Project Completion Report
of
Installation of Solar Power System
for
Karnali Community Library
in
Jumla, Karnali

April 2009

Submitted To:
UNICA FOUNDATION

System Designed and Installed By:

Lasersun Energy Pvt. Ltd.
Sanepa, Lalitpur; Nepal
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Solar Photovoltaic System in Karnali Community Library Jumla, Karnali

Introduction

As per the agreement between the Unica Foundation and Lasersun Energy Pvt. Ltd, solar PV system to provide 6 KW power is installed for Karnali Community Library, Jumla, Karnali. Unica Foundation decided to install solar PV system to fulfill the demand of electricity in Karnali Community Library.

The solar system is designed by Lasersun Energy with the load and operating hour provided by the Unica Foundation. The system is designed with Solar Array charging the batteries through charge controllers and accompanied by two inverters to supply the AC load.

The Solar Photovoltaic system has been installed in Karnali Community Library. The load requirement for the design of the system is as below.

1. Lights
2. TV 29"
3. TV 21"
4. Fax
5. DVD
6. Casette Player
7. Photocopy
8. Printer
9. Projector

Table1: Loads per system and its operating Hours

Sn	Description	Power Requirement Watt	Qty	Usage Hrs/day	Total Load Watt Hrs /day
1	Computers	150	14	3	6300
2	Lights	9/11	72	4	3220
3	TV 29"	200	1	4	800
4	TV 21"	140	1	4	560
5	Fax	30	1	24	720
6	DVD	25	1	4	100
7	Casette Player	30	1	2	60
8	Photocopy	1000	1	0.5	50
9	Printer	50	1	0.5	25
10	Projector	500	1	4	2000
	Total Load per day				**13,835**

With the provided load the system is designed using different components for solar PV system. The system is designed with 48 V DC and is converted to 230 VAC with inverter. The total system has been built as two independent units: one for lighting purpose and other one for operating other electrical appliances. The system is designed for 4.5 peak sun hours. The major components of the solar PV system are as follows:

Solar Module
The solar module used in the system is Kyocera KC 130 with 130Wp capacity manufactured by Kyocera, Japan. An array of 48 modules (Kyocera KC130) is installed in the site. Out of the total solar modules, 24 solar modules are used for lighting and remaining 24 are used for operating other electrical equipments.

Solar Support Structure
Nepal made galvanized solar support structure is used in the system. 4 sets of galvanized solar support structures are used. Each structure has an array of 12 solar modules: 2 in each row and 6 in each column. Altogether 8 modules are accommodated in each row and 6 in each column.

Battery
Deep cycle tubular battery manufactured by Sunera, Nepal is used in the system. Each battery is rated for 12V/200 AH. The battery size is calculated to provide 2 days of autonomy to the system. 4 numbers of batteries are used in series and 8 in parallel to form 48 V DC system. Total number of batteries used is 32. Out of this, 16 batteries are used for lighting and remaining 24 are used for operating other electrical equipments.

Charge Controller
The charge controller designed for system is tristar TS-60, 60 Ampere/48V with meter, manufactured by Morningstar, USA. 2 numbers of charge controllers have been used. 1 meter is connected with each controller to provide the visual display of the information the tristar charge controller and the operation of the system. One charge controller is used for lighting and one for operating other electrical equipments.

Inverter
The inverter used in the system is VFX3048E (48VDC/3000VA) 230VA/50Hz, manufactured by Outback, USA. 2 outback inverters are used to operate 6KW load. The capacity of each inverter is 3 KVA with 48 V DC as input and 230V AC sine-wave as output. One inverter is used for lighting and one for operating other electrical equipments.

Delivery of the Components

The system components were delivered from Lasersun Head Office in Sanepa, Lalitpur. The goods were packed and sent via road and air transport up to Jumla. The installation was performed by the technical team of Lasersun Energy Pvt. Ltd. and then it was tested and commissioned 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.

