

Environmental Consciousness and Sustainability

7.1.3 (QnM) The Institution has facilities for alternate sources of energy and energy conservation devices (data for the preceding academic year)

Solar energy		Wind energy		Sensor-based energy conservation		Biogas plant		Use of LED bulbs/power efficient equipment	
Yes		Yes		Yes		Yes		Yes	



Sri Manakula Vinayagar Medical College and Hospital

Kaarthikaarthi Kuppam, Puducherry - 605 107, Ph.: 0413 - 2643000, Fax: 0413 - 2643014

Purchase Order

Supplier Name & Address :

M/s ARJUNA ASSOCIATES

1, Chairman Chintambaram Street, Near KVR guest house,

WEST SHANMUGAPURAM, VILLUPURAM,

TAMIL NADU - 605102, Ph.: 04146221222

GSTIN : 34AAAATM9599A1ZE

P.O. No. : PO1907043

P.O. Date : 02/07/2019

Delivery Date : 06/07/2019

REF :

We confirm our order on your for the following subject to the terms and conditions contained herein.

S.No.	Item Name	Brand/Model/Spec.	Qty	Rate	Disc. %	CGST %	SGST / UGST %	IGST %	Amount
1	Automatic Water Level Controller	Arjun / Nil / Nil	5	4200.00	0.00	0.00	0.00	0.00	21000.00
	Installation charges	FUTURENET / Nil / Nil	5	500.00	0.00	0.00	0.00	0.00	2500.00
3	SENSOR	Arjun / Set / Nil	5	400.00	0.00	0.00	0.00	0.00	2000.00

* Total Value should not be Less than

Gross Amount (Rs.) :	25,500.00
Additional Charge (Rs.) :	0.00
CGST Amount (Rs.) :	0.00
SGST / UGST Amount (Rs.) :	0.00
IGST Amount (Rs.) :	0.00
Net Amount (Rs.) :	25,500.00

Amount in Words : RUPEES TWENTY FIVE THOUSAND FIVE HUNDRED ONLY

Warranty Details : One year from the date of installation

Loc of Delivery : At Our Hospital

Mode of Despatch : Direct Supply

Payment Terms : 100% Advance Payment

Inc. Details : Not Applicable

Other Instructions : Any dispute will lie only with in the Jurisdiction of Pondicherry Court

Other Charges :

Indent Reference : Indent Ref No : 3764 Indent Date : 02/07/2019 Indent Dept.: Electrical Maintenance

Use : Material for 1. Hospital Surgi 2. Medical college surgic 3. Asst professor qtrs surgic 4. Ladies hostel Phase I

Emp No. At hospital camp



Sri Manakula Vinayagar Medical College and Hospital

Kalitheerthal Kuppam, Puducherry - 605 107. Ph.: 0413 - 2643000. Fax: 0413 - 2643014.

Work Order

Supplier Name & Address :

M/S. INNOVATIVE DOOR SOLUTION

NO.282, 13TH STREET, PORUR GARDEN,PHASE I, VANAGARAM,
CHENNAI,CHENNAI.,

TAMIL NADU - 600 116 Ph.:044-23862367

W.O. No. : WO1611013

W.O. Date : 08/11/2016

Rev W.O. No. :

W.O. Ref. No. : Your quotation no. IDS/Q-1814(Rev2)/2016-17, date: 08.11.16

P.O. Ref. No. : None

Kind Attention : Mr. Ramesh

Sir,

Sub : Work order for Hospital main entrance sliding glass door works at SMVMCH campus.

We are pleased to place our order for the following items to the terms and conditions contained herein.

S.No.	Items Description	UOM	Qty	Rate	Total Amount
1	AUTOMATIC SLIDING DOOR Providing and fixing of Automatic sliding door of Dorma(Make: DORMA ES 200 STD 6.25 MTR compliant with future European standards and produced according to the guidelines for power-operated windows, doors and gates, BGR 232, the UVV and the VDE regulations.TÜV design tested, tested according to the low voltage guidelines, production according to ISO 9001:2000 certification, fulfils DIN V18650 (as perEN 12650) standards, modular design including internal cover, Operator dimensions (H x D) : 100 x 180 mm and of length as required to suit the opening size given below. The track profile should be separate from the main profile for enabling reduction in noise and providing vibration insulation.with clear passage size of 2400 mm x 2820 mm of double moving panels ,double fixed panels supported with DORMA UK Connector , Further door shall be operator profile, Mechanical component, Electrical component,including 2 nos of 1550mm glass clamping rail, 2nos of light barriers, 2 no. of radar , 2nos of floor Guide for glass door,Program Switch with cable, EM lock & Soft Nose Seals, fixture plates for light barriers including 12 mm toughened clear glass as detail in the drawing and instructed by manufacture and directed by Engineer incharge (Location: Main Entrance)	Nos			
1.a	AUTOMATIC SLIDING DOOR ES 200 STD Automatic sliding door operator 6.25 Mtr type A	Nos	1.00	327,335.00	327,335.00
1.b	AUTOMATIC SLIDING DOOR UK Connector	Nos	12.00	2,020.00	24,240.00
1.c	AUTOMATIC SLIDING DOOR wall connecting profile for 12mm glass - Non security version	Nos	6.00	5,398.00	32,388.00
1.d	AUTOMATIC SLIDING DOOR Soft nose Seal for 12mm glass	Nos	4.00	1,200.00	4,800.00
2	12MM GLASS PARTITION				

No.	Items Description	UOM	Qty	Rate	Total Amount
	Providing and fixing of 12mm glass partition using Wall connecting profile basic version in the glass top & bottom with proper accessories. Profile dimensions (H x D) : 38 x 40 including 12 mm toughened clear glass as detail in the drawing and instructed by manufacture and directed by Engineer incharge.	Sq.Ft.			
2.a	12MM GLASS PARTITION				
	12MM Clear Toughened Glass ✓	Sq.Ft ✓	344.00 ✓	190.00 ✓	65,360.00 ✓
2.b	12MM GLASS PARTITION				
	CSK Holes on Glass ✓	Nos ✓	12.00 ✓	200.00 ✓	2,400.00 ✓
2.c	12MM GLASS PARTITION				
	sealant ✓	Nos ✓	10.00 ✓	150.00 ✓	1,500.00 ✓
3					
	Installation charges for operator ✓	Nos ✓	1.00 ✓	15,000.00 ✓	15,000.00 ✓
4					
	Installation charges ✓	Sq.Ft ✓	344.00 ✓	100.00 ✓	34,400.00 ✓
* Decimal Value Rounded off for Two Digit				Gross Amount (Rs.) :	507,423.00 ✓
Rupees in Words : RUPEES FOUR LAKHS SIXTY-SIX THOUSAND SIXTY AND TWENTY-FIVE PAISA ONLY				Discount Amount (Rs.) :	104,966.01 ✓
				Service Tax (Rs.) :	7,410.00 ✓
				VAT Amount (Rs.) :	51,193.26 ✓
				Adl. Amount (Rs.) :	5,000.00 ✓
				Net Amount (Rs.) :	466,060.25 ✓

