

Project Completion Report
of
Solar Photovoltaic System
for
Umbrella Organization Nepal
in
Nuwakot District, Nepal

October 2008

System Designed and Installed By:

Lasersun Energy Pvt. Ltd.

Pulchowk, Lalitpur; Nepal

Ph: 01 5536171, 01-5549607 Fax 01-5549348

Email: lasersun@wlink.com.np

Solar Photovoltaic System in Nuwakot District

Introduction

As per the agreement between the Umbrella Organization Nepal and Lasersun Energy Pvt. Ltd, solar system to operate different system is installed in Sunkhani VDC and Samundra Devi VDC, Nuwakot, Nepal. Umbrella Organization Nepal decided to install solar PV system to fulfill the demand of electricity in 2 schools and 1 education centre.

The solar system is designed by Lasersun Energy with the load and operating hour provided by the Umbrella Organization Nepal. The system is designed with Solar Array Charging the battery with charge controller and accompanied by an inverter to supply the AC load.

The Solar Photovoltaic system has been installed in 3 sites. The load requirement for the design of the system is as below.

1. Two schools: 1 TV,1 DVD and 4 lights
2. Education Centre: 1 TV,1 DVD and 2 lights

Table1: Loads per system and its operating Hours

Sn	Description	Power Requirement Watt	Qty	Usage Hrs/day	Load Whr/day	Power Watt
1	TV 14" color and DVD	125	1	3	375	125
2	TL Lights	6	4	3	72	24
	Total Load per day				447	149

With the provided load the system is designed using different components for solar PV system. The system is designed with 12 V DC systems and is converted to 220 V AC with inverter. The system is designed for 4.5 peak sun hours. The components to fulfill the demand are as follow

Solar Module

The solar module used in the system is Kyocera KC 130 with 130Wp capacity manufactured by Kyocera, Japan. Array of 1 module (Kyocera KC130) is installed in 1 site. Total number of modules used is 3.

Battery

Deep cycle battery manufactured by Sunera, Nepal is used in the system. Each battery is rated for 12V/100 Ah. The battery size is calculated to provide 3 days of autonomy to the system. 2 number of batteries are used in parallel with 12 V DC system. Total number of batteries used is 6.

Charge Controller

The charge controller designed for system is 12V/ 10 A manufactured by Arsh.

Inverter

The inverter used in the system is manufactured by Su-Kam India. The capacity of the inverter is 250 VA with 12 V DC as input and 220V AC sine-wave as output.

Inverter Specification (250 VA Sine Wave)

Battery Voltage	12 V
Output Voltage	220V \pm 6%
Output Frequency	50 Hz \pm 0.5
Output Waveform	Sine Wave

The installation diagram of the system is provided below.

Delivery of the Components

The system components were delivered from Lasersun Head Office in Pulchowk, Lalitpur. The goods were packed and taken by truck up to Nuwakot. The installation was performed by the technical team of Lasersun Energy Pvt. Ltd. and then it was tested successfully. The system was able to fulfill the demand and found to be working quite good as per the design of the system.

The connection diagram of the system is given below.

