

SOLAR POWER PLANT

INTRODUCTION

Asutosh College is the first college in West Bengal and perhaps the first college in the country where solar power has been used for running laboratory works since February 2008 till date. A couple of 74 Watt panel were set up at the roof of the college with the help of West Bengal Renewable Energy Resource Development Agency (WBREDA), is powering instruments in the Electronics and Computer laboratories.

In order to meet the requirement of uninterrupted street lighting at Asutosh College second campus, Vasa the College authority installed solar street light. Ten poles each 5 'mtr in length were mounted with 80 Wp solar panels. The harvested solar energy is stored in SMF Battery of 75 Ah attached with each pole. The Solar LED Street Lighting System (Dusk to Dawn) Auto On/Off turns on using Battery power when natural light dims and fades in presence of natural light, thus uses energy efficiently.

Asutosh college with financial assistance from Govt. of West Bengal has implemented Roof top greeed connected solar photovoltaic system at the roof of main building (92, S. P Mukherjee Road, Kolkata-26) in the year 2019. An array of 80 photovoltaic panels each capable of harvesting Maximum Power (Pmax) - 250 Wp thus an overall 2X10 kVA (maximum capacity) non-conventional energy harvesting unit has been installed. The green energy generated by the system is transferred to the grid and thus our college actively contributes in green energy generation.

THE BEGINNING

The plant started working under leadership of Sri Anshutosh Khan (Department of Physics) and Sri Bikash Pal (Department of Physics) from 2009. Currently, Dr. Surjya Sarathi Bhattacharyya, Assistant Professor in Physics is in-charge of several solar power units of college.

OBJECTIVES

1. Reduce usage of conventional sources of energy and introducing non-conventional source of energy in academic practices, which can motivate student's community for practicing the same in their day-to-day life.
2. Practical applicability of non-conventional sources of energy been proposed for long and it remained a bookish subject for years. Thus, it was necessary for premier academic institution like Asutosh College, Kolkata to test them in practical circumstances such as instrument based laboratories viz. Electronics, Physics etc.
3. The problems raised by interruptions in electric supply at district areas can be fulfilled by taking initiative, such as introducing photosensitive solar streetlight, which turns on at dusk and turns off at dawn. Thus, it serves the purposes of uninterrupted street lighting and saves power.
4. Roof top greeed connected solar photovoltaic system for harvesting green energy.

UTILITY IN LABORATORY

It is convenient as most of electronic equipment's require only 12V DC. However, conventionally 440V AC is supplied by local electric supply agency namely, CESC. Thus we need to step down the input and to convert AC to 12V DC in order to fulfil laboratory requirements. But the converters have a tendency to develop defects and we have incurred huge expenses in past. Hence, the solar energy became a more convenient alternative for our purposes. Empowered by solar energy, said laboratories while running experiments remains unaffected by power cut for supply problems.

INSTRUMENTS OPERATED AT A TIME USING THIS SOLAR POWER IN THE LABORATORY

- Cathode Ray Oscilloscope (CRO).
- Function Generator.
- RMS AC Milli Voltmeter
- DC Power Supply (0-12V).
- Milli& Micro Ammeter.
- LCR (Q) Meter.
- Tube light & CFL light.

SOLAR BATTERY SPECIFICATION IN LABORATORY

- Battery Specification: Solar Tubular Battery of 12V, 120Ah.
- Inverter.

SOLAR STREET LIGHT SPECIFICATIONS



SOLAR STREET LIGHT

ABOUT SOLAR STREET LIGHT

A solar lamp is a fixture composed of LED Luminary, solar panel, and a rechargeable battery. Outdoor lamps may have a lamp, solar panel and battery integrated in one unit.

EXECUTIVE SUMMARY

Solar LED Street Light is a tall pole with lighting attached to the top pointing towards the ground, usually but not always used to light a highway or recreational field. The lighting is mounted on is generally at least 5 meters tall (under this height it is referred to as conventional lighting system), while the lighting consists of a luminary on the pole with one or several independent lighting fixtures mounted around it.

System at a Glance

- PV Array capacity - 1No. 80 Wp.
- Solar LED Street Lighting System (Dusk to Dawn) Auto On/Off.
- Street Light (HOT DIP GI) Pole 5 'mtr.
- SMF Battery of 75 Ah with Hazardous and Maintenance Free.

SOLAR PV SYSTEM DESCRIPTION

The PV system configuration is a standalone System with Battery Backup, which consists of the following:

- **SOLAR PV MODULES** - 80 Wp capacity of Si crystalline PV module of 12V.
- **STREET LUMINARY (LED)** - 1 no of 18 watt with AL- DIA cast metal Cabinet, Having DUSK to Down Control facility.
- **MECHANICAL STRUCTURE AND HARDWARE FOR MODULE MOUNTING** - Solar Street Light Pole, with (HOT DIP GI) anti dust and anti rust coating.
- **WIRE, CABLE, LUGS & TERMINALS** - As required for 1 set.
- **EARTHEN-** 1 Set.
- **BATTERY BANK** - Battery bank two days Backup with sealed and maintenance free having capacity 12v, 75 AH.