Terms and Conditions

- | | | |
|---|-----------------------|---|
| 1 | Tax | 1. Vat - 14.50% for Item no. 1.a to 2.c ✓
2. Service tax - 15% for item No. 3 to 4 ✓ |
| 2 | Date of Completion | Within 10 working days from the receipt of order along with advance payment ✓ |
| 3 | Payment | 70% advance payment ✓
20% after material delivery ✓
Balance 10% against installation. ✓ |
| 4 | Discount | 27% inclusive (Item no. 1.a to 1.d) ✓ |
| 5 | Warranty | One year from the date of installation ✓ |
| 6 | Retention | The retention amount 5% should be deduct in every running bills certification ✓ |
| 7 | Performance guarantee | Due to performance guarantee 5% of bill value should be deduct every month bill and it will be paid after four month completion of certification months ✓ |
| 8 | Other Details | 1. Scaffolding client scope ✓
2. If need any steel or wood support client scope ✓
3. Tolerance & Forms for flat toughened glass (Deviation of Form +/- 3mm, Straightness of edge < 3mm/m, Twisting < 4mm/3mm ✓
4. Additional amount Rs. 5,000/- for Transport charges ✓
5. Any dispute will lie only with in the jurisdiction of Pondicherry Court. ✓ |

S.No.	Items Description	UOM	Qty	Rate	Total Amount
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For Sri Manakula Vinayagar Medical College and Hospital

Administrative Officer

I accept the above all terms and conditions.

Supplier's Signature

Copy to:

- Civil Store.
- Related Departments.
- Purchase Department.

Mr. Ganesan
Chairman 9-11-16
[Signature]



SERVICE INVOICE

Original - Buyer's Copy

INNOVATIVE DOOR SOLUTION
 No.282, 13th Street, Porumbagdan Phase 1
 Vanagaram, Chennai-600 116
 Contact : 23862367, 9884618717/9884608717
 E-Mail : solutioninnovative@gmail.com
 www.idsgroup.in

Invoice No. **ID-10141** Dated **22-Nov-2016**
 Delivery Note Mode/Terms of Payment
 Supplier's Ref Other Reference(s)

Buyer
Sri Manakula Vinayagar Medical College and Hospital
 Kalitheerthal Kuppam,
 Pondicherry-605102
 Phone 0413-2643000

Buyer's Order No. **WO1611013** Dated **8-Nov-2016**
 Despatch Document No. Delivery Note Date
 Despatched through Destination
 Terms of Delivery

Sl No	Description of Goods	Quantity	Rate	per	Amount
1	Installation Charge - Operator	1 Nos	15,000.00	Nos	15,000.00
2	Installation Charges (Sq.Ft)	344.00 Sq.Ft	100.00	Sq.Ft	34,400.00
		344.00			49,400.00
	Output Service Tax @ 14%			14 %	6,916.00
	Swetch Bharath Cess @ 0.5%			0.50 %	247.00
	Krishi Kalyan Cess @0.5%			0.50 %	247.00
	Total				₹ 56,810.00

Amount Chargeable (in words)
INR Fifty Six Thousand Eight Hundred Ten Only

Less : Retention 5% = 2840.50(-)
53969.50

Rs - 53969/-

Company's VAT TIN : 33261122481
 Company's CST No. : 869242 DT:05-04-2007
 Company's Service Tax No. : AAFFD8126MST001
 Company's PAN : AAFFD8126M

Declaration
 We declare that this invoice shows the actual price of the goods described and that all particulars are true and correct.

Bill checked & certified
 with payment deduction
 for INNOVATIVE DOOR SOLUTION
 Authorized Signatory



26/11

SALES INVOICE

Original - Buyer's Copy

INNOVATIVE DOOR SOLUTION
 No. 282, 13th Street, Porurgarden Phase-I
 Vanagaram, Chennai 600 116
 Contact : 23862367, 9884618717/9884608717
 E-Mail : solution.innovative@gmail.com
 www.idsgroup.in

Invoice No.	Dated
IDS-10935	22-Nov-2016
Delivery Note	Mode/Terms of Payment
IDS-11294	
Supplier's Ref.	Other Reference(s)

Buyer
Sri Manakula Vinayagar Medical College and Hospital
 Kalitheerthai Kuppam,
 Pondicherry- 605107
 Phone : 0413-2643000

Buyer's Order No.	Dated
WO1611013	8-Nov-2016
Despatch Document No.	Delivery Note Date
	22-Nov-2016
Despatched through	Destination
TN 20 CV 1252	
Terms of Delivery	

S. No.	Description of Goods	Quantity	Rate	per	Amount
1	ES 200 Standard 6.25 Operator	1 Nos	2,38,954.55	Nos	2,38,954.55
2	UK Connector	12 Nos	1,474.60	Nos	17,695.20
3	WCP with Cover-12mm Non Safety	6 Nos	3,940.54	Nos	23,643.24
4	Softnose Seal 10/12mm 2.5mtr	4 Nos	876.00	Nos	3,504.00
5	12mm Clear T/Glass (Sq.Ft)	344.000 Sq.Ft	190.00	Sq.Ft	65,360.00
6	CSK Holes	12 Nos	200.00	Nos	2,400.00
7	Sealant	10 Nos	150.00	Nos	1,500.00
					3,53,056.99
			CST@14.5%	14.50 %	51,193.26
			Transport Charges		5,000.00
			Round Off		(-0.25)
					₹ 4,09,250.00

Amount Chargeable (in words)
 INR Four Lakh Nine Thousand Two Hundred Fifty Only

Less: Advance payment = $\frac{3,26,242.00(-)}{8,3008.00}$
 Less: Retention 5% = $\frac{20,462.50(-)}{6,2545.50}$
 Balance payment = $\frac{6,2545.50}{}$

Company's VAT TIN : 33261122481
 Company's CST No. : 869242 DT:05-04-2007
 Company's Service Tax No. : AAFFD8126MST001
 Company's PAN : AAFFD8126M

Declaration
 We declare that this invoice shows the actual price of the goods described and that all particulars are true and correct.

Rs - 62545/-
 Bill checked & verified with payment deduction
 N. S. [Signature]
 Authorized Signatory
 24/11/16

SUBJECT TO CHENNAI JURISDICTION
 This is a Computer Generated Invoice

Received
 26/11/16

Your Satisfaction Our Perfection!



Sri Manakula Vinayagar Medical College and Hospital

(B)

Kalitheerthai Kuppam, Puducherry - 605 107. Ph.: 0413 - 2643000. Fax: 0413 - 2643014.

