SHSs) are highly decentralized and are particularly suitable for remote, inaccessible areas. Under the “Rural Electrification Program” of the Government of Bangladesh, about 3 million Solar Home Systems have been installed in last 16 years. Of these 3 million, around 1.5 million were installed by Grameen Shakti since 1996. Grameen Shakti focuses on off-grid rural areas in this, one of its most successful programs. Currently, Grameen Shakti is one of the largest and fastest-growing rural-based renewable-energy companies in the world. Grameen Shakti is also promoting Small Solar Home System to reach low-income rural households.

Solar Home System can be used to light up homes, shops, fishing boats, etc. It can also be used to charge cellular phones as well as to run televisions, radios, and cassette players. Solar Home Systems have become increasingly popular among users because they present an attractive alternative to conventional electricity. Advantages include that there are no monthly bills, no fuel cost, very low repair and maintenance costs, easy of installation anywhere, etc.

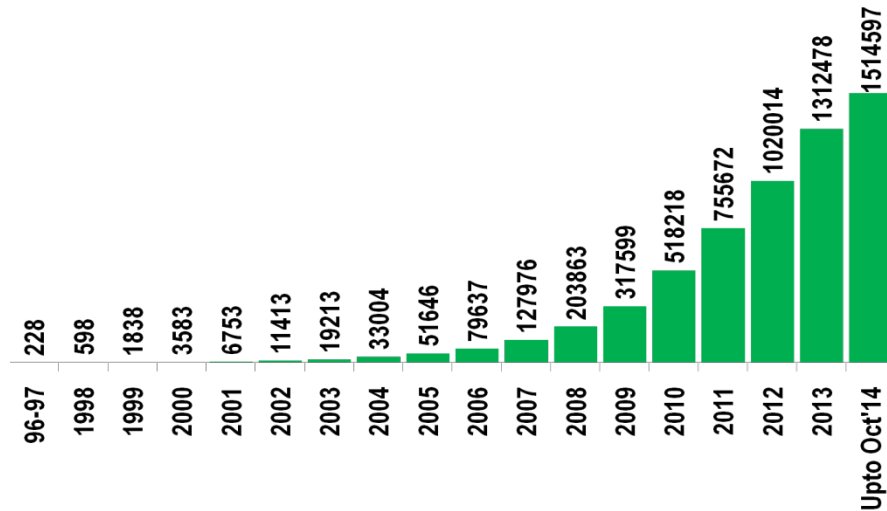
Solar Home Systems (SHSs) installed by Grameen Shakti have had a positive impact on the rural people. Grameen Shakti has introduced a micro-utility model in order to reach the poorer people who cannot afford a SHS individually. Making it possible to charge mobile phones with SHSs provides new access to more reliable telecommunication in off-grid areas.

Market Development

After starting its journey in 1996, Grameen Shakti focused on a door-to-door product campaign. Other significant components in market development and capacity-building were demonstrations held in village markets, school campaigns, and sharing information in village gatherings, especially among housewives in rural areas. Grameen Shakti continues these activities on a regular basis. Collection of monthly installments from customers’ houses and free checkups during service periods build trust between Grameen Shakti and customers. Satisfied customers are promoters of Grameen Shakti’s products to others.

Grameen Shakti now installs more than 25,000 Solar Home Systems (SHSs) each month. The milestone of 1 million SHSs installed was reached in November of 2012 and the next 1 million SHSs are expected to have been installed by 2015.

The following graph shows the number of Solar Home Systems (SHSs) installations (cumulative) since 1996.



Micro Credit Scheme

Grameen Shakti has structured its ownership-based financial mechanism in such a way that wide ranges of customers can afford a Solar Home System.

- A 6% discount is available on the price in case of cash purchase.
- On credit-based purchases of a Solar Home System, the user has to pay 15% of the total price as a down payment. The remaining 85% of the total cost is to be paid within 12/24/36 months with 12% (flat rate) service charges.

After Sale Services

- A free monthly checkup of the system during payment of installments.
- Post-warranty service through annual maintenance contract for Solar Home Systems, with an annual fee of USD 4.
- Inclusive warranty system for solar panel, charge controller, battery, and LED light.
- A buy-back system is available under which a buyer may return his/her solar system to Grameen Shakti when his/her area gets connected to the grid. However, the buy-back system is not applicable after 5 years.
- Regular training sessions for users so that they can take care of their systems.

Effects on Poverty Reduction, Employment, Obstacles, Dissemination

Grameen Shakti has a vast network of over 1,500 local branches that are easily accessible to customers throughout Bangladesh. Most of the staff of over 12,000 are competent in the Solar Home System technology. In addition, 150 women engineers work in 36 Grameen Technology Centres, where they perform electronic repairs and maintenance of Solar Home Systems. More than 3,000 women from disadvantaged groups have received training free of charge from Grameen Technology Centres; some of them have become independent entrepreneurs.