SOLAR PV MODULES

Solar PV modules (IEC 61215 Certified) are framed and hermetically sealed assembly of 36 solar cells connected in series. It converts the sunlight into electricity. The shape and size of the modules is approximately 1950mm x 950mm. For this project, 10 nos. (12V/80Wp each) of poly crystalline solar modules are considered.

MODULE MOUNTING STRUCTURE (MMS)

The Module mounting structure is made up of GI POLE with anti rust & Dust coating.

CABLES AND CONNECTORS

Cables chosen for this solar project, PVC insulated of ISI make, and have excellent quality and characteristics to provide for a long service life. All the cables, lugs and terminals are made of best quality.

EARTHING & OVER VOLTAGE PROTECTION

Earthing for Module mounting structure and control panel for safe handling as per MNRE standard.

OPERATION AND MAINTENANCE

Operation of the Street light is totally automatic in nature and does not require any attention as long as the systems are in operation. For maintenance, technician's visit the site once in six months for routine check-up of the system and also to top up the battery with distilled water. Regular cleaning of the modules is carried out regularly by college authority, which ensures rated power output.

Features Solar LED Street Lighting System (Dusk to Dawn)

- High power Osaram LED street light luminary with DDC-1 No.
- 2 days power Backup for Non sunny days.
- Charging and Battery low indicators-to indicate the battery status
- Weather proof outdoor Aluminium sheet metal cast.
- Two step MPPT/PWM charge controller protects from over and deep discharging.
- Low maintenance Gel Battery.
- Galvanized Street pole and Battery Box.

Technical Specifications

| Sl.no | Technical Detail | Specification |
|--------------|-------------------------|----------------------|
| 1. | Power Consumption | 20 Watt |
| 2. | Voltage In | 10.5 V – 14.5 V |
| 3. | Power Factor | >0.90 |
| 4. | CRI | >80 |
| 5. | LED Source | NICHIA / LEMWS593020 |
| 6. | Lumens | >= 1800 – 2000 Lm |
| 7. | Lux@3m Mounting Height | lux > = 600 |
| 8. | IP Protection | IP65 |
| 9. | Housing | Aluminium Sheet |
| 10. | Driver | Internal |
| 11. | LED Type | HIGH POWER SMD LEDs |

| | | |
|-----|------------------------|--|
| 12. | Warranty on LED | 4 Years |
| 13. | Optics | Milky White Diffuser. LED not visible. |
| 14. | Luminaire Efficacy | $\geq 95 - 105$ lm/watt |
| 15. | Color Temp | ≥ 6500 K |
| 16. | Life of LED | 50,000 hours |
| 17. | Surge Protection | Available |
| 18. | Overvoltage Protection | Yes |
| 19. | Working Temperature | -10° C to $+ 50^{\circ}$ C |

ROOF TOP GREED CONNECTED SOLAR PHOTOVOLTIC SYSTEM SPECIFICATIONS

Asutosh college with financial assistance from Govt. of West Bengal has implemented Roof top greed connected solar photovoltaic system at the roof of main building. An array of 80 photovoltaic panels each capable of harvesting Maximum Power (Pmax) - 250 Wp thus an overall 2X10 kWp (maximum capacity) non-conventional energy harvesting unit has been installed. The green energy generated by the system is transferred to the grid and thus our college actively contributes in green energy generation.



ROOF TOP GREED CONNECTED SOLAR PHOTOVOLTIC SYSTEM

INVENTORY OF SPARES AT PROJECT SITE

LOA No.- WBREDA/59(2013)/NleT/-02/15-16/340, Dated 18.08.2016

WBREDA/59(2013)/NleT/-02/15-16/341, Dated 18.08.2016

PROJECT SUMMARY

Design & Engineering Manufacture/ Procurement, Testing, Supply, Installation and commissioning of 80 Nos Rooftop Grid Connected Solar PV Power Plants each of array capacity 20 kVA, including 5 years of Comprehensive Maintenance on turnkey Basis at the rooftop of Asutosh College Main building, address 92, S. P Mukherjee Road, Kolkata-26.

