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# Current Financial Schemes of Solar Home System Projects in Bangladesh and Users' Opinion

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**Abstract** - In this study, a baseline survey was carried out to clarify current situation of renewable energy in Bangladesh. All the information has been collected by inventory survey for 120 Solar Home System (SHS) users and private sectors including NGOs which are working on PV or Biogas. 14 villages of 6 districts (Pabna, Natore, Bogra, Sirajgonj, Barisal & Jhalkathi) have been covered through-out the whole study. Financial support of this survey has been provided by Nippon Koei, Japan & JICA (Japan International Co-operation Agency) provided all kinds of technical support. The study represents a real time reflection of the general people opinion on the payment scheme of PV systems provided to them.

**Keywords**-Rural Electrification Board (REB), Solar Home System (SHS),Grameen Shakti (GS), Non-Government Organization (NGO), Infrastructure Development Company Limited (IDCOL), Japan International Co-operation Agency (JICA), Fee for Service, Micro-Credit

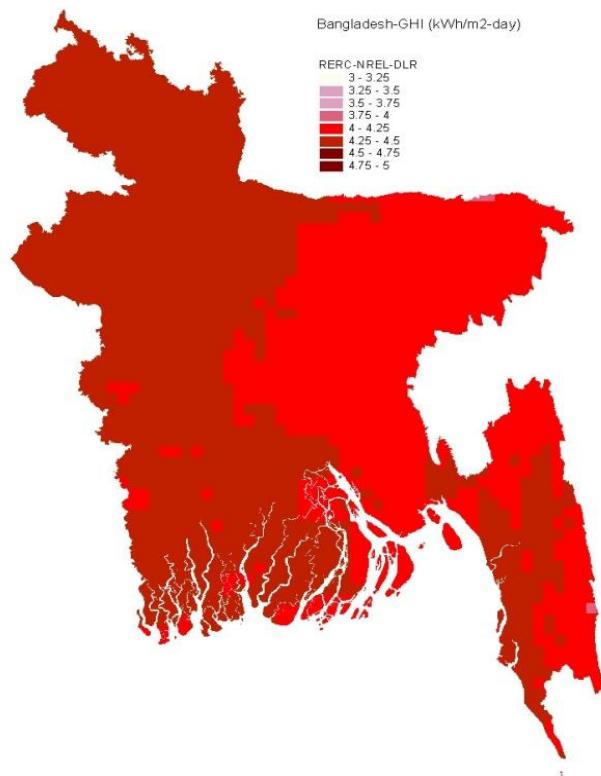
## I. INTRODUCTION

Greates amount of solar energy is available in two broad bands [1] encircling the earth between 15° and 35° latitude north and south. The next best position is the equatorial belt between 15° N and 15° S latitude. Most of the developing countries, being situated [2] in these regions, are in a favorable position in respect of solar energy. Bangladesh is situated between 20.34° and 26.38° latitude north [3] and as such has a good solar energy potential. The location is suitable for use of solar energy for power generation. Average daily solar irradiation [4] at flat surface is around 4.0 to 6.5 kWh/m<sup>2</sup> in Bangladesh. Monthly average of solar irradiation is highest at March and April and lowest at December and January. Figure-1 shows solar irradiation map [5] which has been prepared by SWERA (Solar and Wind Energy Resource Assessment) project financed by UNEP / GEF.

## II. BACKGROUND

In 1988, Bangladesh Atomic Energy Commission (BAEC) installed several pilot PV systems. The first significant PV-based rural electrification program was financially supported by France. Three Battery Charging Stations (BCS) with a total capacity of 29.4 kWp and a number of standalone solar home systems (SHS) with a total capacity of 32.5 kWp were installed. Rural Electrification Board (REB) owned the systems and the users paid a monthly fee for the services. REB has installed around

13,000 SHSs under UNDP/GEF project which was implemented during 2002 to 2008. Since 1996, SHSs have been disseminating rapidly, due to the efforts of mainly Grameen Shakti (GS), which sells PV systems on micro credit to rural households through its extensive network. PV modules are imported while there are private companies which manufacturing PV accessories. As indigenous industry, local manufactures of PV components are well established.



## III. PRESENT SCENARIO

Infrastructure Development Company Limited (IDCOL) is a semi-governmental organization which was established in May 1997 [6] by the Government of Bangladesh. The company was licensed by Bangladesh Bank as a non-bank financial institution in January 1998. Under IDCOL's project, largest number of SHS are installed in Bangladesh. IDCOL plans to install 1,000,000 SHS [7] at rural households by 2012. IDCOL has installed around 284,000 of SHSs until March 2009. Table-1 indicates division-wise installation of SHS by Participating Organizations of IDCOL.

