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Energy and Infrastructure Policy Network

POLICY LESSONS FROM SOLAR HOME SYSTEMS IN BANGLADESH & WAY FORWARD

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Policy Lessons from Solar Home Systems in Bangladesh & Way Forward

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A. Context

Bangladesh, located between 20.30 and 26.38° north latitude and 88.04 and 92.44° east longitude, has a high potential for solar energy, measured by global horizontal irradiation (GHI) in kilowatt hours per square metre (kWh/m^2). The country's average theoretical potential is 4.596 kWh/m^2.[1]

Promoting solar power in Bangladesh involves off-grid methods like Solar Home Systems (SHS), solar rooftops, solar irrigation, and on-grid installations of solar parks. A GIS-modelled analysis revealed Bangladesh's maximum installable generation capacity for Solar PV is 191 GW, with grid-connected solar parks capable of 177 GW.[2] Because of the unavailability of suitable lands and the constraints in grid connectivity around 1.7% of the total land of the country can be used for solar parks to produce around 50 GW of electricity according to the researchers.

Solar rooftops can offer a solution to help Bangladesh utilise the full potential of solar energy. To enhance solar rooftop installations, the lessons from the Solar Home Systems (SHS) can be beneficial to policymakers.

This policy brief has provided a short history of SHS in Bangladesh and the reasons behind its stagnation in recent years though it was once termed as a major success story of the country.

B. Solar Home Systems in Bangladesh

SHS is comprised of a solar module that is linked to a rechargeable battery and a charge controller. SHS is generally suitable for low-power-consuming equipment such as televisions, radios, light bulbs, and so on. SHS efficiency is determined by array dimension and sunlight availability. Grameen Shakti, a non-profit organisation, introduced the solar house system in Bangladesh in 1996.[3]

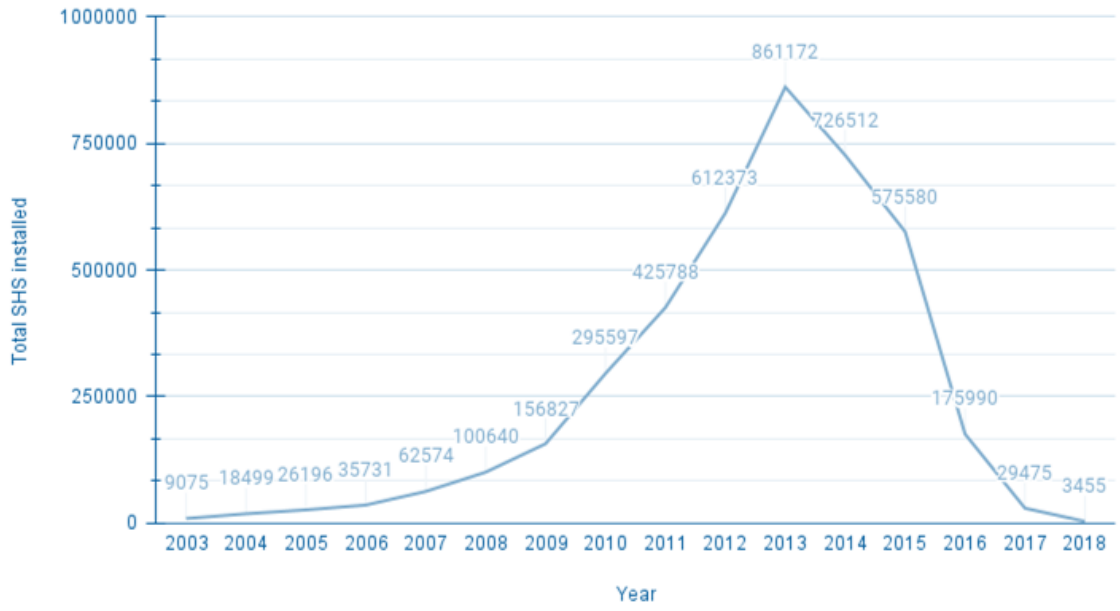
Only 21% of the population had access to electricity in 1996, and progress in rural electrification, particularly in isolated and coastal areas, remained slow. In 2012, just 30% of rural households in Bangladesh had access to grid electricity. As a result, the solar home system was regarded as a viable solution for providing access to electricity in isolated places, such as islands and coastal areas, where extending the national grid would be difficult.[4]

Following the receipt of funds from The World Bank and the Global Environment Facility Trust Fund (GEF), Infrastructure Development Company Limited (IDCOL) began supporting

the installation of SHS in 2003, with an initial goal of installing 50,000 SHS by the end of June 2008, which was met by September 2005, saving nearly $2 million USD.[5]

Since installing SHS requires an upfront investment, IDCOL's strategy included a flexible micro-credit plan. Besides, a campaign that assisted the organisation in increasing SHS installation helped to educate people in rural and remote areas.