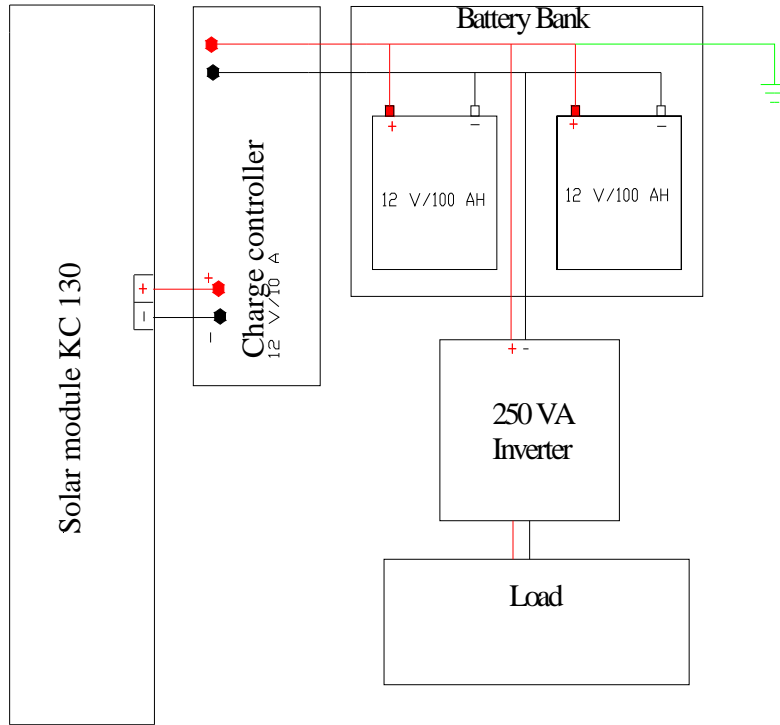


Fig: Connection Diagram of the Solar Photovoltaic System

Installation of the System

The system was designed and installed by technical team of Lasersun energy Pvt. Ltd. Also the training was provided to the children and the villagers of Gurje village. The team comprises of

Basanta Sapkota (Design Engineer)
Prakash Mishra (Technician)
Bhupendra Sodari (Technician)
Rabi Thapa (Technician)

The solar module is mounted in the specially constructed solar mounting structure. The modules are placed in such a way that there is a provision for wind passing in between and all the modules mounted in the structure are earthed. The specification of the individual module installed in the site is

• Model	Kyocera KC 130
• Rated Power	130Wp
• Open circuit Voltage (Voc)	21.7 V
• Short circuit Current (Ish)	8.02 A
• Voltage at Load (Vmp)	17.6 V
• Current at Load (Imp)	7.39 A

The power from the solar modules is fed to the charge controller for charging the battery. The battery used in the system is 100 AH/12 V deep cycle battery. Altogether 2 number of batteries are used in the system which will provide autonomy of 3 days under full load condition. These batteries are robust in nature and have long life than that of ordinary lead acid battery.

The loads are operated with AC system. The available DC electricity is converted into AC using 250 VA sine-wave Su-Kam inverter. The inverter has 12V DC as an input and 220 V AC as output.

Besides this the cables and other BOS are used in the system to ensure minimum voltage drop and reliable system performance.

Improvements in Our Previous Installations

As requested by the Umbrella Organization, some improvements were made in the previous installations by the technician from Lasersunenergy Pvt. Ltd. They are listed below:

1. Batteries



Old situation

Umbrella Organization wanted to replace the location of batteries.

New situation

The batteries were placed on a more safe location.



2. Wiring

Old situation



There was complaint regarding the connections of the wiring during the installations.

New Situation

Rewiring was done and Junction Boxes were placed at the joints for safer connections.



3. Lighting arrester

There was complaint regarding the lightning arrester.

Old Situation



There was problem with the installation of lightning arrester system.

New Situation

Thicker wires were used. Also the lightning arrester was placed on a better location.



Conclusion

The system was installed and operated successfully according to the requirement of Umbrella Organization. The system is capable of supplying the mentioned load. The installed system will provide the electricity to operate loads in 2 schools and 1 education centre in Nuwakot district. The system is expected to work well in the future too provided it is properly maintained and operated. Care should be taken during the days when there is no any sunshine for few days and the voltage levels should be regularly checked to ensure the battery is not too deeply discharged. All the loads should be kept shut off when they are not in use as most of the appliances consume power even in case when they are not operating. Proper care and maintenance will give the sustainability to the system.

Annex



Fig. 1: Installation of the Solar Array on the roof



Fig. 2: Lasersun Technician and Umbrella Guys working together for the Installation of Solar Photovoltaic System



Fig. 3: Panel and lightning Arrester



Fig. 4: Earthing of the System for the protection against Lightning



Fig. 5: Lights operating after Successful Completion of Installation



Fig. 6: Lasersun Technician providing Training to the Children and Villagers



Fig. 7: Children and Villagers looking happy to have the Solar Photovoltaic System successfully installed in the village