System at a Glance

| Sl. No | Item | Make | Unit | Qty. |
|--------|--|----------------|-------|------|
| 1 | Poly crystalline Solar PV Module of 250 Wp having 60 cells | Sunshine | Nos. | 80 |
| 2 | MS Structure for mounting SPV modules with Hot dip galvanized minimum 70 micron for 10kVA PV Array | Sunshine | Sets. | 02 |
| 3 | PV Array Junction Box (AJB) | Sunshine | Sets. | 02 |
| 4 | 10kVA, 415 V, 50 Hz AC Grid-Tied Inverter | ABB India Ltd. | Nos. | 02 |
| 5 | Web based On line data logger and remote Monitoring unit | ABB India Ltd. | Nos. | 02 |
| 6 | Inverter LT panel | Sunshine | Set | 02 |
| 7 | Grid Interfacing LT panel | Sunshine | Set | 02 |
| 8 | Kiosk (for Inverter and other accessories) | Sunshine | Set | 02 |
| 9 | 3Ø, 4 wire, 415 V AC 3X (20A-100A) whole current Export Import energy meter | SECURE | No. | 02 |
| 10 | Cables and Wiring materials | POLYCAB | Lot | 02 |
| 11 | 4C X 6 Sq. mm PVC insulated Cu cable from | MESCAB | Mtrs. | 100 |

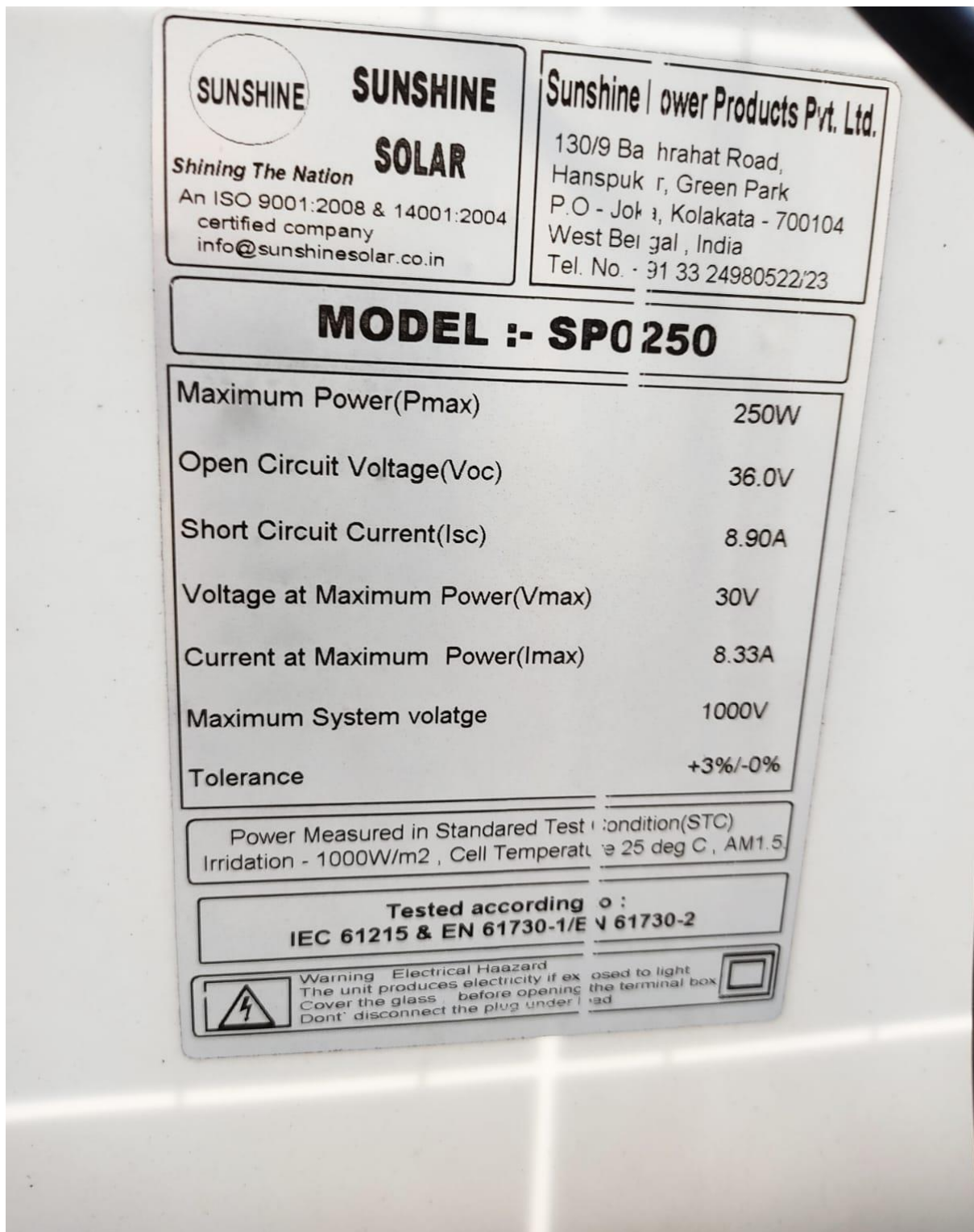
| | | | | |
|----|--|---------|-------|----|
| | Inverter LT panel to Point of common Coupling (Supply Mains) | | | |
| 12 | Equipment, Array structure Earthing as per technical specification with Chemical Gel Earthing System (4 Nos) | Reputed | Sets | 02 |
| 13 | Lighting arrangement (4ft., 40W, 230 V, 50 Hz, AC, Fluorescent Tube Light) | | Sets | 04 |
| 14 | PV array cleaning arrangement | | Sets. | 02 |
| 15 | Fire Extinguisher | | No. | 02 |
| 16 | Spares, Tools and Measuring Instruments | | Set | 1 |
| 17 | Signage | | | |
| | Project Information Signage | | Nos. | 04 |
| | Schematic Diagram | | No. | 02 |
| | Safety Signature as per site requirement | | Set | 02 |