<b>Division</b>	<b>Number of SHSs Installed</b>
Barisal	40,251
Chittagong	59,496
Dhaka	62,756
Khulna	46,664
Rajshahi	40,293
Sylhet	34,012
<b>Total</b>	<b>284,102</b>

Table 1: Division-wise installation of SHS by POs of IDCOL (March, 2009)

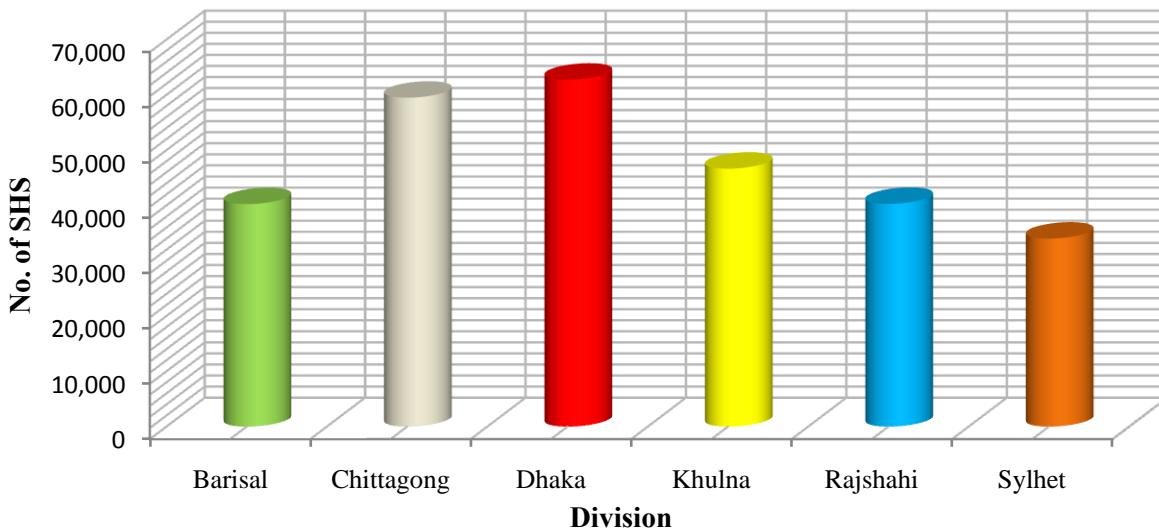


Fig. 2. Division-wise distribution of SHS installed by IDCOL

#### IV. FINANCIAL MODELS

There are two types of payment schemes for using SHS. First model is known as Fee for Service and this project is being carried on by Rural Electrification Board (REB). The other scheme is known as Micro-Credit System [8] which is handled totally by NGOs. Grameen Shakti (GS) is the most leading NGO which was initiated in 1996 by the co-builder of Grameen Bank. More than 220,000 of SHS have been installed by GS at the end of March in 2009.

#### V. MICRO-CREDIT SYSTEM

Several types of SHSs package and credit schemes are available in GS projects. Table-2 shows price list of SHS packages in GS project. Therefore, it is easier for customer to select appropriate SHS based on their income level and demand of electricity. The capacity of the smallest system is 10 Wp and the load is a 5 W lamp with two LEDs. The capacity of the largest system is 130Wp and the load is

11numbers of 6W lamp and one black and white TV with 17 to 20"Under GS projects, SHS have been installed around in 40,000 villages and it covers all of 64 districts in the country. There are three payment schemes as shown in table-3. Most common system for users is 50Wp system and the load is 4 of 6W lamp and one of black and white TV.

#### VI. FEE FOR SERVICE

Around 13,000 SHSs which have been installed by REB follow this Fee for Service scheme. In this service, the PV system remains under the ownership of REB and customers have to pay monthly bill to REB. Though the initial cost of membership is same for all packages but monthly bill varies according to system capacity. REB provides four different packages to the customers and their monthly billing information has been visualized in Table-4.

