

## **Strategy for Promotions and Development of Renewable Technologies in Bangladesh: Experience from Grameen Shakti**

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### **Abstract:**

This paper discusses experiences from the renewable energy program of Grameen Shakti, which is aimed at increasing energy efficiencies to rural areas. Grameen Shakti has already passed two and half years in the renewable energy sector in Bangladesh. Within this short period Grameen Shakti gathered a lot of experience in marketing the solar home system.

### **Introduction:**

Electricity is considered to be one of the essential inputs for improved quality of life. As a matter of fact, the per capita consumption of electricity is taken as an indicator of a country, a state or a community. Bangladesh is a country with one of the lowest per capita GDP (US\$ 236 in 1994/95) and faces formidable development problem.

Rural Bangladesh is deprived of electricity. Only 15% population is getting grid electricity in Bangladesh. There is no possibility of connecting all the homes of remote villages and isolated areas, business centers and other establishments, to grid system in the near future. Power system in Bangladesh almost entirely depends upon fossil fuels, which are depleting fast. At this stage electrification by solar photovoltaics has emerged as a viable technical option for meeting lighting and other small energy needs of the millions of people living in isolated background areas of Bangladesh. In this context, it would be great benefit for the rural people to adopt the renewable energy to bridge the gap of energy need of the 85% people with clean, safe and environment friendly energy without depleting our precious natural gas reserve resources. Renewable energy can also bring considerable improvement in rural life through income generation and thus alleviating poverty. In addition, it can bring multiple positive results in terms of women's welfare, children's education, employment and income generation.

### **Why is Grameen Shakti Interested in Rural Electrification**

Since rural Bangladesh is deprived of electricity, children's education, businesses and trade, agricultural productions are interrupted due to shortage of power. There is no possibility of connecting all the homes of remote villages and isolated areas, business centres and other establishments, to grid system in the near future. Power system in Bangladesh almost entirely depends upon fossil fuels, which are depleting fast. This obstacle of non-electrification prevents rural people from earning to their full potential. By having electricity households and micro-enterprises can enormously benefit through:

- extending working hours,
- extending selling & shopping hours in the rural areas,
- increasing income from women-led micro-enterprises include basket making, electronics repair, carpentry workshops, tailoring, stores, fish net weaving, and many other activities,
- growing the local technical retailers include local expertise in selling, maintaining, and repairing,

- helping to become productive households,
- extension of housing plan,
- facilitates children's education, women's welfare, recreational activities, income generation of the rural households,
- Extending education, health benefits to end the cycle of poverty.

In the above background a company named “**Grameen Shakti**” (GS) came into existence in June 1996 as a renewable energy company.

### **Programs of Grameen Shakti:**

Grameen Shakti is a specialised and leading organisation in renewable energy sector in Bangladesh. It is currently implementing projects in renewable technologies:

1. PV Program
2. Wind Program
3. Bio-gas Program
4. Research & Dissemination Program
5. Training Program

#### **PV Program:**

GS has already installed 578 Solar Home Systems up to December 1998 with installed capacity of 26 kWp. Grameen Shakti has 19 branch offices in rural Bangladesh. This network allows Shakti to quickly disseminate and commercialize any improvement in the technology. It also plans to open some special branches through which Shakti will research on marketing policy. Since the systems are expensive for the rural people Grameen Shakti has introduced a soft financing process.

#### **Wind Program:**

Grameen Shakti is conducting research to utilize wind energy in the coastal areas of Bangladesh. It has taken program to install 4 hybrid power stations (combination of wind turbine, diesel generator and solar modules) in four cyclone shelters of Grameen Bank. The objective is to provide electricity to Grameen members to start micro-enterprises in these shelters. The present phase of the program will allow Shakti to gather financial and technological information for possible future expansion in the other places.

#### **Bio-mass Program of GS:**

Cow dung is widely used as fertilizer and cooking fuel. But the fire and smoke from cow dung create health hazards. Besides indiscriminate cutting of trees for firewood has created environmental problems. Grameen Shakti is promoting bio-digester to produce biogas for cooking and to use residues in the field or in the ponds as an alternative to chemical fertilizer. Thus bio-digester reduces expenditure for firewood and enhances income of households from increased production of crops and fish.

#### **Bio-mass Gasification:**

Grameen bank has installed a gasifier (10 kW) in one of the northern district of Bangladesh. Grameen Shakti has taken over the management of the plant. Shakti plans to conduct research on the economics as well as technological aspects (performance etc.) of the plant in real life setting. GS is plan to supply 125 nos. of customer most of them are in rural bazaars and households.

