



SOLAR HOME SYSTEMS

Clean, Renewable & Affordable
Electricity for the Countryside

A Guide
for Financial Institutions
and Project Developers



The Need for Electrification

Large areas of the Philippines remain without electricity as low demand in remote locations renders the operation of power lines uneconomical.

Some 5 million homes are without electricity and families with no hope for public connection for years to come have no options but to seek individual solutions to their electricity needs.

Renewable Energy, the Viable Solution

The objective of the Philippine-German Special Energy Programme (SEP) as a bilateral cooperation is to support the Government's electrification program to improve rural living conditions. Towards this purpose the SEP has launched pilot projects in selected areas to introduce renewable sources of energy.

By far, the most successful and most popularly accepted are the Solar Home Systems (SHS): Stand-alone generation devices using Photovoltaic (PV) panels. As a means of basic electrification, the SHS has proven reliable, cost-efficient and flexible. However, since few rural households can afford the outright purchase of such a facility, appropriate financing is necessary to make widespread dissemination possible.

This guide presents the key parameters for financing PV projects.

The Attributes of a PV Project

1. Economic Competitiveness

Today's options for unelectrified rural households are: connection to a generator set, use of kerosene-fed wick lamps or pressure lamps, candles, and torches. Some of these are hazardous. Some offer limited time of availability and poor service. All are expensive compared to the Solar Home Systems, which in addition, are safe, non-polluting, and 24 hours available.

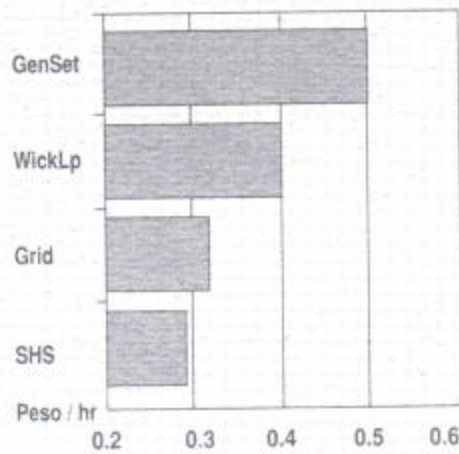


Chart 1

Based on user expense per lighting hour, the SHS offers the lowest cost.

2. Initial Investment Cost

In computing the cost of the SHS, the following components are considered:

Solar Home System Cost	
Solar Generator P 12,000	Balance of System Min. P2,700
Solar Panel 75 Wp Mounting, Cabling Battery Control Unit	Solar Battery 100 Ah Wiring, Installation Lights, Appliances

The Solar Generator cost reflects a size designed for the majority of rural households while the cost for the Balance of System (BOS) may vary with the appliances used by the household. The table shows the minimum BOS for a single-light outfit.

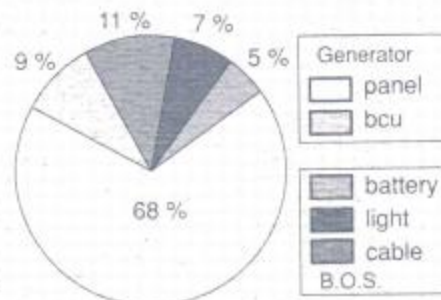


Chart 2

Cost distribution of the SHS. The solar panel takes up 68% of the total system cost, the BOS 23%.

3. Economic Analyses

The value of solar panels is determined by their market price, because like gold or diamonds, they do not depreciate with use. Solar panels work 20 years after installation practically as reliably as on the first day. This is guaranteed by the manufacturer.

This exceptional value makes solar panels a suitable collateral. However, like housing and car loans, the loans for SHS are not serving the purpose of direct income-generation for the end-user. Their attractiveness lies in the improvement of rural living conditions. For the lender however, the financial evaluation will be particularly appreciable if it is compared with the other options available to rural households:

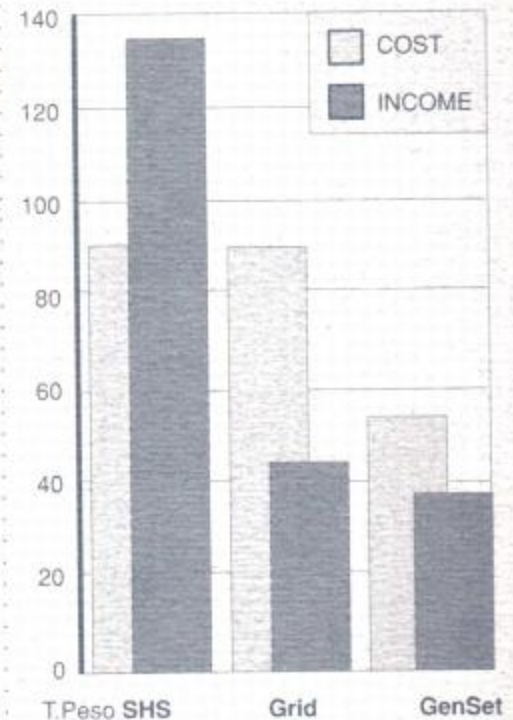


Chart 3:

Annuities of B&O cost vs. long-range income for a 50 household project. Only SHS offers a positive balance.

The above chart is based on a remote rural electricity supply system for 50 households. It shows clearly that the investment in building and operating such a system generates loss for all currently applied energy sources but for the SHS.