	Capacity (Wp)	Load	Instruments	Cost (1USD=Tk.68)
1	130	6W lamp x 11, 17"-20" B/W TV	Battery: 100Ah×2 Charge controller: 15A Others: switch, cable, installation etc.	Tk. 68,000 (USD 1000)
2	120	6W lamp x 10, 17"-20" B/W TV	Battery: 100Ah×2 Charge controller: 15A Others: switch, cable, installation etc.	Tk. 65,000 (USD 956)
3	85	6W lamp x 7, 17" B/W TV	Battery: 130Ah Charge controller: 10A Others: switch, cable, installation etc.	Tk. 42,500 (USD 625)
4	65	6W lamp x 5, B/W TV	Battery: 100Ah Charge controller: 5 or 10A Others: switch, cable, installation etc.	Tk. 34,000 (USD 500)
5	50	6W lamp x 4, B/W TV	Battery: 80Ah Charge controller: 5 or 10A Others: switch, cable, installation etc.	Tk. 28,000 (USD 412)
6	40	6W lamp x 3, B/W TV	Battery: 55Ah Charge controller: 5 or 10A Others: switch, cable, installation etc.	Tk. 22,500 (USD 331)
7	20	7W CFL lamp x1, LED x3	Battery: 23Ah Charge controller Others: switch, cable, installation etc.	Tk. 13,500 (USD 199)
8	10	5W lamp x1, LED x2	Battery: 18Ah Charge controller Others: switch, cable, installation etc.	Tk. 9,500 (USD 140)

Table-2 : Price list of SHS packages in GS project



Fig.-3 : SHS at a shop in rural area

Mode of Repayment	Down Payment	Installment	Service Charge (Flat rate)
Option-1	25%	24 Month	4%
Option-2	15%	36 Month	6%
Option-3			100% Cash payment with 4% discount

Table-3 : Payment scheme

	Capacity (Wp)	Membership Cost (BDT)	Bill per Month (BDT)
1	40	20	180
2	50		205
3	80		306
4	100		392

Table-4 : Fee for Service Billing Schemes

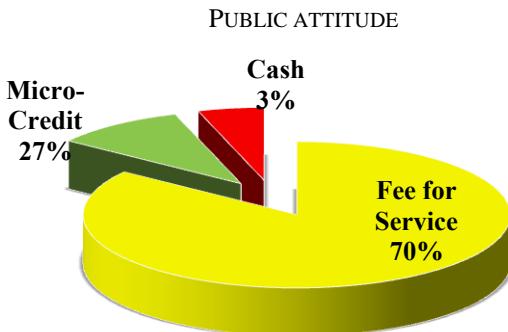


Fig-4 :First half reaction

The field survey [9] has been done through three different tours. The first tour was covered on Sirajgonj and Pabna district whereas the second tour was carried through Natore and Bogra. During these two tours, 60 household data has been collected who use SHS. Among them, 16 liked to choose the Micro-Credit system, 42 casted their vote on Fee for Service scheme and the residual 2 put the tick mark on Direct Cash payment. At last tour, data has been collected from Barisal and Jhalkathi. Again 60 household data has been accumulated among which 51 families picked up Micro-Credit system, 5 went for Fee for service and 4 chose Direct Cash payment package. To cover first two survey, REB provided the additional man-power and GS managed local support for the last visit.

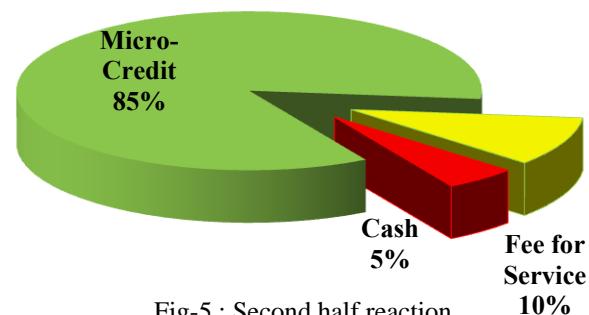


Fig-5 : Second half reaction

## VII. CONCLUSION

All the financial models ongoing for SHS expansion projects are represented thoroughly in this study. Attitude of general people for billing schemes is also surveyed. From the data analysis, public reaction can be explained in such a way that in the districts of Rajshahi Division (Natore, Bogra, Sirajgong & Pabna), Fee for service scheme is more popular than Micro-Credit system. This is because in Fee for service, the PV system remains at the ownership of government. The national grid is going to expand in those districts and when grid current will be available to users then the SHS will become a burden to them. So they are not willing for permanent ownership through Micro-Credit system. In case of villages at Barisal division, Micro-Credit system is more popular because their land is separated from main-land by a lot of rivers. There is a less or no chance for national grid expansion in near future at that region. As a result, inhabitants of that region are not interested in continuous billing process through Fee for Service system. Rather they want the ownership of the SHS by Micro-Credit installment system.

## VIII. ACKNOWLEDGEMENT

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