SOLAR PV SYSTEM DESCRIPTION

The PV system configuration is the following:

- Maximum Power (P_{max}) - 1No. 250 Wp.
- Open Circuit Voltage (V_{oc}) - 36.0 V
- Short Circuit Current (I_{sc}) - 8.9 A
- Voltage at maximum power (V_{max}) - 30V
- Current at maximum power (I_{max}) - 8.33A
- Maximum System Voltage - 1000 V
- Tolerance - +3%- 0%

(Power measured in standard test condition (STC), irradiation 1000 w/m² , Cell temperature- 25°C, AM-1.5)



A TYPICAL PHOTOVOLTAIC PANEL SPECIFICATION

KEY FEATURES OF SOLAR PV SYSTEM

- Guaranteed power output
- Manufactured according to international quality and environment management system standard ISO 9001, ISO 14001
- 100% tested modules

- 5 years product warranty on workmanship
- 25 years linear output power warranty

QUALITY AND RELIABILITY OF SOLAR PV SYSTEM

- Maximum output by minimizing mismatch factor
- Anti-reflective glass captures more sunshine and increase the output power
- Ultra soft interconnect with stress release and high conductivity and increase current flow
- Lead free solder products health and environment friendly
- Best encapsulation to increase panel file
- Special type of Black sheet able to resist moisture even in marine area
- Corrosion and torsion resistant coating protects frame
- IP 65 rated junction box compatible cable connector and heat resistant diode allow modules to operate over a wide verity of temperature conditions.

CERTIFICATION OF SOLAR PV SYSTEM

- IEC 61215 assures us about the Quality of the modules.
- IEC 61730-1 & 2 assures us about the electrical and mechanical operating safety during its entire expected service life.
- IEC 61701 assures us about the working ability even in the marine area
- ISO 9001:2008 Quality management system
- ISO 14001:2004 Environment management system

SOLAR INVERTERS

PERFORMANCE DETAILS OF PVI-10.0/12.5 -TL-OUTD (10 to 12.5kVA)

- Designed for commercial usage, this PVI-10/12.5, three phase inverter is highly unique in its ability to control the performance of the PV panels, especially during the periods of variable weather conditions.
- The high speed and precise Maximum Power Point Tracking (MPPT) algorithm provides real time power tracking and improved energy harvesting.
- This transformer-less device has two independent MPPTs and efficiency rating up to 97.8%
- Flat efficiency curves ensures high efficiency at all output levels ensuring consistent and stable performance across the entire input voltage and output power range.
- The wide input voltage range makes the inverter suitable for low power installations with reduced string size.

HIGHLIGHTS OF PVI-10.0/12.5 -TL-OUTD (10 to 12.5kVA)

- True three-phase bridge topology for DC/AC output converter

- Transformer-less topology
- Each inverter is set on specific grid codes which can be selected in the field
- Wide input voltage range
- Dual input section with independent MPPT allows optimal energy harvesting from two-sub arrays oriented in different directions.

**APPLICATION FOR EXTENDING NET METERING FACILITY FOR GRID
CONNECTED SOLAR PV POWER PLANT OF CAPACITY 2X10 KW_p TO BE
INSTALLED AT OUR MAIN CAMPUS**

ASUTOSH COLLEGE

(ESTD. 1916)

92, S.P MUKHERJEE ROAD
KOLKATA-700026

Phone : 2455-4505/2454-2371/2372

Fax : (033) 2454-3329

E-mail : mail@asutoshcollege.in

Web : www.asutoshcollege.in

Ref. No. :

Date:29/11/2016

To
General Manager (Customer Relations)
CESC House, Chowringhee Square
Kolkata – 700001

Your Ref. No. WBREDA/105(2016)/611(1)

Date: 23/11/2016

Kind Attention: Shri Amitava Shome
(email ID: amitava.shome@rp-sg.in)

Subject: Application for extending net metering facility for the grid connected solar PV power plant of capacity 2 X 10KWp to be installed at our main campus

Our Consumer No: 85038015007

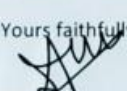
Dear Sir,

With reference to the above subject, we would like to inform you that we are going to install a grid connected solar PV Power plant of Capacity 2 X 10KWp at main campus,92, S. P. Mukherjee Road, Kolkata – 700026. The PV Power Plant will be connected to our internal electrical distribution system at the voltage level 3Ø 4 wire 400V, 50Hz.

We would now request to install Export-Import Energy Meter to avail net metering benefit.

Your early action will be highly appreciated.

Yours faithfully,


Dr. Dipak Kr. Kar
Principal
Asutosh College
Kolkata

Principal
ASUTOSH COLLEGE
KOLKATA - 28

Checked
By
29/11/16.