Work Order

Supplier Name & Address :
NIRMAL BIO-GEN TECHNOLOGY
KUPALLAM POST, VIA., KUMULI, IDUKKI DT.,
Kerala,
Pin - 685 509 Ph.: 04868-282866

W.O. No. : WO1611008
W.O. Date : 04/11/2016

W.O. No. :
D. Ref. No. : Your quotation no. nil, dated: 16.10.16
I. Ref. No. : NONE
Attention : Mr. V.R. RAJENDRAN

Work order for Designing, Engineering and commissioning of HU-Methane Gas plant based on Night Soil and other organic waste works at SMVMCH campus.

Items Description	UOM	Qty	Rate	Total Amount
Designing, Engineering and commissioning of HU - Methane Gas Plant based on Night Soil and other organic waste. Plant capacity - 120 Cum Gas Production daily - 30 Kg	Nos	1.00	2,600,000.00	2,600,000.00

Final Value Rounded off for Two Digit
Amount in Words : RUPEES TWENTY-SIX LAKHS ONLY

Gross Amount (Rs.) :	2,600,000.00
Discount Amount (Rs.) :	0.00
Service Tax (Rs.) :	0.00
VAT Amount (Rs.) :	0.00
Adl. Amount (Rs.) :	0.00
Net Amount (Rs.) :	2,600,000.00

21/11/16

o. Items Description	UOM	Qty	Rate	Total Amount
Terms and Conditions				
1 Tax	1. Sales tax extra at actual ✓ 2. Excise duty is not applicable to your products. In case the excise duty is applicable at the time of dispatch or commissioning or before completion - Extra ✓			
2 Date of Completion	12 to 15 Weeks time from the date of receipt of work order along with the payment ✓			
3 Payment	50% advance payment ✓ 25% on completion of RCC work at the digester bottom. ✓ 15% on completion of site works. ✓ 10% on completion of the plant. ✓			
4 Warranty	All the materials supplied guaranteed against defective material/ workmanship for a period of one year from the date of commissioning or one year and three months from the date of receipt. ✓			
5 Retention	The retention amount 5% should be deduct in every running bills certification ✓			
6 Penalty	If for reasons beyond the control of the contractor except force majeure the completion of work is not possible within the time stipulated, the client shall lay penalty on certified bill value per week up to a maximum of 3% of the certified bill value/ contract value whichever is higher. The penalty clause is applicable after agreement period. ✓			
7 Performance guarantee	Due to performance guarantee 5% of bill value should be deduct every month bill and it will be paid after four month completion of certification months ✓			
8 Other Details	1. Details enclosed in annexure - 1 ✓ 2. Any dispute will lie only with in the jurisdiction of Pondicherry Court. ✓			

For **Sri Manakula Vinayagar Medical College and Hospital**

Administrative Officer

m. s. s. s.

Chairman 9-11-16

Prinip

I accept the above all terms and conditions.

Supplier's Signature

Copy to:

Civil Store.
Related Departments.
Purchase Department.

Tax Invoice

(DUPLICATE FOR TRANSPORTER)

K-Lite Industries
 D10, AMBATTUR INDUSTRIAL ESTATE
 AMBATTUR
 CHENNAI - 600 058
 Ph.No.26257710,48581950
 Fax.No.26257866,26243600
 GSTIN/UIN: 33AAAFK2474N1Z8
 State Name: Tamil Nadu, Code: 33
 E-Mail: info@k-lite.in,accounts@k-lite.in site:www.k-lite.in

Invoice No. **645** Dated **15-May-2019**
 Delivery Note Mode/Terms of Payment
 Supplier's Ref. Other Reference(s)

Consignee
SRI MANAKULA VINAYAGAR MEDICAL COLLEGE AND HOSPITAL
KALITHEERTHAL KUPPAM
PONDICHERRY - 605 107
INDIA
 GSTIN/UIN : 34AAATM9599A1ZE
 State Name : Puducherry, Code : 34

Buyer's Order No. **PO1903402** Dated **16-Mar-2019**
 Dispatch Document No. Delivery Note Date
 Despatched through Destination

Buyer (if other than consignee)
SRI MANAKULA VINAYAGAR MEDICAL COLLEGE AND HOSPITAL
KALITHEERTHAL KUPPAM
PONDICHERRY - 605 107
INDIA
 GSTIN/UIN : 34AAATM9599A1ZE
 State Name : Puducherry, Code : 34
 Place of Supply : Puducherry

Terms of Delivery

Sl. No.	Description of Goods and Services	HSN/SAC	Quantity	Rate	per	Amount
1	4179 KL -OJAS 50W LED WITH TWINKLE FLACO LIGHTING POLE SA HT-5500MM(KP-8333*)	94064090	59 NOS	17,821.10	NOS	10,51,444.90
2	8333*KP-TWINKLE FLACO LED LIGHTING POLE SA HT-5500MM	94054090	1 NOS	15,846.60	NOS	15,846.60
						10,67,291.50
		998519			12 %	14,000.00
						1,29,754.98
						(-)0.48
	Total		60 NOS			₹ 12,11,046.00

Amount Chargeable (in words) **INDIAN RUPEE Twelve Lakh Eleven Thousand Forty Six Only** E. & O.E

HSN/SAC	Taxable Value	Rate	Integrated Tax Amount	Total Tax Amount
94054090	10,67,291.50	12%	1,28,074.98	1,28,074.98
998519	14,000.00	12%	1,680.00	1,680.00
Total	10,81,291.50		1,29,754.98	1,29,754.98

Tax Amount (in words) : **INDIAN RUPEE One Lakh Twenty Nine Thousand Seven Hundred Fifty Four and Ninety Eight paise Only**

Remarks:
 OC NO: 34958-2
 Declaration
 We declare that this invoice shows the actual price of the goods described and that all particulars are true and correct.
 Customer's Seal and Signature

Company's Bank Details
 Bank Name : **HSBC BANK**
 A/c No. : **042-690297-001**
 Branch & IFS Code: **CHENNAI MAIN BRANCH & HSBC0500002**

Prepared by *[Signature]* Verified by *[Signature]*
 Authorized Signatory *[Signature]*

7+4
7.13.3

SRI MANAKULA VINAYAGAR MEDICAL COLLEGE & HOSPITAL

Kalitheerthalkuppam, Madagadipet – 605 107.