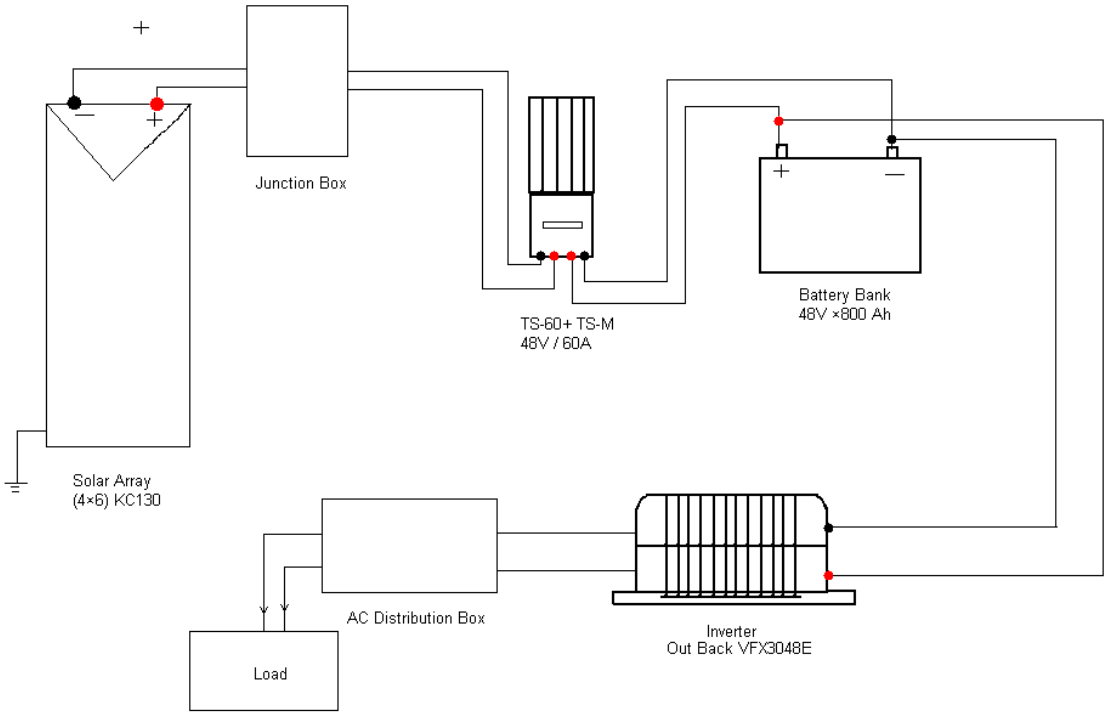


Fig: Connection Diagram of the Solar Photovoltaic System

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 members of the community library . The team comprises of

Mr. Yogesh Bhandari (Design & Sales Engineer)
Mr. Ram Bahadur Khatri (Senior Technician)
Mr. Rabi Thapa (Senior Technician)
Mr. Netra Raj Bhatta (Technician)
Mr. Sanjay Kunwar (Technician)

The solar modules are 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

Solar energy is converted into electrical energy in the solar modules. The power from the solar modules is fed through the charge controllers to the batteries for charging the batteries. The power is stored in the batteries and used to operate the electrical equipments whenever necessary. The loads are operated with AC system. The available DC electricity is converted into AC using inverter.

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

The complete system was installed in two halves:

- Independent System used for Lighting only
- Independent System for powering remaining load.

Training to the Community People

Training was provided the community people selected by the community about the proper operation and maintenance of the system. This training has been conducted with a motive of creating awareness among the people about the solar PV system and its benefits.
the people selected by the community were as mentioned below

Mr. Dhan Krishna Khatri
Mr. Deep Bahadur Shahi.
Mr. Dhan Bahadur Mahat.

Validity of Warranty

As per the agreement with Unica Foundation the overall system is warranted for one year which is valid up to April 11th 2010. At the end of the first year Lasersun Energy will send a monitoring team to inspect the system performance.

Conclusion

The system was installed and operated successfully according to the requirement of UNICA Foundation. The system is capable of supplying different electrical appliances listed above. The installed system will provide the electricity to operate loads in Karnali Community Library in Karnali, Jumla. The system 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.