### **Training Program of GS:**

GS gives training to the technician on PV installation and maintenance in order to create employment for the local people. It has several dimensions: transferring of technologies and developing skilled technician-cum retailer in the rural areas who will be able to provide after sale services to SHS buyers, provide the accessories and retail SHS as well; educating the rural people in renewable energy and popularizing the use of renewable energy. Grameen Shakti already trained 200 Technician under its PV program. GS also trains the users in application and maintenance of PV system.

### **Research and Development Program of GS:**

Research Program: The research programs have four distinct areas:

- (i) exploring ways to develop appropriate technologies and their uses,
- (ii) developing ways to popularize and making the renewable energy systems that will be easily accessible to large number of households and institutions,
- (iii) innovating financial services for the customers to facilitate rapid expansion of use of renewable energies,
- (iv) developing and fabricating the solar accessories (charge controller, lamps, dc to dc converters etc.) locally in order to reduce the total system cost.

Under this program Grameen Shakti is trying to develop the quality of the system as well as reduce the cost of the system.

### **Strategy of Grameen Shakti in Marketing Solar Home System:**

Since solar photovoltaic system is very new technology in Bangladesh Grameen Shakti is taken the following steps to popularizing the systems:

1. GS introduced a soft financing process so that people can easily buy it. The procedures are as follows:

- ❖ A PV system buyer pays 25% of the system cost as down payment
- ❖ The remaining 75% can be paid within 2 years time in equal monthly installments with 8% service charge on the outstanding amount.
- ❖ In case of cash purchasing GS provides 3% discount.

Grameen Bank members can get financing from the Bank where the payments are made in weekly installments instead of monthly installments.

2. To popularize the technology GS arranged demonstration meeting in the rural market places or in a school/college where the engineers of GS describe the technology, its uses and preference. Within its awareness program GS make poster, leaflet, brochure, video etc. so that people can easily understand the process.

3. GS also trying to introduce small system for the rural shop by which the rural market can be electrified and they can sales at night.

4. In future Grameen Shakti is going to introduce 4-5 years loan for the poor rural people so that they can easily buy a system.

### **Challenges yet to be meet:**

Grameen Shakti has to meet the following challenges in marketing solar home system in rural areas.

1. High cost of the system: Since the solar system is costly, it is beyond the purchasing capacity of the poor rural people. So the system is not affordable to the poorer customer.
2. Threatened by Palli Biddut Samity of Rural Electrification Board: Rural electrification Board of Bangladesh Government usually provides grid electricity through their field offices called Palli Biddut Samity. Government provides subsidies in grid electricity sector. Since installation of distribution line in the village area is not economically feasible, they are not interested to provide the electricity in all areas of the country. However, the expansion plan (which is not implemented in future) obstructs the solar program of GS.
3. Threatened by Natural Disaster: Every year flood causes tremendous disaster in Bangladesh. Rural people are affected by the flood. Their crop fields are goes under water. Since Bangladesh is a land of cultivation, most of the people are living by cultivating their land. So after flood they losses everything. To improve this condition they have to wait for another season. The solar project of Grameen Shakti is affected by flood'98.
4. Awareness: Since solar system is a new technology most of the people does not know about it. They are anxious about the durability of the system. Also the time constraint (4 hours per day) is another factor to popularizing the system.

### **Income Generating Activities through Photovoltaics:**

Grameen Shakti encourages entrepreneurs to apply PV systems for generation of income. Few examples of application of PV systems for income generation are cited below:

- ô One customer of Grameen Shakti is using PV system for heating soldering iron for repairing radio, TV etc.
- ô One carpenter extended his working hours after the sunset using solar system by enabling him earn more than before.
- ô One saw mill owner has extended his working hours as well by installing solar system.
- ô Another buyer has installed a system in the rural market and he is selling power to the shop owners who buy power to light their shops. It is an example of micro utility company.
- ô By operating solar powered computer, some institutions in the remote area have improved their working ability.

Few case studies of photovoltaic applications are being cited here.

### **Case –1**

Mr. Hanif is a saw mill owner. The mill is located in the rural area named Dhalapara and is operated by diesel. The villagers bring their timbers to the sawmill for sizing. Before using the solar system the mill owner failed to deliver the timbers in right time. But by working at night with the help of solar light, the working capacity of the mill has increased and the villagers are getting their timbers delivered at right time, which has increased the number of customers.