DEPARTMENT OF ELECTRICAL MAINTENANCE (Hospital)

Date: 06.08.2018

7.1.3.1. – Annual power requirement met by Renewable energy sources

- Power requirement met by renewable energy sources – 300 KW – A
- Total power requirement – 500 KW – B

$$A/B \times 100 - 300/500 \times 100 = 60 \%$$

7.1.4.1. Annual lighting power requirement met through LED bulbs

- Lighting power requirement met through LED bulbs – 9.23 KW – A
- Total lighting power requirements – 82.5 KW – B

$$A/B \times 100 - 9.23/82.5 \times 100 = 11.18\%$$


Electrical Incharge

SRI MANAKULA VINAYAGAR MEDICAL COLLEGE & HOSPITAL

Kalitheerthalkuppam, Madagadipet – 605 107.

DEPARTMENT OF ELECTRICAL MAINTENANCE (College)

Date: 06.08.2018

7.1.3.1. – Annual power requirement met by Renewable energy sources

- Power requirement met by renewable energy sources – 100 KW – A
- Total power requirement – 350 KW – B

$$A/B \times 100 - 100/350 \times 100 = 28.5 \%$$

7.1.4.1. Annual lighting power requirement met through LED bulbs

- Lighting power requirement met through LED bulbs – 1.5 KW – A
- Total lighting power requirements – 32.3 KW – B

$$A/B \times 100 - 1.5/32.3 \times 100 = 4.6 \%$$


Electrical Incharge

Plant Portfolio Manager



Home Plants Events Help

EUPHORIA GREENTECH 🔍 👤

Portfolio	History	Last 24 hours
Plants	1 Last 30 Days	Energy 881
Installed Capacity	211.71 kW Last 30 Days	35.58 kW

List Grid Map

Status	Plant	Performance	System Size	Install Date
🟢	EGT - MVMT	not configured	211.71 kW	2019-02-05



BIOGAS PLANT





Angalamman temple
Unnamed Road, Kalitheerthalkuppam, Tamil Nadu 605108, India

RI MURUGAN
MPLE

Manakula
Institute of
Perunthalaiva
Kamarajar Arts College

Muthamil Vay
Madagadipe

Kalitheerthalkuppam
Tamil Nadu
India

34°C
93°F

2019-07-16(Tue) 04:12(PM)





सत्यमेव जयते

INDIA NON JUDICIAL
Government of Puducherry

e-Stamp

Certificate No.	: IN-PY25259253739098Q
Certificate Issued Date	: 11-Jun-2018 03:15 PM
Account Reference	: IMPACC (SH)/ pyshimp17/ THIRUKKANUR/ PY-PU
Unique Doc. Reference	: SUBIN-PYPYSHIMP1740566888204720Q
Purchased by	: SRI MANAKULA VINAYAGA EDUCATIONAL TRUST
Description of Document	: Article 5 Agreement or Memorandum of Agreement
Property Description	: AGREEMENT
Consideration Price (Rs.)	: 0 (Zero)
First Party	: EUPHORIA GREEN TECHLONOGIES CHENNAI
Second Party	: SRI MANAKULA VINAYAGA EDUCATIONAL TRUST
Stamp Duty Paid By	: SRI MANAKULA VINAYAGA EDUCATIONAL TRUST
Stamp Duty Amount(Rs.)	: 100 (One Hundred only)



.....Please write or type below this line.....

ENGINEERING, PROCUREMENT & CONSTRUCTION AGREEMENT

This Engineering, Procurement & Construction Agreement (hereinafter referred to as the "Agreement") is entered into on this Thirteenth day of June, 2018 at Puducherry

BY and BETWEEN

M/s Euphoria Green Technologies, Chennai, having Office at No. 21, PSG Tam Flats, 29/33, North Mada Street, Srinagar Colony, Chennai – 600015

For Sri Manakula Vinayaga Educational Trust

For EUPHORIA GREEN TECHNOLOGIES

Proprietor

Chairman and Managing Director
TQ 0003710582

Statutory Alert:

1. The authenticity of this Stamp Certificate should be verified at "www.stcstamp.com". Any discrepancy in the details on this Certificate and as available on the website renders it invalid.
2. The onus of checking the legitimacy is on the users of the certificate.
3. In case of any discrepancy please inform the Competent Authority.

the "CONTRACTOR" which expression shall where the context so admits be deemed to include its executors, administrators, representatives and permitted assigns) of the ONE PART;

AND

Sri Manakula Vinayaga Educational Trust SMVET, legal owner of the premises, having its Administrative Office at Kalitheerthalkuppam, Madagadipet, Puducherry - 605107, who intend to get installed the solar PV system, at their SMVMCH Campus at Kalitheerthalkuppam, Puducherry and at SMVEC Campus at Madagadipet, Puducherry (here in after referred to as the "CUSTOMER" which expression shall where the context so admits be deemed to include its heirs, executors, administrators, representatives and permitted assigns) of the OTHER PART;

The expressions "CONTRACTOR" and "CUSTOMER", wherever the context so permits or requires shall collectively be referred to as "Parties" and individually as the "Party".

WHEREAS:

A. M/s Euphoria Green Technologies, Chennai is a REAP Empanelled Vendor/System Integrator for Installation and Commissioning of Grid Connected Solar Rooftop Power Plant System in UT of Puducherry, who offers comprehensive Solar solutions to Governments, Corporate houses, Villages, Industries and other consumers in UT of Puducherry and other parts of the country.

B. CUSTOMER is a Public Trust which runs various educational institutions in Puducherry.

C. CUSTOMER enters into this Agreement with the CONTRACTOR for Survey, Design, engineering, procurement & construction of a Grid connected Rooftop Solar PV System on the Rooftops of various buildings at their SMVMCH Campus at Kalitheerthalkuppam and SMVEC Campus at Madhagadipattu, Puducherry, as detailed in the Schedule A, including warranty and operation and maintenance for a period of five years from the date of commissioning of the System.

NOW, this Agreement witnessed as follows:

I. PURPOSE & SCOPE OF THE AGREEMENT


Scope of the Project

1.1 The scope of the Project (the "Scope of the Project") shall mean and include, during the Agreement (Contract) Period:

- a. Survey, Design, procurement, construction and commissioning of the rooftop solar generation project development as per
 - i. the scope defined in Schedule A
 - ii. at sites specified in Schedule B,
 - iii. in conformity with the Technical Specifications and Standards set forth in Schedule C and
 - iv. Interconnection requirements set forth in Schedule D;
- b. operation and maintenance of the solar rooftop project in accordance with the provisions of this Agreement; and

For EUPHORIA GREEN TECHNOLOGIES


Proprietor

For Sri Manakula Vinayaga Educational Trust

Chairman and Managing Director

- c. Performance and fulfillment of all other obligations of the CONTRACTOR in accordance with the provisions of this Agreement and matters incidental thereto or necessary for the performance of any or all of the obligations of the CONTRACTOR under this Agreement.

