

Idcol's subsidized solar home system (shs) program in bangladesh

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IDCOL's subsidized solar home system (SHS) program was considered as one of the fastest growing off-grid renewable energy programs in the world. Since its introduction in 2003, the SHS program of IDCOL has distributed about 4.13 million SHS to ensure a supply of solar electricity to about 20 million people i. e. 12.5% of the country's total population who previously used kerosene lamps for lighting. The program reached its peak in 2013 when average installation of SHS was about 81,000 units per month (Figure 6). However, the average installation rate started declining since then due to various reasons including grid expansion by REB, emergence of a low-cost unregulated private SHS market and free distribution of SHS under a social safety-net program of the government. The program sees ups and down, having reached its peak in 2013 when average installation of SHS was about 71,033 per month. Afterward, the installation rate started declining. During the last one year or so, the sales of SHS came down to about 1100 per month. Moreover, existing customers who bought SHS in installments refuse to pay back because of lower price of the same unit in the private market. Those who got grid electricity connection soon after having SHS also refuse to pay back and they ask POs to return their money already paid for the SHS and take away the unit. This has posed a serious threat to achieving IDCOL's target of 6 million SHS installation. The factors such as sales of SHS at a lower price in the unregulated open market, a significant expansion of grid connection by Rural Electrification Board (REB), and the free distribution of SHS under KABITA and TR (two social safety net programs) programs as well as an absence of new demand are thought to be responsible for the current dwindling situation of the SHS market. To understand the current dwindling

situation of the program, it is important to make an in-depth analysis of the program.

IDCOL's SHS program is an example of public-private partnership of green energy technologies. IDCOL involves NGOs for marketing of SHS in their respective operational areas, who are called partner organization (PO). POs are provided several incentives such as capital buy-down grant, institutional development grant and refinancing facilities by IDCOL for the credit given to households for selling the SHS on installments. POs also make a contribution of their own in providing credit while they receive an institutional development grant. Households make down payments as well as installments. POs receive the credit from IDCOL at a 6-8 percent rate and pay back in 6-8 years. Households pay a 12 percent interest and pay back in 3 years.

However, as market matures, the grants POs receive have been on a declining trend. The program started in 2003 with a subsidy of \$90 per system, which has come down to \$20 per system since 2015. The capital buy-down grant has come down to \$20 applicable to 30 or lower WP systems since 2015 from \$70 for a system irrespective of capacity. The current subsidy structure continues to provide incentives to sellers of smaller systems so that they can keep the price at an affordable level of the poor rural households. As a result of subsidies, a relatively low cost but better quality photovoltaic panels and batteries are being offered by IDCOL compared to unregulated private market products. Even the price of a typical 50Wp SHS is relatively lower in Bangladesh (about US\$408),

compared to her neighbors like India (about US\$490-500) and Sri Lanka (US\$480). Being a successful SHS program, it is necessary to analyze the incentive structure, its efficiency and associated derived consumer demand from sustainability perspective of the SHS program. Several methods of economic analyses of subsidies and demand for SHS are applied here. While price elasticity determines the sensitivity of a price hike towards demand, willingness to pay measures the affordability of consumers in terms of accrued/perceived benefits from SHS. That is, while elasticity is the measure of sensitivity across the board, willingness to pay will determine the consumers at different levels of income. Furthermore, estimating the internal rate of return (IRR) with/without subsidy helps to understand the justification of subsidies in terms of cost-benefit perspectives of households. Thus, the analysis employs several conventional techniques of economic analyses using data that comes from a primary survey of 462 households including SHS and non-SHS households conducted in 7 districts in 2015.

The analysis of subsidies in the SHS program proceeds following the approaches suggested by Barnes and Halpern (2000). They suggest that subsidies in a program should be assessed in terms of its relative efficacy, sector efficiency, and cost-effectiveness. If the subsidy reaches those for whom it is intended, particularly the poor, then it ensures efficacy of the program. If the subsidy is structured in such a way that it encourages provision of service at the least cost, it indicates the efficiency of the program. However, sector efficiency is an important aspect that needs to be addressed more thoroughly in the energy sector restructuring work,

particularly in remote rural off-grid areas. Cost-effectiveness of the program may be measured in a way if the subsidy achieves social goals at the lowest program cost while providing incentives to businesses to serve the poor and rural populations. Therefore, in the light of these aspects, the current subsidy structure for SHSs has been analyzed in this study.

The descriptive analysis provides an understanding that subsidy has implication on the changing demand for SHS amid its effect on prices. In this section we try to estimate the elasticity of demand for different Wp SHS and willingness to pay of the consumers using standard econometric techniques. Moreover, the justification of subsidies has also been assessed by analysis cost-benefit ratios.