APPENDIX

Fig.1: Installation Of Solar Modules On The Area Provided By Army And Old Library Building

Fig.2: Tubular Battery Placed On Wooden Frame

Fig.3: Battery Bank Of 32 Batteries

Fig.4: Connection Of 2 Junction Boxes, 2 TS-60 Charge Controllers And 2 Outback Inverters

Fig.5: Connection Of AC Distribution Box And Breakers

Fig.6: Lasersun Staff Performing Conduit Wiring

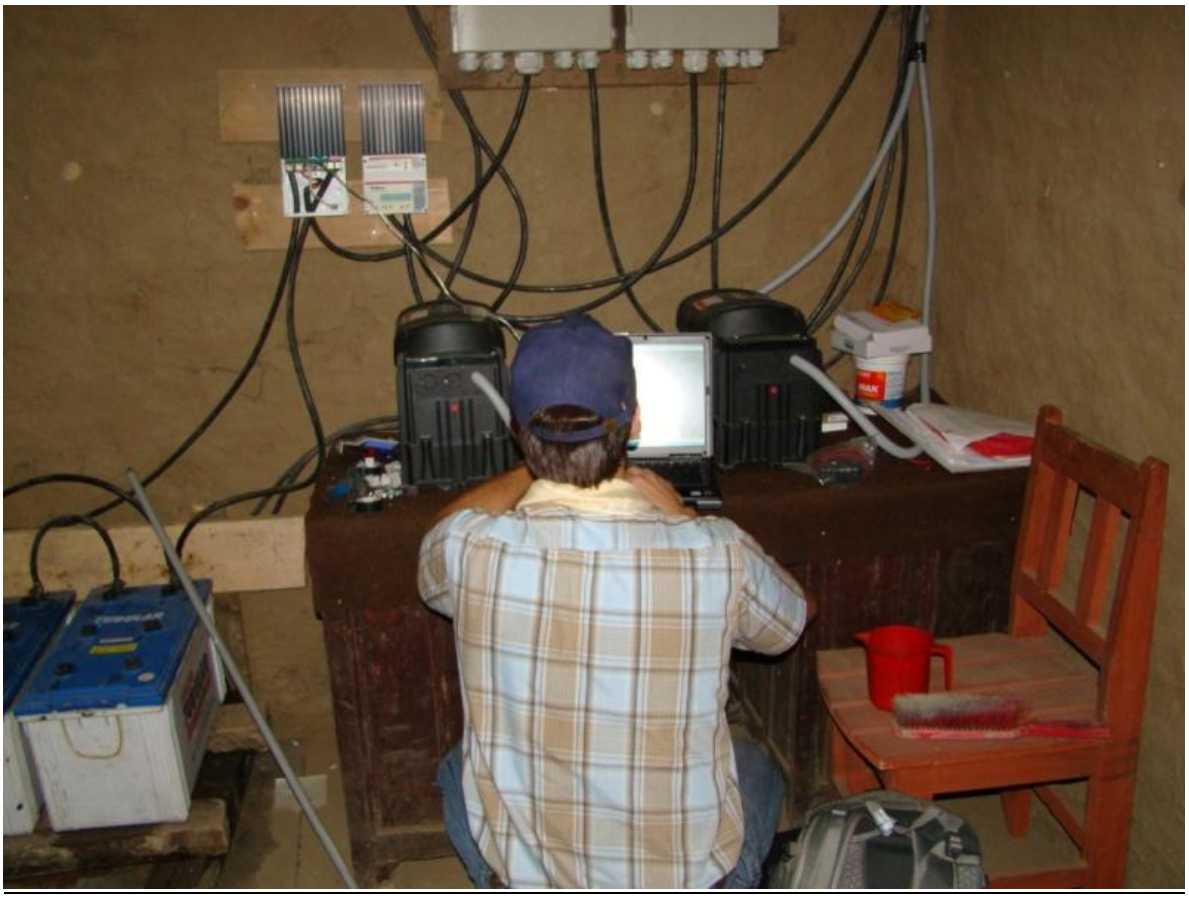


Fig.7: **Inspection:** Mr.Roy Downloading Data From The Charge Controller

Fig.8: CFLs Lighting In The Library Room After Successful Commissioning Of The Solar PV System