2. PROJECT COST

- 2.1 The Project cost shall include all the costs related to above Scope of Work. CONTRACTOR has quoted @ Rs 5.3 Crore per MW and agreed by the CUSTOMER, for the entire facilities on a "single responsibility" basis such that the above Project Cost of Rs 5.3 Crore per MW covers all the obligations in respect of Survey, Design, Supply, Erection, Testing and Commissioning including Warranty, apart from Operation & Maintenance for a period of 05 years from the date of commission of the System, goods and services including spares required, if any, during O&M period. The CONTRACTOR has to take all necessary permits, approvals and licenses from appropriate Government Departments, Government Agencies, Safety Certificates, Insurance etc., at his own cost and provide training and such other items and services required to complete the scope of work mentioned above.
- 2.1.1 The agreed Project cost is on lump sum turnkey basis and the CONTRACTOR is responsible for the total Scope of work described at SCHEDULE A of this Agreement.
- 2.1.2 The project cost shall remain firm and fixed and shall be binding on the Successful CONTRACTOR till completion of work. No escalation will be granted on any reason whatsoever. The CONTRACTOR shall not be entitled to claim any additional charges, even though it may be necessary to extend the completion period for any reasons whatsoever.
- 2.1.3 The project cost shall be inclusive of all duties and taxes, insurance etc. and no price variation /adjustment shall be payable by the CONTRACTOR.
- 2.1.4 The Operation & Maintenance of Solar Photovoltaic Power Plant would include wear, tear, overhauling, machine breakdown, insurance, and replacement of defective modules, invertors / Power Conditioning Unit (PCU), spares, consumables & other parts for a period of 05 years from the date of commissioning of the System in all respects.

Schedule A Project

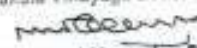
Development

3. **Project development** - The CONTRACTOR shall be obligated to perform following Scope of Work in relation to the Project. The Scope of Work of the CONTRACTOR includes, but is not limited to, the following:
- 3.1. Design, develop, procure, construct and commission, operate and maintain various roof mounted SPV power Plants totalling to capacity of 1,000 KWp, which includes, but is not limited to the following:

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- a. Solar PV modules.
- b. Mounting structures, array foundation (grouting on terrace), earthing, grid design, and module inter-connection and Grid Integration.
- c. All System Junction boxes.
- d. Power Conditioning Units (PCU)/ Inverters with monitoring.
- e. Appropriate AC power evacuation panels, according to Project Site requirements, with bus bars (in-built or otherwise) and circuit breakers.
- f. Protection/isolation systems.
- g. Power and Control Cables.
- h. Lightning protection system.
- i. Data monitoring system with remote monitoring facilities.
- j. Transportation, unloading, and loading of all equipment at Project Site.
- k. Project Management including adherence to all requisite safety practices.
- l. MPPT – Max power point tracking built in the PCU
- m. Fire fighting and fire detection systems

3.2 Installation and Commissioning of various roof mounted SPV power plants totalling to capacity of 1000 kW, that includes:

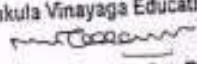
- a. Design and construction of foundations / grouting for holding module mounting structures without puncturing the roof; maintaining proper drainage of rain water over terrace through the installation area; cable routings through PVC pipes not obstructing the movement on the terrace.
- b. Before commencement of work, the CONTRACTOR to obtain all approvals for related drawings to be obtained from the concerned authorities.
- c. All drawings shall conform to relevant IS standards.
- d. Special care to be taken while designing all structures for modules to cater to heavy rainfall, strong winds and earthquake that may be prevalent in the area.
- e. Test running of the grid-connected solar Facility including load trials at Project Site, prior to handover and commencing energy export for metering.
- f. Grid commissioning; the plant needs to be grid interactive. Interconnection points to be checked and certified by the CUSTOMER for accuracy and safety.
- g. Installation of Main Net Meter shall be done by the CONTRACTOR and the CONTRACTOR shall submit drawings for grid interface for each individual power plant and get approved prior to commencement of work on Project Site.
- h. Commissioning certificate from relevant authorities for the Facility.

3.3. General Instructions

- a. Construction Water and Construction Power shall be the responsibility of the CUSTOMER.

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- b. Security, safety, watch, and ward of all materials at sites shall be the responsibility of the CONTRACTOR.
- c. The CONTRACTOR to obtain comprehensive insurance cover for the Project.
- d. Liaison with statutory authorities as applicable for all the Project approvals.
- e. Expenses for any other works, supply of material, and providing services required for the successful commissioning and operation of the Facility, but not specifically mentioned in this document.
- f. Safety Management to be strictly complied with by the CONTRACTOR throughout Project activity.
- g. First-Aid medical facilities at the Project Site during construction to be provided by the CONTRACTOR.
- h. All local Labour, employment, and other issues shall be handled independently by the CONTRACTOR.
- i. The entire responsibility and risk relating towards the workforce working at the Project Site, and compliance of different statutory regulations like Workman Compensation Act, ESIC, Factory Act 1948, Contract Labour Regulation, and Abolition Act 1970, Shop and Establishment Act 1948, and other Statutory regulatory bodies shall solely lie with the CONTRACTOR. The CONTRACTOR shall also be solely responsible for payment of Wages, PF, Bonus, Retrenchment Compensation Leave etc. applicable as per various statutory regulations to their entire workforce, and keep the CUSTOMER indemnified in this regard against any Claim.

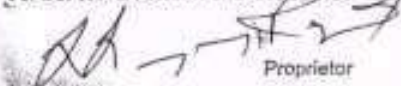
3.4. The following Statutory Clearances to be obtained by the CONTRACTOR wherever applicable:

- a. Electrical System approval (Electrical Inspector)
- b. Fire System approval (CFO)
- c. All equipment, accessories, materials, civil construction & erection works should comply with statutory requirements and IEC, IS standards.
- d. All statutory requirements for working at the Project Site like Labour Registration, Workman Compensation Policy, ESIC etc. to be complied with by the Vendor before deployment of resources at the Project Site.