CESC APPROVAL



RP- Sanjiv Goenka
Group

Growing Legacies

CS- 296/16



Date: 05/12/2016

The Principal
Ashutosh College
92, S.P.Mukherjee Road,
Kolkata 700 026

Dear Sir,

*Setting up of Roof Top Grid Connected Solar
PV Source, capacity 2 x 10 KWp at 92, S.P.Mukherjee Road
Kolkata - 700 026
Consumer No. 85038015007
Customer ID No 85000024386*

We refer to your letter dated 29.11.2016 in respect of the above and would inform you that we have no objection regarding installation of roof top solar PV source at above.

We would inform you that metering, billing, payment and connection of the PV source to CESC's distribution system shall be in accordance with the Regulations of West Bengal Electricity Regulatory Commission and Central Electricity Authority as applicable.

For such connection, a connectivity Agreement is required to be entered between you and us (i.e. CESC Limited). Accordingly, a Draft Agreement is enclosed for your kind perusal.

Upon receipt of a confirmation from your end regarding installing and commissioning of the proposed Solar PV Plant, we would allow parallel operation of the Solar PV Source following entering into the Agreement, and satisfaction in respect of safety and connectivity issues.

We stand committed to our spirit of co-operation and service to you.

Yours faithfully,

Manager (SUB-South)

AGREEMENT WITH CESC



पश्चिम बंगाल पश्चिम बंगाल WEST BENGAL

01AB 343131

THIS AGREEMENT (hereinafter referred to as the "Agreement") is entered at Kolkata on the *Seventeenth* day of *March* 2017 by and between **CESC Limited**, a Company within the meaning of The Companies Act, 2013 and a Distribution Licensee under Section 14 of The Electricity Act, 2003, having its Registered Office at CESC House, Chowringhee Square, Kolkata - 700001 (hereinafter referred to as "CESC", which expression, unless excluded by or repugnant to the context or meaning thereof, shall be deemed to include its successors and assigns) of the **FIRST PART**.

190871

[Handwritten signature]

NAME.....
 ADD.....
 Rs.....
 14 DEC 2016
 S. CHATTERJEE
 Licensed Stamp Vendor
 C. C. Court
 2 & 3, K. S. Roy Road, Kol-1

14 DEC 2016

14 DEC 2016

[Handwritten signature]

ONE HUNDRED

ONE HUNDRED

ONE HUNDRED

-AND-

ASHUTOSH COLLEGE having its registered office at 92, S.P.Mukherjee Road, Kolkata 700 026, being the developer of Roof-top Solar PV source at its branch office at 92, S.P.Mukherjee Road, Kolkata 700 026 (hereinafter referred to as the "Consumer", which expression, unless excluded by or repugnant to the context or meaning thereof, shall be deemed to include its successors and permitted assigns) of the **SECOND PART**.

WHEREAS

- A. Consumer is in the process of installing 2 x 10 kWp Solar PV source at 92, S.P.Mukherjee Road, Kolkata – 700 026..
- B. Consumer is a Medium Voltage consumer of CESC having consumer number ~~85030015007~~: *16051004004* *JCH* *ATM*
- C. Consumer intends to interconnect the above Solar PV Source at its Medium Voltage distribution network available within the premises and run in parallel with CESC's Distribution System and accordingly applied to CESC for such interconnection.
- D. In terms of the West Bengal Electricity Regulatory Commission (Cogeneration and Generation of Electricity from Renewable Sources of Energy) Regulations, 2013 as amended (hereinafter referred to as the "**Renewable Sources of Energy Regulations**"), CESC agrees to allow interconnection and parallel operation of the Solar PV Source with CESC's Distribution System on the terms and conditions as mentioned in this Agreement.

NOW, THEREFORE, IT IS HEREBY AGREED BY AND BETWEEN THE PARTIES HERETO AS UNDER:

1. Consumer shall be responsible for the design, installation, operation and maintenance of the Solar PV Source and shall obtain and maintain any

required approvals / authorization from appropriate authorities as applicable from time to time;

2. Consumer shall comply with the requirements for installation and operation of the Solar PV Source as stipulated in relevant standards of Bureau of Indian Standard (BIS). If BIS Standards are not available for a particular material / subject, International Electro-Technical Commission (IEC) Standards, or any other relevant Standard shall be followed by the Consumer.
3. All equipment belonging to Consumer and connected to the Distribution System of CESC shall be of suitable design and shall be maintained to the reasonable satisfaction of CESC. The setting of fuses and relays on the Consumer's control gear as well as rupturing capacity of any of its Circuit Breakers shall be subject to CESC's satisfaction. In case any defect in any part of the Consumer's installation is discovered either by the Consumer or by CESC, Consumer shall, on its own or at the request of CESC, forthwith isolate/disconnect the faulty part of the installation from the circuit of CESC. CESC shall be under no responsibility whatsoever of any kind for and/or in connection with Consumer's installation or any apparatus of Consumer.
4. To avoid accidents, Consumer shall make necessary automatic arrangement for instantaneous disconnection of the Solar PV Source in case of loss of supply voltage from CESC's Distribution System. The Source should also have an arrangement to isolate itself immediately upon occurrence of abnormal condition, internal or external, without any damage through suitable protective gears and CESC shall not be responsible for damages, if any.
5. Consumer shall provide the certification that the contractor/ supplier for installation of the Roof-top Solar PV source has complied with IEEE – 929, IEC Standard or any other relevant standard relating to the recommended

practice for interconnection, standards for safety towards installation of PV Source etc.