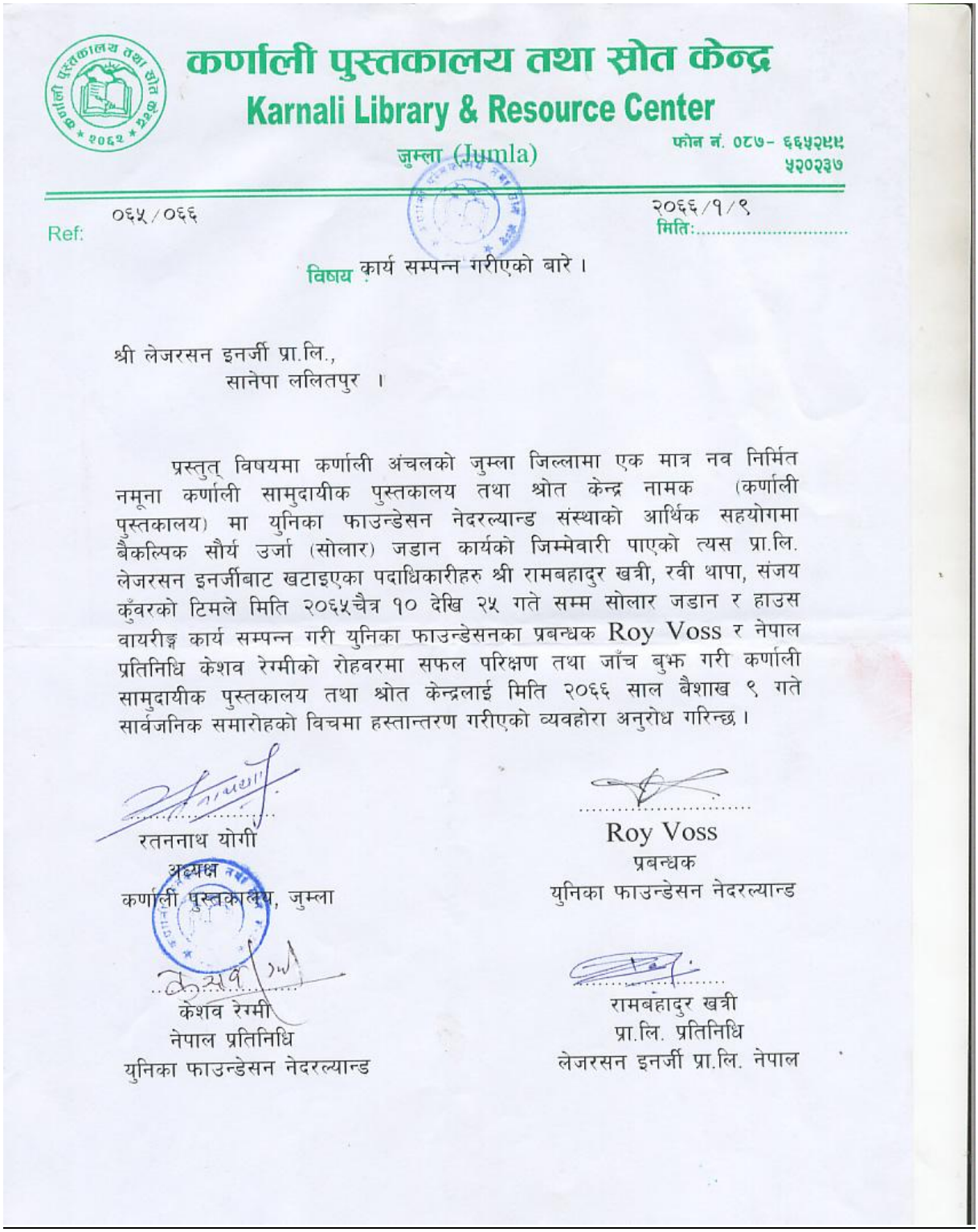
Fig.9: Community People Working With Computer Operated By Solar PV System

Fig.10: Television In Community Library To Be Operated By Solar PV System

Fig.11: Lasersun Engineer Reading Data From Display Of Tristar Meter

Fig.12: Lasersun Staff Providing Training to the community people

Fig 13: Community people participating in training.