3.5. The CONTRACTOR shall give undertaking that for the plant period of minimum 5 years all the power plants covered under this project will be operated, maintained and repaired whenever necessary so that all Units are operative and export maximum possible energy to the grid. This shall be ensured through undertaking services that include, but are not limited to, the following

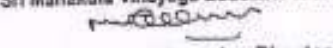
- a. Daily monitoring of plant performance.
- b. Supply of all technical, production/operation data and information through a monthly report.
- c. Planned visits on a weekly basis for preventative and corrective maintenance which include, but are not limited to the following:

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- i. Clean solar panels on fortnightly basis or as appropriate to get maximum output from the panels.
 - ii. Check inverter cabinets (ventilation openings, lighting, leakages in inverter cabinets and cleaning of filters) and inverter maintenance. CONTRACTOR will keep the necessary spares at the Project Site.
 - iii. Check security and fire protection system.
 - iv. Check parts for corrosion.
 - v. Check the state of tightness of connections, fuses, main junction boxes, etc.
- d. Adequate spares to ensure uninterrupted operation and minimum downtime during the entire period.
- e. Comprehensive operation and maintenance of the Facility up to the energy meter shall be the responsibility of the CONTRACTOR.
- f. Comprehensive Operation and Maintenance during entire life of the systems shall include supply of spares, consumables, machine breakdown insurance and general comprehensive insurance covering fire, cyclone, earthquake and provision of security personnel with the insurance policy which shall be taken in the SMVET's name as the primary beneficiary. Copies of the Insurance Policies are to be given to the concerned department, as and when taken/renewed. All risks associated with lapses or delays in insurance coverage, during the construction period, shall be at the CONTRACTOR's cost.
- g. The CONTRACTOR shall ensure efficient operation of the Project and the associated facilities to achieve the maximum power generation from the Project. For this purpose, the CONTRACTOR shall engage the services of adequate number of Engineers and Technicians throughout the Contract Period. The CONTRACTOR shall also attend to all failures, rectifications, breakdown, comprehensive Operation and Maintenance checks. Daily Management Information System (MIS) reports with generation and down time analysis data shall be made available to the CUSTOMER office by E-mail.


3.6. The CONTRACTOR should not misuse the area and/or assign responsibility to a third party for the safety of machinery within the premises.

**Schedule B
SITE OF THE PROJECT**

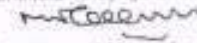
4. The Site

4.1. Site of the CUSTOMER shall be the rooftops of the Buildings given in the Annex-I AND Annex - II of this Schedule B.

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- 4.2. All the piece and parcel of terrace portion of rooftop measuring approximately 100000 square feet and having shade free area of approximately 100000 square feet situated on building located at the Buildings mentioned in the Annex 1 and Annex 2. [50,000 sq.ft + 50,000 sq.ft]. It is proposed to install a System of 500 kWp capacity on the said premises mentioned in Annex - 1 and 500kWp capacity on the premises mentioned in Annex - 2.

Annex 1

S. N.	Installation Location SMVMCH Campus	Approx rooftop space available as per survey (sq ft)	Proposed Power Plant Capacity (kW)
1	MIT	28000	280
2	BOYS HOSTELS	7000	70
3	JR & SR QTRS	5000	50
4	NURSES' QTRS	5000	50
5	Ladies Hostel	5000	50
	Total	50000	500

Annex 2

S. N.	Installation Location SMVEC Campus	Approx rooftop space available as per survey (sq ft)	Proposed Power Plant Capacity (kW)
1	Admin Building	5000	50
2	Mechanical Block	15000	150
3	EEE Block	5000	50
4	Architect Block	5000	50
5	University Building	20000	200
	Total	50000	500

Schedule C

Technical specifications and standards

5. Technical specifications - The Project shall be commissioned as per the technical specifications given below.

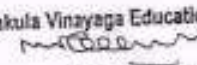
DEFINITION

A Grid Tied Solar Rooftop Photo Voltaic (SPV) power plant consists of SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter, and Controls & Protections, interconnect cables and switches. PV Array is mounted on a suitable structure. Grid tied SPV system is without battery and should be designed with necessary features to supplement the grid power during day time. Components and parts used in the SPV power plants, including the PV modules, metallic structures, cables, junction box, switches, PCUs etc., should conform to the BIS or IEC or international specifications, wherever such specifications are available and applicable. Solar PV system shall consist of following equipments/components.

- ✓ Solar PV modules consisting of required number of MonoCrystalline PV modules.

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- ✓ Grid interactive Power Conditioning Unit with Remote Monitoring System
- ✓ Mounting structures
- ✓ Junction Boxes.
- ✓ Earthing and lightning protections.
- ✓ IR/UV protected PVC Cables, pipes and accessories

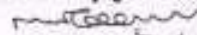
5.1 SOLAR PHOTOVOLTAIC MODULES:

- a. The PV modules used should be of Make Vikram Solar.
- b. The PV modules used must qualify to the latest edition of IEC PV module qualification test or equivalent BIS standards Mono Crystalline Silicon Solar Cell Modules IEC 61215/IS14286. In addition, the modules must conform to IEC61730 Part-2- requirements for construction & Part 2 – requirements for testing, for safety qualification or equivalent IS.
- c. For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701/IS 61701.
- d. The total solar PV array capacity should not be less than allocated capacity (kWp) and should comprise of solar crystalline modules of minimum 365Wp and above wattage. Module capacity less than 365 watts will not be accepted.
- e. Protective devices against surges at the PV module shall be provided.
- f. Low voltage drop bypass diodes shall be provided.
- g. PV modules must be tested and approved by one of the IEC authorized test centers.
- h. The module frame shall be made of corrosion resistant materials.
- i. The CONTRACTOR shall carefully design & accommodate requisite numbers of the modules to achieve the agreed rated power.
- j. Other general requirement for the PV modules and subsystems shall be the following: -
 - i) The rated output power of any supplied module shall have tolerance of +/- 3%.
 - ii) The peak-power point voltage and the peak-power point current of any supplied module and/or any module string (series connected modules) shall not vary by more than 2 (two) per cent from the respective arithmetic means for all modules and/or for all module strings, as the case may be.
 - iii) The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of by-pass diode. The box shall have hinged, weather proof lid with captive screws and cable gland entry points or may be of sealed type and IP-65 rated.
 - iv) I-V curves at STC should be provided by the CONTRACTOR.
- k. Modules deployed must use a RF identification tag. The following information must be mentioned in the RFID used on each modules (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions).

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- a) Name of the manufacturer of the PV module
- b) Name of the manufacturer of Solar Cells.
- c) Month & year of the manufacture (separate for solar cells and modules)
- d) Country of origin (separately for solar cells and module)
- e) I-V curve for the module Wattage, Im, Vm and FF for the module f) Unique Serial No and Model No of the module
- g) Date and year of obtaining IEC PV module qualification certificate. h) Name of the test lab issuing IEC certificate.
- i) Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO 14001.

i. **Warranties:**

a) **Material Warranty:**

- i. Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than Ten (10) years from the date of commissioning.
 - ii. Defects and/or failures due to manufacturing
 - iii. Defects and/or failures due to quality of materials
 - iv. Non conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will replace with new solar module(s).

b) **Performance Warranty:**

The predicted electrical degradation of power generated not exceeding 20% of the minimum rated power over the 27 year period and not more than 10% after ten years period of the full rated original output.

5.2 **ARRAY STRUCTURE**

a) GI mounting structures should be used for mounting the modules/ panels/arrays. Each structure should have angle of inclination as per the site conditions to take maximum isolation. However to accommodate more capacity the angle inclination may be reduced until the plant meets the specified performance ratio requirements.

b) The Mounting structure shall be so designed to withstand the wind speed of 150 km/hour. It may be ensured that the design has been certified by a recognized Lab/ Institution in this regard and submit wind loading calculation sheet to the CUSTOMER. Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed.