6. Consumer shall not commence parallel operation of the Solar PV source without prior written approval of CESC.
7. Consumer shall provide suitable space for installing meters for net metering purpose as may be required for the connectivity.
8. Consumer shall pay the Meter Rent as admissible.
9. Consumer shall continue to be a consumer of CESC and all terms and conditions of the Agreement entered with CESC and subsequent renewal thereof shall continue to be followed.
10. CESC will issue electricity bill(s) in accordance with the tariff order, Renewable Sources of Energy Regulations and other relevant Regulations of the Hon'ble West Bengal Electricity Regulatory Commission (hereinafter referred to as the "Hon'ble Commission") at regular interval. At the beginning of each financial year, cumulative carried over injected energy from Solar PV source, if any, will be reset to zero in terms of Renewable Sources of Energy Regulations.
11. Monthly meter readings shall be taken by CESC. For each billing period CESC shall show in the bill the quantum of injected energy from Solar PV source into CESC's Distribution System, supplied energy by CESC, net billed energy for payment by Consumer and net carried over energy to the next billing period, if any, together with Demand Charge, Meter Rent etc. and the same shall be paid by Consumer within due date. Any delay in payment of

such bill(s) shall attract surcharge as per the order(s)/ regulations of the Hon'ble Commission.

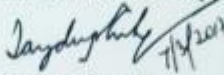
12. In the event of default in payment of bill(s) and/ or default in complying with any of the terms of this Agreement, CESC shall serve 15 (fifteen) days' notice to rectify the defect(s)/ defaults(s) and in case of defect(s)/ defaults(s) continuing thereafter, this Agreement may be terminated by CESC without serving further notice. This Agreement may be terminated by the Parties on mutual consent at any point of time.
13. Both the parties shall abide by the provisions of the Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources Regulations), 2013 and Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010 and any other relevant Regulations with regard to safety of operation and testing and installing of the Source, as applicable. Consumer shall comply with all directions of CESC with reference to safety, security and reliable operation of CESC's Distribution System.
14. Consumer shall furnish data as prescribed by CESC from time to time. Consumer shall install metering arrangement to measure electricity generation from the Solar PV Source and inform CESC about energy generation in kWh from the Solar PV Source every calendar month within 7 days of the subsequent month.
15. Consumer shall not indulge in unauthorised use of electricity or permit or allow electricity to be used beyond the limits of the said premises or carry out any unauthorised alteration/ extension/ reconnection. In case Consumer indulges in unauthorised use of electricity CESC shall forthwith disconnect the

service in terms of WBERC (Electricity Supply Code) Regulations, 2013 or any subsequent replacement of it. In the event Consumer fails to comply with the provisions of the applicable Act/Regulations/ Codes/ Rules, the service is liable to be disconnected upon serving 14days notice and without prejudice to any other action that CESC is entitled to.

16. CESC may disconnect the service for distress or damage to the electrical plants, electric lines or meter or for causing loss of human life in terms of WBERC (Electricity Supply Code) Regulations, 2013.
17. Consumer shall be responsible for and will make good to CESC all damages or injuries to the electric lines and/or apparatus of CESC due to accident or negligence on the part of Consumer or his employees or representatives or agents.
18. This Agreement shall remain in force from the date of its signing and execution and shall remain in force initially for a period of 25 (Twenty Five) years unless earlier terminated for any reason contained herein or otherwise.
19. This Agreement shall automatically be terminated in case the Consumer fails to qualify for energy adjustment in accordance with Clause 6.1 (v) (c) of the Renewable Sources of Energy Regulations (or any amendment thereof) or any other relevant Regulation.
20. This Agreement does not qualify as a Power Purchase Agreement under the Renewable Sources of Energy Regulations and the Parties also do not intend to consider this Agreement as a Power Purchase Agreement.
21. Save as hereinbefore specified or otherwise provided in the event of any dispute or difference arising at any time between Consumer and CESC with

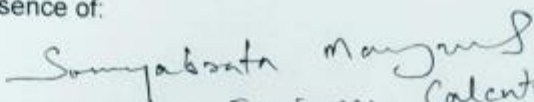
regard to any matter arising out of or in connection with this Agreement such dispute or difference shall be referred to the Hon'ble Commission for adjudication in terms of The Electricity Act, 2003.