Type of use	: For lighting a diesel operated saw mill.
System description	: One 17W solar module, Two 7W fluorescent lamp
Total system cost	: US\$ 270

Daily hours of use : 4 hours

Impact of solar system :

**Direct impact**

- Extending working hour (4 hours/day)
- 20 US\$ extra income per day (100 cft/day @0.20US\$/cft)
- Better quality of work
- Better working environment

**Indirect impact**

- Increasing income of the workers
- Increasing employment opportunity
- Increasing social status

**Case-2**

Mr. Manik, husband of a Grameen Bank member operates a repairing shop of the electronic/electrical appliances. The main obstacle of his business before using the solar system was, heating up the soldering iron. Now by the help of solar system he is using the DC soldering iron operated by solar power to test the appliances and using solar light for his shop that enables him to work even at night.

Type of use : Using solar power for repairing the electronic appliances (e.g. TV, radio, cassette, emergency light etc.) in an electronic repairing shop.

System description : One 34W solar module, Two 7W fluorescent lamp  
One outlet for powering TV, radio,DC soldering iron

Total system cost : US\$ 354

Daily hours of use : 4 hours/day (for lamps) & 6 hours (for iron)

Impact of solar system :

**Direct impact**

- Increasing income by efficient repairing of by electrical iron.
- Extending working hour at night
- 2.5 US\$ more income per day than before
- Increased efficiency of work
- Better working environment

**Indirect impact**

- Increasing income of the workers appliances
- The villagers feel easy to use entertaining appliances
- Increasing the standard of living of the villagers

**Case-3**

Mr. Umor has a grocery shop at of kormel bazar. He has bought a solar system with six lamps. He uses one lamp for his shop and has rented other five lamps to the nearby shops. He collects the rent @2.5 US\$ per lamp per month from those shops. Not only Mr. Umor getting more money with the help of this system but also the other users are selling more at the night. This is an example of micro-utility model.

Type of use : Earning by selling solar power to the shopkeepers.

System description : One 50W solar module, Six 7W fluorescent lamp

Total system cost : US\$ 520

Daily hours of use : 4 hours

**Impact of solar system :**

**Direct impact**

- Running a business by providing solar lights to the shopkeepers on rental basis.
- 12.50 US\$ income per month (@2.5US\$ /lamp per month)
- Explored an additional way of income
- Earning more from his shop by attracting more customers at night by brighter light.

**Indirect impact**

- The income of the other shopkeepers has also increased due to the use of solar light.
- The customers are feeling easy to market at night.
- Making easy the living status of the villagers.
- Increasing social status

**Case-4**

Use of solar system has given Mr. Shah Alam a new dimension of business. He has taken a cellular phone connection to his shop by which he provides telephone service to the customer in a rural area named Nabinagar where no other telephone facility exists. The villagers have got a tremendous communication network with all over the world by the phone service operated by solar system.

Type of use : Operating cellular phone powered by solar system.

System description : One 50W solar module ,Two 6W fluorescent lamp  
One socket for charging cellular phones battery.

Total system cost : US\$ 450

Daily hours of use : 4 hours (for lamp) & 8 hours (for phone)

Impact of solar system :

**Direct impact**

- Running a business by private telephone service.
- 30.00 US\$ income per day [30 calls/day @1.00US\$(average)/Call]
- Better quality of work -
- Better working environment

**Indirect impact**

- Established a good network between the rural and the urban areas.
- Villagers are happy to getting the way to communicate with their relatives living abroad.
- Increasing the business position of the locality by the communication system.

**Impact of Photovoltaic on Women:**

Electrification by solar systems have directed the housewives to some income generating activities (e.g basket making at night, net weaving, tailoring etc). The solar light has eliminated the health hazard kerosene lamp thus providing a better environment. Women need not to bother for lighting up their houses at every night. It is also helping in improvement of the children's education. The bright lights have ensured the women's security. The areas where the wind turbines will be installed will be developed as a micro-enterprize zone. The targeted options of this micro -enterprize are electric sewing machine, ice-making, rice-husking etc, where women will be encouraged to participate.

**Conclusion:**

Solar photovoltaic systems are most suitable for electrification of isolated remote areas in developing countries like Bangladesh. But people living in such backward area can hardly meet the high cost of solar PV system due the poverty. By introducing a soft loan procedure Grameen Shakti is creating a small market for Solar Home System. Now by using solar electricity, the rural people who are involved in business and other activities are getting a lot of help. Having access to electricity they can work at night and can earn extra money. Electricity has improved children's education as well as the social status of the villagers. Grameen Shakti's effort helps rural people to achieve better quality of life.