The annual installation of SHS by IDCOL (2003-2018)



Source: World Bank/Living in the Light: The Bangladesh Solar Home Systems Story

More donor organisations, including GIZ and SNV-Netherlands, followed suit, and the organisation set a target of installing around 6 million SHS by 2021 with a generation capacity of approximately 220 MW from SHS. However, as of 2021, IDCOL claimed to have installed 4.13 million SHS around the country, with 185 MW capacity.[6] Though the organisation has installed around a million SHS through the TR-KABITA project, the installation has slowed down and many borrowers started defaulting.

C. Challenges that disrupted the SHS installations

The dramatic fall in SHS installations since 2015 illustrates how competition policies and technological challenges can act as a barrier to increasing renewable energy.

i. Competing policies

SHS was particularly focused on electrifying the remote and rural areas of the country where the expansion of the national grid is costly and difficult. However Bangladesh's incumbent government to reach the target of 100% electrification by 2021, undertook a variety of programmes to attain the goal, including a significant expansion of the national grid to rural areas.

The national grid started reaching the locations chosen for SHS installation thanks to the massive drive of electrification. This enabled those living in rural and distant places to connect to the national grid. As a result, customers defaulted on their loan payments and abandoned the programme.[7]

ii. The proliferation of low-quality alternatives

In its annual report, IDCOL has pointed out that the decrease in SHS installations can be attributed to market saturation caused by the proliferation of low-quality products available at lower prices. SHS is a stand-alone off-grid system (OGS) that comprises essential components like solar panels, inverters, and batteries. Providers of SHS must offer consumers the assurance of high-quality systems and services throughout the entire lifespan, encompassing maintenance, battery replacement, and other post-sales support for extended periods.[8]

The challenge arises from the fact that Bangladesh lacks ISO-certified testing facilities for solar-based appliances, and there is a deficiency in the technical infrastructure required to support local manufacturing and assembly of solar system components. This scarcity makes it exceedingly difficult to guarantee the quality of SHS.[9]

Consequently, sustaining the growth of SHS becomes problematic when the quality of these systems is found to be subpar, eroding consumer trust in the reliability of the systems. This leads some consumers to discontinue using SHS altogether or default on their loan payments.[10] The decline in SHS installations serves as an illustration of how inadequate technical quality and the overall user experience can impede the adoption of solar PV-based systems in rural communities.

iii. Unsustainable solution

IDCOL used a co-ownership model for SHS installations, in which microcredit was given to consumers to install SHS, and they had to pay it back gradually. This was a

financially viable and sustainable model where the consumers could become the owner of the system by paying back the loan in time.

Disregarding this model, the government began distributing free off-grid SHS (OGS) to poor households through a short-term scheme called TR-KABITA.[11]

Though IDCOL became a project implementation partner in TR-KABITA, the free OGS had a negative impact on the long-term viability of IDCOL's initial SHS programme based on microcredit, discouraging many potential participants from enrolling and borrowing money to fund SHS. Around 1.2 million consumers who had already signed up for the three-year financing plan to acquire an SHS had fallen behind on their loan payments.

The TR-KABITA programme, on the other hand, was a one-off programme that ended in December 2021, putting an apparent end to the SHS installations.

D. Policy lessons and way forward

1) The coordination gap between the different stakeholders, in this case, IDCOL and the energy ministry, can lead to competing policies where one dominant policy disrupts the other one.
2) The initiative to provide 100% of population with the access to electricity is praiseworthy and necessary for rapid economic growth. However, the mass adoption of SHS could have provided a more sustainable solution reducing the pressure on the national grid for electricity. And the government might not need to import huge amounts of fossil fuel from abroad to meet the electricity demand. This potential remained untapped due to the massive expansion of the national grid.
3) While promoting rooftop solar PV installation, the government must ensure that consumers have a reason to opt for rooftop solar instead of grid-based electricity.
4) The enduring issue of inadequate research and monitoring resources presents a twofold challenge. Firstly, it complicates efforts to curb the proliferation of

substandard materials, and secondly, it stifles the potential for local innovation that could have otherwise delivered high-quality technologies at reduced costs.

5) To effectively address this technological challenge, investments in research and development should be closely integrated with educational institutions and local talent pools. This approach will not only incentivise more students to cultivate their skills and participate in scientific research but also contribute to the establishment of an innovation ecosystem capable of addressing these technological barriers.
6) Since Bangladesh is part of the global free market economy, free services or products with no or limited responsibility to the consumers should not be promoted to ensure the sustainability of the projects.

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