IN WITNESS WHEREOF these presents have been entered into the day, month and year first above written.

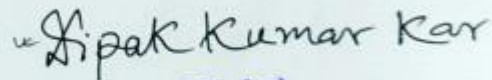

Manager (South)
South Regional Office
CESC Limited

SIGNED, SEALED and DELIVERED for and on behalf of CESC Limited by its Constituted

Attorney in presence of:


Signature : 
Occupation : District Engineer, Calcutta South District
Address : CESC Ltd, 6, Mandeville Gardens, Kol-19

SIGNED, SEALED and DELIVERED for and on behalf of Ashutosh College by its Principal



Principal
ASHUTOSH COLLEGE
KOLKATA - 98

in presence of :

Signature : 
Occupation : Associate Professor
Address : 1, Chanditala Lane
Kolkata - 700040.



COMMISSIONING REPORT OF GRID CONNECTED SOLAR PHOTOVOLTAIC

Grid Connected SPV power plant of 2X10 kVA capacity has been installed by SUNSHINE Power Products Private Limited, Bakrahat Road, Hanspukur Green Park, PO-Joka, Kolkata-700104 as per direction of


West Bengal Renewable energy Development Agency (WBREDA) , Bikalpa Shakti Bhavan, Plot Number J1/10, Block-EP & GP Sector - V, Salt Lake Electronics Complex , Kolkata-700091 on **20.04.2017** without installation of bi-directional meter. The system is as per BIS/MNRE specifications.

PROJECT HANDOVER DETAILS

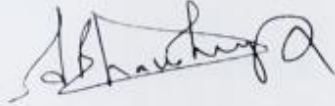
West Bengal Renewable energy Development Agency (WBREDA) handed over the asset to Asutosh College on **01.06.2017** as created by installation of grid connected roof top solar PV power plant of PV Array capacity 2X10 kVA in full working and operating condition along with bill of materials and project documents. WEBREDA shall be the **“Principal of the Project”** during defect Liability period of the power plant.

COMMISSIONING REPORT (PROVISIONAL) FOR GRID CONNECTED SOLAR
PHOTOVOLTAIC POWER PLANT (with Net-metering facility)

Certified that a Grid Connected SPV Power Plant of 2x10kWp capacity has been installed at the site **Ashutosh Collage . No. 92, Near Cancer Hospital, Shyamaprasad Mukherjee Road, Kolkata, Pin -700026** district Kolkata of West Bengal which has been installed by **M/S SUNSHINE Power Product Pvt. Ltd.** on 20/04/2017. The system is as per BIS/MNRE specifications. The system has been checked for its performance on 20/04/2017 without installation of bi- directional meter and it is working satisfactorily. The system is suitable for installation of bi- directional and gross energy meters.

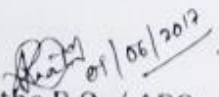


Signature of the beneficiary **Dr. Dipak Kumar Kar**
(Principal)
Principal
ASUTOSH COLLEGE
KOLKATA - 26



(SUNSHINE POWER PRODUCT PVT Ltd.)

Signature of the rep. of supplier
With name, seal and date



Signature of the P.O. / APO
With name, date and seal

S.A.E
W.B.R.E.D.A. (PRASANTA MAITI)



Handover – Takeover Note

Name of the project: **10 KWp** on Grid connected Roof top Solar PV Power Plant.

Installation Site: **Ashutosh College**

Project funded by: i) Govt. of West Bengal
ii) MNRE, Government of India.

End user: **Ashutosh College**

Name & Address of the Implementing Agency: West Bengal Renewable Energy Development Agency (WBREDA)
Bikalpa Shakti Bhavan, Plot No.J1/10, Block - EP & GP, Sector - V, Salt Lake Electronics Complex, Kolkata - 700 091.
Ph.No.(033) 23575038/5348 Fax.(033) 23576569
E_mail ID : cewbredagedcl@gmail.com
Mob No.

Executing Agency: SUNSHINE Power Products Pvt. Ltd
Bakrahat Road, Hanspukur Green Park
PO- Ioka, Kolkata-700104
Contact No: +91 33 2498 0522
Fax: +91 33 2498 0508

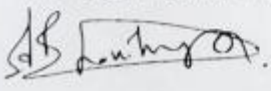
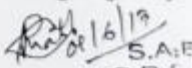
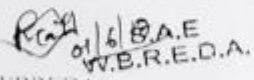
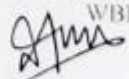

Date of handing over: 01.06.2017

West Bengal Renewable Energy Development Agency (WBREDA) is handing over the assets on 01.06.2017 as created by installation of grid connected roof top solar PV power plant of PV Array capacity **2X10 kWp** at Ashutosh College to Ashutosh College in full working and operating condition along with bill of materials Ashutosh College is taking over the assets along with the project document with the terms and conditions as mentioned herein under However WBREDA shall be the "Principal of the Project" during defect Liability period of the Power plant :

Terms and conditions:

1. Ownership of project will rest with the **Ashutosh College herein after called 'Institute'**. The asset of this project shall not be transferable. At the end of the life of the project the materials shall be disposed of properly.
2. The **Institute** shall arrange for adequate security of the systems to be installed under the project and shall ensure protection of the system in order to avoid tempering and any unforeseen affair which may cause damage to the system.
3. The **Institute** shall maintain and monitor regular performance of the power plant. In case of any mal functioning of the system, Institute shall directly contact with the Executing Agency with an intimation to WBREDA.
4. WBREDA shall be the "**Principal of the Project**"
5. WBREDA shall have right to access in respect of study, analysis for evaluation of the performance of the project.
6. The **Institute** shall allow the officials of WBREDA, MNRE Government of India or their authorized representative to access the project site after giving intimation to the Institute.
7. WBREDA and the **Institute** shall be entirely responsible for protecting the confidentiality of all data, technology and strategies mutually exchanged for implementation and success of the project
8. The complete PV Power Plant shall be warranted for a period of **five years**. WBREDA shall ensure warranty obligation through SUNSHINE POWER PRODUCTS PVT. LTD who has executed the work.
9. The **Institute** shall provide the Internet connectivity and rental charge of Internet for the PV power plant for Remote Monitoring System.
10. The **Institute** shall take up the necessary formalities with the utility to avail Net metering benefit.
11. The **Institute** shall responsible to upkeep the PV Power plant and also keep close contact with the Executive Agency for breakdown and preventive maintenance.

12. The **Institute** shall arrange as and when so required regular cleaning of PV Array as and when so required, at their own cost.
13. The institute shall arrangement the capital maintenance, if required after expiry of Guarantee Period to ensure the trouble free operation of the PV power plant.
14. The institute shall enter into an Annual Maintenance Contract (AMC) after expiry of Guarantee Period to ensure the trouble free operation of the PV power plant.
15. The **Institute** shall designate one of their officials as the as the Nodal officer to look after the project.
16. The detail of the Assets has been submitted to the **Institute** to maintain the Asset Register and future guidance.
17. The Operation and day-to-day maintenance training of the system has been given to the **Institute**.

| | |
|---|--|
| Handed over to WBREDA by  (On behalf of Executing Agency) Witness (On behalf of the Executing Agency) | Taken over by WBREDA from the Executing Agency  (On behalf of WBREDA) Witness (On behalf of WBREDA) |
| Signature Name D:..... | Signature Name D:..... |
| Handed over to the Beneficiary Organization by WBREDA  (On behalf of WBREDA) | Taken over by Beneficiary Organization from WBREDA  Dr. Dipak Kumar Kar (On behalf of Beneficiary Organization) Principal |
| Witness (On behalf of the WBREDA) Signature Name D:..... | Witness (On behalf of Beneficiary Organization) Signature  Name Goutam Mahapatra Associate Prof. and Head Dept. of Comp. Sc. |



SOLAR PV GRID CONNECTED POWER PLANT SYSTEM MAINTENANCE RECORD

Date -

Work Order No.- WBREDA/59(2013)/NleT-02/15-16/340 Dated: 18.08.2016 & WBREDA/59(2013)/NleT-02/15-16/341 Dated: 18.08.2016

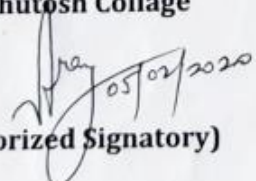
TO WHOM IT MAY CONCERN

This is to certified that the representative of M/S- Sunshine Power Products Pvt. Ltd. has visited at site for maintenance of 2X10KWp Solar PV Grid connected Power Plant System to do the following job -

- a. Checking and tightening of all electrical connections.
- b. Checking and tightening of all mechanical fittings.
- c. Checking the earthing systems
- d. Cleaning of Modules, Inverter, and other equipments.
- e. Checking all electrical parameters.
- f. Overall checking of the systems health for smooth functioning.

The SPV Power Plant System working satisfactorily.

For **Ashutosh Collage**


(Authorized Signatory)

PRESENT MEMBERS OF THE PLANT (2017 ONWARDS)

Conveners

- Dr. Surjya Sarathi Bhattacharyya, Assistant Professor in Physics
- Dr. Kunal Sinha, Assistant Professor in Electronics

Members:

1. Dr. Parikshit Dutta, Assistant Professor in Physics
2. Dr. Aditi Das, Assistant Professor in Physics
3. Dr. Sourav Kumar Bhowmick, Assistant Professor in Electronics
4. Dr. Rabia Sultana, Assistant Professor in Electronics
5. Sri Arnab Samaddar, SACT in Electronics
6. Smt. Madhurima Chatterjee, SACT in Electronics

ACTIVITIES (2016 ONWARDS)

1. The solar panels were cleaned thoroughly with fresh water in every 3 months and monitored regularly to keep them free from dust, bird droppings or fallen leaves to secure their optimum performance.
2. Electrical circuitry and Batteries are serviced in every 3 months.