Bringing Solar Home Systems to Off-Grid Communities

HIGHLIGHTS

- The wide range of solar products and prices increases uptake.
- Innovative financing options—including pay-as-you-go and rent-to-own models—increase affordability.
- Use of the solar home systems increases evening study hours, reduces fuel collection time, improves health, increases security, gives people more time for socializing and entertainment, and increases savings.
- The systems create jobs and increase the incomes of the people who sell, install, and service them.
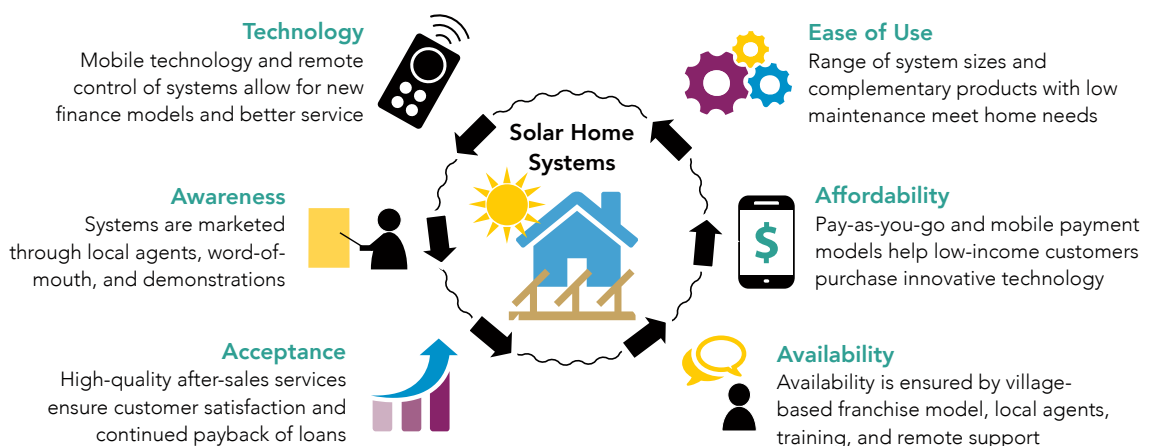
Development Challenge

Some 1.3 billion people live without access to electricity, and another 1 billion have extremely unreliable access. Lack of ready access forces them to use kerosene lanterns and battery-powered flashlights for light, as well as charcoal, firewood, and candles. These alternatives are not only inefficient, hazardous, and expensive, they also generate pollution and cause serious health and environmental problems. In India 75 million rural households are not connected to the electrical power grid and another 80 million are underserved by electrical utilities. In Africa some 630 million people and more than 10 million small businesses are not connected to the grid. Effective clean energy solutions exist, but they require significant upfront costs that often make them unaffordable. Clean, affordable energy is needed to bring power to low-income customers using a decentralized and flexible payment system.

Business Model

A solar home system (SHS) is a small-scale, autonomous source of electricity for households, offices, or businesses that are off-grid or have unreliable access to energy. It typically consists of a solar panel; a battery set, which stores the electricity; and a charge controller, which protects the battery from overcharging. The battery is charged during day hours, and energy is stored to power appliances during the night. System sizes range from 20W to more than 300W.

SHSs generate direct current (DC) that can be used to power a range of electrical appliances, including lights, mobile phones, USB chargers, small televisions, radios, fans, and refrigerators. Some companies, such as BGET in Thailand and Kingo Energy in Guatemala, are also developing alternating current (AC) systems, which allow people to plug in their appliances.

Features of the Solar Home System Business Model

Technology
Mobile technology and remote control of systems allow for new finance models and better service

Ease of Use
Range of system sizes and complementary products with low maintenance meet home needs

Awareness
Systems are marketed through local agents, word-of-mouth, and demonstrations

Affordability
Pay-as-you-go and mobile payment models help low-income customers purchase innovative technology

Acceptance
High-quality after-sales services ensure customer satisfaction and continued payback of loans

Availability
Availability is ensured by village-based franchise model, local agents, training, and remote support

Solar Home Systems

Implementation: Delivering Value to the Poor

Awareness

Businesses use a range of strategies to create awareness about solar electricity, including local agents, such as teachers or other community agents, word-of-mouth, and demonstration plants.

Acceptance

Most businesses offer a large product range with varying prices starting at USD 100 for smaller household units to USD 580 for larger systems. Reliable service is important for gaining customer trust, and companies generally offer service guarantees on their products. A vast rural distribution network, often formed in partnership with locally active NGOs or other community groups, helps to establish trust and generate demand.

Accessibility

Businesses in areas with high population density make their products available through local agents. Businesses in areas with lower population density must develop additional mechanisms. Many companies work through networks of rural distribution agents who maintain existing systems and sell new products. M-KOPA, for example, has built a network of about 1,000 direct sales managers across East Africa.

Affordability

Providers and businesses use a range of financing and payment schemes to best suit the needs of their beneficiaries. These schemes include pay-as-you-go models that include small fees to cover equipment costs, rent-to-own programs, semi-annual payments based on harvest schedules, or partnerships with banks or micro-finance institutions.

The target consumer group for these systems is households with some capital and income who can afford to pay USD 5–50 per month. Properly designed and installed systems operate without supervision and require only minor routine maintenance by end-users.

The biggest player in the market, Grameen Shakti, has reached about 8 million people in Bangladesh, installing more than 1.5 million SHSs. Most other businesses have reached 100,000–1 million people and are in the process of scaling up, including by expanding to other countries and continents. Sunlabob, for example, started operations in 2001 in the Lao People's Democratic Republic. Since then it has become a global player, operating in Afghanistan, Cambodia, Tanzania, and Uganda.

Several new businesses, including Fosera, M-Kopa, Mobisol, and Off-Grid Electric, have entered the African market in recent year. They offer smart financing models (some of them using mobile technology) and use their distribution channels to sell complementary goods, such as televisions, fans, and refrigerators.

Results and Effectiveness

Adoption of SHS improves a wide variety of outcomes. It increases evening study hours, which can improve educational outcomes and long-term income-earning potential. It reduces fuel collection time for women; increases the use of televisions, which, by providing information, empowers people; improves health, by limiting the spread of respiratory diseases from kerosene consumption; increases security; gives people more time in the evenings for socializing and entertainment; and increases savings.

SHS can also have a major impact on the incomes of people who sell, install, and service the systems. One-third of Mobisol customers have become at least part-time entrepreneurs. Mobisol estimates that they collectively earn more than USD 8 million per year. Based on an interview with the CEO of SOLshare, it is surmised that in Bangladesh most of the local entrepreneurs and managers selling SHS are women.

SHS reduce greenhouse gas emissions and pressure on natural resources used to produce electricity. They cut waste from dry batteries and leaks from kerosene or diesel. The potential negative effects of lead used for the batteries of SHS on the soil and the rest of the environment have not yet been sufficiently analyzed.