कर्णाली पुस्तकालय तथा स्रोत केन्द्र
Karnali Library & Resource Center
जुम्ला (Jumla)
फोन नं. ०८७- ६६५२५५
५२०२३७

Ref: ०६५/०६६
२०६६/१/९
मितिः.....

विषय कार्य सम्पन्न गरीएको बारे ।

श्री लेजरसन इनर्जी प्रा.लि.,
सानेपा ललितपुर ।

प्रस्तुत् विषयमा कर्णाली अंचलको जुम्ला जिल्लामा एक मात्र नव निर्मित नमूना कर्णाली सामुदायीक पुस्तकालय तथा श्रोत केन्द्र नामक (कर्णाली पुस्तकालय) मा युनिका फाउन्डेसन नेदरल्यान्ड संस्थाको आर्थिक सहयोगमा बैकल्पिक सौर्य उर्जा (सोलार) जडान कार्यको जिम्मेवारी पाएको त्यस प्रा.लि. लेजरसन इनर्जीबाट खटाइएका पदाधिकारीहरु श्री रामबहादुर खत्री, रवी थापा, संजय कुँवरको टिमले मिति २०६५चैत्र १० देखि २५ गते सम्म सोलार जडान र हाउस वायरीङ्ग कार्य सम्पन्न गरी युनिका फाउन्डेसनका प्रबन्धक Roy Voss र नेपाल प्रतिनिधि केशव रेग्मीको रोहवरमा सफल परिक्षण तथा जाँच बुझ गरी कर्णाली सामुदायीक पुस्तकालय तथा श्रोत केन्द्रलाई मिति २०६६ साल बैशाख ९ गते सार्वजनिक समारोहको विचमा हस्तान्तरण गरीएको व्यवहोरा अनुरोध गरिन्छ ।

रतननाथ योगी
अध्यक्ष
कर्णाली पुस्तकालय, जुम्ला

Roy Voss
प्रबन्धक
युनिका फाउन्डेसन नेदरल्यान्ड

केशव रेग्मी
नेपाल प्रतिनिधि
युनिका फाउन्डेसन नेदरल्यान्ड

रामबहादुर खत्री
प्रा.लि. प्रतिनिधि
लेजरसन इनर्जी प्रा.लि. नेपाल

Fig 14: Completion Letter provided by Karnali Community library acknowledged by Unica representatives.

The letter issued by Karnali Community Library Certifying completion of work
(Translates as follow)

Ref: 065/066 Date: 22nd April 2009

Subject: Regarding Completion of work

M/S Lasersun Energy Pvt. Ltd.
Sanepa, Lalitpur,

This is to certify that the work related to Electrification of "Karnali Community Library And Resource Center, Jumla, Karnali" by Alternative Energy Sources (Solar PV) under the financial aid of UNICA FOUNDATION has been completed by the technical team of Mr. Ram Bahadur Khatri, Mr. Ravi Thapa and Mr. Sanjaya Kuwar, from Lasersun Energy Pvt. Ltd. from May 24th to April 10th and the system has been publically handed over to the Community Library after successful testing and monitoring of the system under the presence of Unica Foundation Project Manager Mr. Roy Voss and Nepal Representative Mr. Keshab Regmi on 22nd April 2009.

Signed By,

Mr. Ratan Nath Yogi.
President Karnali community library

Mr. Roy Voss
Project Manager, Unica foundation

Mr. Keshab Regmi
Nepal Representative, Unica Foundation

Mr. Ram Khatri,
Company Representative
Lasersun Energy Pvt. Ltd.