Additional Advantages

Substantial advantages emerge when an evaluation is based on the application on a national scale:

- **Low foreign exchange expense** - The generator (the only imported component) lasts exceptionally long.
- **Substantial domestic content**- All BOS parts are locally manufactured.
- **No fuel cost** - The sun is the primary energy source.
- **Low recurrent cost** - The generator needs no maintenance and the BOS is easy and inexpensive to maintain.
- **Positive environment impact** - Silent and clean, no emissions, no residue.

The use of PV panels can effectively push back the limits of long-range marginal cost of electrification, as they are the only electricity-generating device with no hidden costs to society.

Financial Exposure

It has proven good practice to account the cost of the BOS and of the generator separately.

The **BOS** components have a shorter lifetime and the cost may vary with the requirements of each user. The BOS makes for a minimum of 23% of an SHS and is therefore considered the equity to be paid Cash on Delivery (COD). The ability to shoulder this cost proves the financial capability and willingness to be a Solar Home System user.

The **generator** has an extraordinarily long lifespan which makes financing feasible. To spread the overhead cost of financing and operation, the loans are usually not extended to individual users, but to communities of not less than 20 households.

A typical SHS project is packaged for 50 users. At P12,000 generator cost, it will require an exposure of P600,000 for a period of 3 to 5 years. The SEP has in the past years demonstrated and evaluated a variety of

financing models, differing in terms, lenders, implementors and regional user characteristics.

The following are two typical Loan Models:

Lease Concept: *An entrepreneur owns and operates the system for users who do not wish to buy the solar generator.*

1. The entrepreneur/ lessor gets a bank loan for the purchase of the solar generators.
2. The lessor selects the site and clients of a leasing project.
3. The lessor charges the lessees a service fee to cover the amortization of his loan and the cost to maintain the SHS operational.
4. The lessor may avail of the tax benefits.
5. The leasing contract includes maintenance -- lessees pay operating cost, lessor monitors the system.

TIP: *It was found useful to combine long payment intervals with an early payment bonus, e.g. one year advance payment was rewarded one month discount. This accommodates seasonal income patterns.*

Credit Concept: *Users wishing to own the solar generator amortize the system through an intermediary.*

1. The intermediary (EC, LGU, NGO or Cooperative) packages the loan applications of individual SHS users.
2. The intermediary avails of a bank loan and passes it on to applicants with an interest spread of 2-4%.
3. The systems are mortgaged with the bank and ownership is transferred to the users on full payment of the loan by the intermediary.
4. The loan periods are 1 to 5 years. Only viable clients are chosen.

TIP: *While favorable loan terms are crucial for the affordability of SHS, it was found equally important that loan processing be fast and flexible and assesses the risk realistically.*

The leasing concept is usually applied as an institutional service by utilities in remote areas. The loan concept is preferably adopted by entrepreneurial implementors in more accessible locations. The SEP has developed tools and procedures for a successful appraisal of prospective communities and information campaigns to identify viable applicants.

Collaterals

1. Solar panels are used for chattel mortgage.
2. Buy-back agreement with panel supplier.
4. Exceptional securities such as government employee benefits, real estate mortgage, Internal Revenue Allotment (IRA).

International Funding

Strong international concern for preserving the environment and reducing greenhouse emissions, has led to the availability of funding for renewable energy projects from the World Bank, the Global Environment Facility, the Asian Development Bank, the European Union, and many bilateral funding institutions, e.g. from Japan, Australia, and the Netherlands. International and bilateral loans are usually lent through a national financing institution.

National Funding

In the Philippines, the Government Financing Institutions (GFIs) facilitate funding for government priority projects. Particularly for renewable energy utilization, the Department of Energy created the REPP facility with a volume of P750 million, to be administered by the DBP, PNB and LBP. The Development Bank of the Philippines already has valuable experience in financing PV projects under the Window III program. Help and advice are also available from the Non-Conventional Energy Division (NCED) of the DoE. Most extensive experience has been gained by the SEP's partner organization, the National Electrification Administration. NEA has extended more than 20 loans to Electric Cooperatives for PV projects nationwide. Under the SEP a total of 1,716 households in 93 villages have been electrified with solar energy systems.

USEFUL ADDRESSES FOR PROJECT FINANCIERS:

During the dissemination phase of the last three years,
the SEP has closely cooperated with the following institutions:

Department of Energy (DoE)
Non-Conventional Energy Division
Merritt Road, Ft. Bonifacio, Makati, M.M.
Tel. (+632) 818-8614

National Electrification Administration (NEA)
Alternative Energy Development Department
1025 Quezon Avenue, Quezon City
Tel. (+632) 97-15-04

Development Bank of the Philippines (DBP)
Sen. Gil Puyat Avenue, Makati, M.M.
Tel. (+632) 893-4444

Land Bank of the Philippines (LBP)
319 Sen Gil Puyat Ext., Makati, M.M.
Tel. (+632) 814-0174

Decentralized Energy Systems Project (DES)
PNOC Energy Research and Development Center
Commonwealth Avenue, Diliman, Quezon City
Tel. (+632) 977-611 to 19

Preferred Energy Investments (PEI)
Strata 100 Bldg., Emerald Avenue
Pasig City, Metro manila, 1600
Tel. (+632) 631-2826

Asian Development Bank
6 ADB Avenue
Mandaluyong, M.M.
Tel. (+632) 632-6408

The World Bank
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