Effects on Greenhouse-Gas Emissions (Fossil Fuel)

Socio-Economic impact:

The Solar Home System costs 104 USD (10 Wp system) to 590 USD (130 Wp system) and the savings is 100 USD (only kerosene of 108 litres annually).

The pay-back time is around 2.5-3 years.

Environment impacts:

For the savings, each household saves around 108 litres of kerosene that produces 0.232 ton of CO₂ annually.

Installing 1.5 million Solar Home Systems save 164 million litres kerosene and thus saving 350,000 tonnes CO₂.

Around 10 million people benefit from 1.5 million Solar Home Systems (SHSs).

The total number of SHSs installed by Grameen Shakti save 164 million litres kerosene and its costs, which is around 146 million USD.

As Bangladesh is dependent on imported kerosene fuel, this huge volume of saved kerosene contributes a lot in the country's economy. In addition, around an annual 350,000 tonnes of CO₂ emissions are prevented by use of these installed SHSs.

The Solar Home System Program of Grameen Shakti has been registered with the Clean Development Mechanism (CDM) program under UNFCCC in June 2012, and the latest monitoring report is available for 2013-14 period.

More information on the CDM registration can be obtained from the following web link:

http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/ZSI6WP0ODGRQ8UYKXB3MHTL957JVAE/view

Potential for Scale-Up and Replication

It is very important to remember that, in Bangladesh, 40% of the people do not have access to grid electricity yet. In addition, the Government of Bangladesh has determined a target of 5% electricity generation by 2015 and 10% by 2020 from renewable energy sources. The micro-credit system is replicable in other countries, especially in South Asia, Africa, and South America. Several African countries are now focusing on ownership-based dissemination of Solar Home Systems. They frequently visit Bangladesh to learn about the rural electrification program in Bangladesh.

Investments costs 104 USD (10 Wp system) to 590 USD (130 Wp system)

Savings	-- Annually 108 litres of kerosene for each household as well as dry batteries and cell-phone charging, - 100 USD (only kerosene price for 108 litre with 0.90 USD/litre kerosene)
Resources needed for large-scale dissemination	- Expanded supply network of quality PV panel, charge controller, battery and LED lamps. - Expanded micro-loan facility. - Nation-wide repair and maintenance facilities. - Government certification to control import of good quality of product, and laboratory to control the quality. - Government can support private sector with innovated business model for more expansion.

Case: Solar-Powered Grocery Shop in Off-grid Singair Area of Manikganj District, Bangladesh

*Has anyone ever heard that a Solar Home System may be an **income generator** for a family? Yes!* The answer is that it can, as demonstrated by the surprising and inspiring experience shared by Mr. Md. Nurul Islam when he told his story in June, 2014.

Nurul Islam lives in an off-grid village area called North Bokchar at Singair of Manikganj District, Bangladesh. Like others in his village, Nurul leads a very simple life with his family. This 28-year-old resident has been running his grocery shop since 1998. His father died when Nurul was younger.

Nurul keeps the shop open until 10:30 PM every day. Apart from selling of grocery items, he also has an arrangement providing tea-stall facilities. Next to his grocery shop, he has started to run a poultry shed with 100-150 birds. Nurul formerly used kerosene to run a kupa and a lantern. He purchased 6 litres of kerosene every month to light his shop in the evenings and at night.

In 2010, Nurul installed a Solar Home System of 65 Wp for his shop. With this, he can run (in rotation) 5 LED lights, 1 television with DVD player, and a mobile charger. He owns the system, which was purchased on credit from Grameen Shakti. He paid the money in 36 monthly installments. From this solar home system, in addition to lighting his shop, Nurul also gets enough power to light the poultry shed for security purposes. In addition, sales in Nurul's grocery shop as well from his tea stall increase when he switches on a colored television to display daily drama serials, Bangla and Hindi films, jokes and musical programs. Village customers watch these programs in the shop and enjoy tea with cookies. Nurul's innovative idea keeping a color television running with solar power has also lifted up other grocery shops in the small village. Nurul feels happiness when he observes several installed solar panels on other shops' roofs.

Nurul also installed a 20-Wp Solar Home System for his house in 2012, purchased on credit from Grameen Shakti. With this system, Nurul can switch on 4 LED lights for all the rooms. His children can study until 10:00 PM, and other members of the family can perform their different types of tasks smoothly under solar-powered lights. It is very interesting to hear that Nurul has purchased a three-wheeled taxi with profit that he has generated from his solar-lighted shop and poultry shed.

With a happy smile, Nurul closes his story with *“Grameen Shakti Solar Home System is the ‘Income Generator’ of my family, you believe it or not”*. We believe it!.



Photos: Nurul Islam, owner of solar powered grocery shop.

- Solar panel on roof of the shop
- Solar charger as part of the system
- Television run by solar
- Usage of solar light at poultry shed