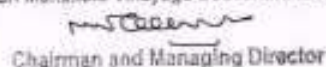
c) The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS 4759.

d) Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts. Necessary protection towards rusting need to be provided either by coating or anodization.

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e) The fasteners used should be made up of stainless steel. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels.

f) Regarding civil structures the CONTRACTOR need to take care of the load bearing capacity of the roof and need arrange suitable structures based on the quality of roof.

g) The total load of the structure (when installed with PV modules) on the terrace should be less than 60 kg/m².

h) The minimum clearance of the structure from the roof level should be 300 mm.

5.3 JUNCTION BOXES (JBs)

a) The junction boxes are to be provided in the PV array for termination of connecting cables. The J. Boxes (JBs) shall be made of GRP/FRP/Powder Coated Aluminum /cast aluminum alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands.

b) Copper bus bars/terminal blocks housed in the junction box with suitable termination threads conforming to IP65 standard and IEC 62208 Hinged door with EPDM rubber gasket to prevent water entry. Single / double compression cable glands. Provision of earthings. It should be placed at 5 feet height or above for ease of accessibility.

c) Each Junction Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs) / SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups.

d) Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification.

5.4 DC DISTRIBUTION BOARD:

a) DC Distribution panel to receive the DC output from the array field.

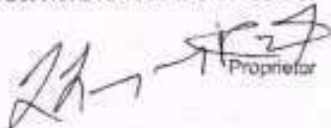
b) DC DPBs shall have sheet from enclosure of dust & vermin proof conform to IP 65 protection. The bus bars are made of copper of desired size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors.

5.5 AC DISTRIBUTION PANEL BOARD:

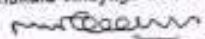
a) AC Distribution Panel Board (DPB) shall control the AC power from PCU/ inverter, and should have necessary surge arrestors. Interconnection from ACDB to mains at LT Bus bar while in grid tied mode.

b) All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS60947 part I, II and III.

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- c) The changeover switches, cabling work should be undertaken by the CONTRACTOR as part of the project.
- d) All the Panels shall be metal clad, totally enclosed, rigid, floor mounted, air - insulated, cubical type suitable for operation on three phase / single phase, 415 or 230 volts, 50 Hz.
- e) The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.
- f) All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better.
- g) Should conform to Indian Electricity Act and rules (till last amendment).
- h) All the 415 AC or 230 volts devices / equipment like bus support insulators, circuit breakers, SPDs, VTs etc., mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions

Variation in supply Voltage	+/- 10 %
Variation in supply frequency	+/- 3 Hz

5.6 PCU/ARRAY SIZE RATIO:

- a) The combined wattage of all inverters should not be less than rated capacity of power plant under STC.
- b) Maximum power point tracker shall be integrated in the PCU/inverter to maximize energy drawn from the array.

5.7 PCU/ Inverter:

As SPV array produce direct current electricity, it is necessary to convert this direct current into Alternating Current and adjust the voltage levels to match the grid voltage. Conversion shall be achieved using an electronic Inverter and the associated control and protection devices. All these components of the system are termed the "Power Conditioning Unit (PCU)". In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array & the Inverter, to the power conditioning unit/inverter should also be DG set interactive. Inverter output should be compatible with the grid frequency. Typical technical features of the inverter shall be as follows:

Switching devices:

IGBT/MOSFET Control:

Microprocessor /DSP

Nominal AC output voltage and frequency : 415V, 3 Phase, 50 Hz

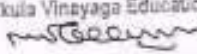
Output frequency : 50 Hz

Grid Frequency Synchronization range : + 3 Hz or more Ambient temperature considered :-

20o C to 50o C Humidity : 95 % Non-condensing

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Protection of Enclosure : IP-20(Minimum) for indoor.

: IP-65(Minimum) for outdoor.

Grid Frequency Tolerance range : + 3 or more

Grid Voltage tolerance : - 20% & + 15 %

No-load losses : Less than 1% of rated power

Inverter efficiency(minimum) : >93%

THD : < 3%

PF : > 0.9

- a) Three phase PCU/ inverter shall be used with each power plant system.
- b) PCU/inverter shall be capable of complete automatic operation including wake-up, synchronization & shutdown.
- c) The output of power factor of PCU inverter is suitable for all voltage ranges or sink of reactive power, inverter should have internal protection arrangement against any sustainable fault in feeder line and against the lightning on feeder.
- d) Built-in meter and data logger to monitor plant performance through external computer shall be provided.
- e) The power conditioning units / inverters should comply with applicable IEC/ equivalent BIS standard for efficiency measurements and environmental tests as per standard SDCes IEC 61683/IS 61683 and IEC 60068- 2(1,2,14,30) /Equivalent BIS Std.
- f) The charge controller (if any) / MPPT units environmental testing should qualify IEC 60068- 2(1, 2, 14, 30)/Equivalent BIS std. The junction boxes/ enclosures should be IP 65(for outdoor)/ IP 54 (indoor) and as per IEC 529 specifications.
- g) The PCU/ inverters should be tested from the MNRE approved test centres / NABL /BIS /IEC accredited testing- calibration laboratories. In case of imported power conditioning units, these should be approved by international test houses.

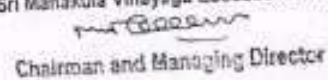
6. The CONTRACTOR agrees to supply and install the SPV Plant as given below:
Technical specification of the Plant:

Description	Make
SPV Modules : \geq 365Wp MONOCRYSTALLINE	IEC Tested , MNRE Certified Vikram Solar Panels
SPV Modules : Product Warranty	10 Years
Performance Warranty	27 Years
Module mounting structure	GI Structure of Standard design as per MNRE prescribed Standards
AC/DC Distribution Panel (Box)	EGT design & EGT Fabrication
Power Conditioning Unit - 3 Phase, 415 VAC with complete set of data logger & monitoring set as per system capacity	As per design and available rooftop
For 1000 kWp	ABB (for 50Kw and 100Kw) SMA (for 25KW and 50KW)
Components for DC Panel	
DC Switch.	ABB
Dc Fuse Holder & Link.	Mersen

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Components for AC Panel	
TPN /MCB's & Isolated Switch	Schneider/L & T (avlbilty)
Metering Panel (on requirement)	EGT design & EGT Fabrication
LT Panel (on requirement)	EGT design & EGT Fabrication
Aluminium (AC)	Paragon / Orbit (avlbilty)
Copper Cables (AC)	Orbit / Omex (avlbilty)
Solar Cables(DC)	KEI / Siechem (avlbilty)
Miscellaneous items-cable trays, fire extinguisher, tools, etc	Reputed Make
Warranty for all other items except SPV Modules	5 Years

7. **INTEGRATION OF PV POWER WITH GRID:**

The output power from SPV would be fed to the inverters which converts DC produced by SPV array to AC and feeds it into the main electricity grid after synchronization. In case of grid failure, or low or high voltage, solar PV system shall be out of synchronization and shall be disconnected from the grid. Once the DG set comes into service PV system shall again be synchronized with DG supply and load requirement would be met to the extent of availability of power. 4 pole isolation of inverter output with respect to the grid/ DG power connection need to be provided.

