

Application of Solar Power for home appliances

Solar panels convert sun light into electric energy and stored the energy into battery. Electric equipments that can use solar energy are: Lamps, TVs, Cassette players, radios, computers and other appliances.

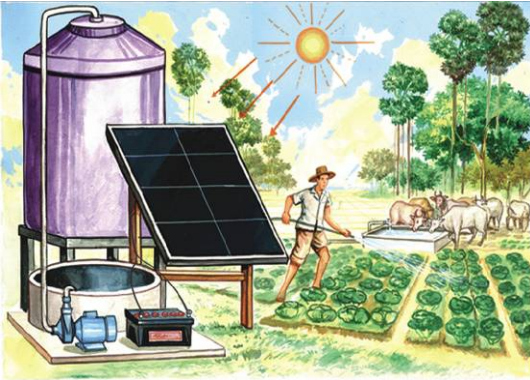


Figure 1 Solar Home system.

Benefits of Solar Home Systems

- It is possible to electrify households far away from the electricity grid
- Solar energy systems are easy to install and use
- Low operation and maintenance costs
- PV systems are modular, and they can be enlarged
- Solar home systems operate without gasoline and can run every day
- Solar energy is clean and renewable. It does not pollute like traditional forms of electrical generation
- PV systems provide brighter light that can prolong evenings while creating less pollution than traditional lighting sources

- When it's cloudy or rainy, the energy that has been stored in the batteries can be used
- It is safe, reliable and silent

How does the solar home system operate?

A solar home system consists of solar panels, batteries, and a charge controller:

Solar Panel: solar panels convert sun light into electric energy during daytime charging batteries. Solar panels lifetime is around 25 year

Battery: Batteries store electric energy that can be used for radio, TV, Lamp and fan when there is no sunlight.

Charge Controller: is used for overcharge protection or overload protection of the battery.

Inverter: it is used to convert the 12V, 24V and 48V DC voltage to 220V AC voltage. Then we can supply the household appliance needed AC voltage.

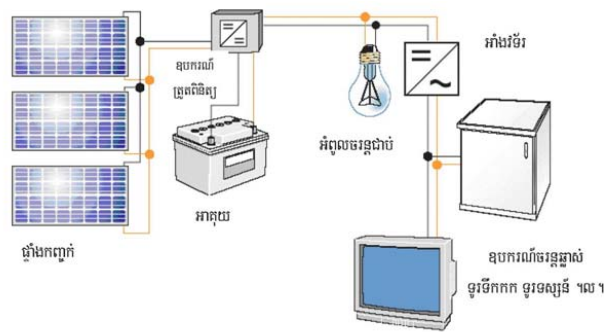


Figure 2 SHS components

Utilization of SHS:

- Turn off light during daytime
- Turn off lamp, TV, Computer and electric appliances when you don't use them.
- Turn off inverter whenever you are not using it

SHS is designed to meet your energy requirements: example 3 or 4 hours operation of 2 Lamps + Black & White TV (40W SHS), 3 or 4 hours operation of 3 Lamps + colour TV (80W SHS), 5 or 6 hours operation of 3 Lamps + colour TV (150W SHS)

Operation and maintenance of solar home systems

- Solar panels should not be placed in places of shadow or where they might break
- Clean the panels regularly of dust
- Check that the connection at solar panel terminals is in good condition and water resistant
- If the fuse is broken, the charge controller will indicate this with a red light

Charge controller indicates the State of Charge (SOC) of the battery where we can see that battery is full of energy or not.

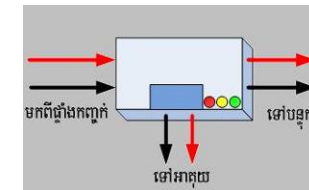


Figure 3 Charge controller

Charge controllers can also be used to protect connections in the reverse direction of solar Panel, battery, appliances, short circuit and block the power flow from battery to solar panel during the night time.

The state of charge of battery

It is recommended to use maximum 50% of State of Charge (SOC) to increase the lifetime of battery. The state of charge of battery can be checked from the indicator light:

- Red indicates that the SOC of battery is 30%
- Yellow indicates that the SOC of battery is 50%
- Green indicates , SOC of battery is 80%

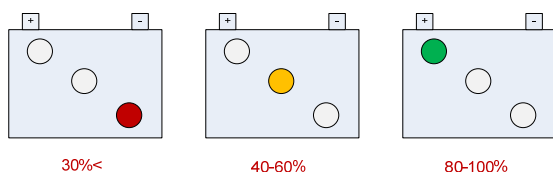


Figure 4 State of Charge of Battery

Remember: Do not use all the energy that is stored in the battery! Whenever the energy in the battery is too low, charge controller will indicate this with a red light shown in figure 4.

What if the battery does not charge? Check the batteries connections and the Acid level in the battery. Fill pure water if there is no acid inside the battery cell. If above step does not work, change the battery sometime the battery is too old to use it. The average lifetime of a battery is 4 years.



Figure 5 Check battery connection and liquid in battery

How Can I watch TV for long time?

In order to use SHS for long time you need to install a high power system then the cost will increase too.

Optimum between solar panel and diesel

The investment cost of solar panel is high at the beginning.(example 40Wp of SHS costs 500 USD) The maintenance costs are very low and consist of panel and battery.

- Nowadays the cost for 1Wp of solar panel in Cambodia is 5 to 6 USD.
- For long time operation, solar system saves money when compared to diesel. Solar panel can use for 25 to 30 years.
- Diesel needs to pay for gasoline everyday, noise, polluted environment and a regularly maintenance. The maintenance fee for Diesel is higher then solar system.

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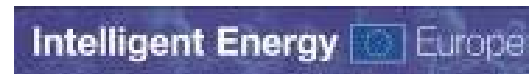
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