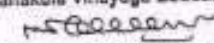
8. **DATA ACQUISITION & PLANT MONITORING**

- i. Weather Monitoring System VSN 800-14 shall be provided for each of the solar PV plant. Features available are provided in the Manual.
- ii. Solar Irradiance: An Integrating Pyranometer / Solar Irradiation integrated with data logging system.
- iii. Wind Speed and Direction sensor will provide all data pertaining to wind.
- iv. Temperature: Temperature probes for recording the and/or ambient temperature to be provided complete with readouts integrated with the data logging system.
- v. The Data Manager available in the inverter will enable the following parameters to be accessible via the operating interface display in real time separately for solar power plant:
 - a. AC Voltage.
 - b. AC Output current.
 - c. Output Power
 - d. DC Input Voltage.
 - e. DC Input Current.
 - f. Time Active.
 - g. Time disabled.
 - h. Time Idle.
 - i. Power produced
 - j. Protective function limits (Viz-AC Over voltage, AC Under voltage, Over frequency, Under frequency ground fault, PV starting voltage, PV stopping voltage.

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- vi. All instantaneous data shall be shown on the monitor screen.
- xiv) Provision for internet monitoring and download of data shall be also incorporated.
- xv) Remote Server and Software for centralized internet monitoring system shall be also provided for download and analysis of cumulative data of all the plants and the data of the solar radiation and temperature monitoring system.
- xvii) Simultaneous monitoring of DC and AC electrical voltage, current, power, energy and other data of the plant for correlation with solar and environment data shall be provided.

9. METERING:

- a) The bidirectional electronic energy meter as per DISCOM spec. shall be installed for the measurement of import/Export of energy.
- b) The CONTRACTOR must take approval/NOC from the Concerned DISCOM for the connectivity, technical feasibility, and synchronization of SPV plant with distribution network and submit the same to the CUSTOMER before commissioning of SPV plant.
- c) Reverse power relay shall be provided by CONTRACTOR, if required, as per the local DISCOM requirement.

10. POWER CONSUMPTION:

Regarding the generated power consumption, priority need to give for internal consumption first and thereafter any excess power can be exported to grid.

11. PROTECTIONS

The system should be provided with all necessary protections like Earthing, Lightning, and Grid Islanding as follows:

➤ **LIGHTNING PROTECTION**

- a) The SPV power plants shall be provided with lightning & overvoltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors. Lightning protection should be provided as per IEC 62305 standard. The protection against induced high-voltages shall be provided by the use of metal oxide varistors (MOVs) and suitable Earthing such that induced transients find an alternate route to earth.

➤ **SURGE PROTECTION**

- a) Internal surge protection shall consist of three MOV type surge-arrestors connected from +ve and -ve terminals to earth (via Y arrangement).

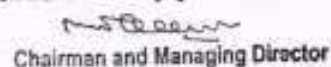
➤ **EARTHING PROTECTION**

- a) Each array structure of the PV yard should be grounded/ earthed properly as per IS:3043-1987. In addition the lightning arrester/masts should also be earthed inside the array field. Earth Resistance shall be tested in presence of the representative of CUSTOMER/DISCOM as and when

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required after Earthing by calibrated earth tester. PCU, ACDB and DCDB should also be earthed properly.

b) Earth resistance shall not be more than 5 ohms. It shall be ensured that all the earthing points are bonded together to make them at the same potential.

➤ **GRID ISLANDING:**

a) In the event of a power failure on the electric grid, it is required that any independent power-producing inverters attached to the grid turn off in a short period of time. This prevents the DC-to-AC inverters from continuing to feed power into small sections of the grid, known as "islands." Powered islands present a risk to workers who may expect the area to be unpowered, and they may also damage grid-tied equipment. The Rooftop PV system shall be equipped with islanding protection. In addition to disconnection from the grid (due to islanding protection) disconnection due to under and over voltage conditions shall also be provided.

b) If required by the DISCOM, A manual disconnect 4pole isolation switch beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility personnel to carry out any maintenance. This switch shall be locked by the utility personnel.

12. CABLES


Cables of appropriate size to be used in the system shall have the following characteristics:

- Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards
- Temp. Range: -10oC to +80oC.
- Voltage rating 660/1000V
- Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- Flexible
- Sizes of cables between array interconnections, array to junction boxes, junction boxes to inverter etc. shall be so selected to keep the voltage drop (power loss) of the entire solar system to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use.
- Cable Routing/ Marking: All cable/wires are to be routed in a GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable easily identified.

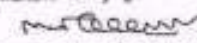
The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e. 25 years.

- CONTRACTOR to indicate size and length as per system design requirement. All the cables required for the plant provided by the CONTRACTOR. Any change in cabling sizes if desired by the CONTRACTOR has to be approved by the CUSTOMER. All cable schedules/layout drawings are to be approved by the CUSTOMER prior to installation.
- Multi Strand, Annealed high conductivity copper conductor PVC type 'A' pressure extruded insulation or XLPE insulation. Overall PVC/XLPE insulation for UV protection

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Armoured cable for underground laying. All cable trays including covers to be provided. All cables conform to latest edition of IEC/ equivalent BIS Standards as specified below:
 BoS item / component Standard Description Standard Number Cables General Test and Measuring Methods, PVC/XLPE insulated cables for working Voltage up to and including 1100 V ,UV resistant for outdoor installation IS /IEC 69947.

- The size of each type of DC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 1%.
- The size of each type of AC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 2 %.

13. TOOLS & TACKLES AND SPARES:

- a) After completion of installation & commissioning of the power plant, necessary tools & tackles are to be provided free of cost by the CONTRACTOR for maintenance purpose. List of tools and tackles to be supplied by the CONTRACTOR for approval of specifications and make from SECI/ owner.
- b) A list of requisite spares in case of PCU/inverter comprising of a set of control logic cards, IGBT driver cards etc. Junction Boxes. Fuses, MOVs / arrestors, MCCBs etc along with spare set of PV modules be indicated, which shall be supplied along with the equipment. A minimum set of spares shall be maintained in the plant itself for the entire period of warranty and Operation & Maintenance which upon its use shall be replenished.

14. DANGER BOARDS AND SIGNAGES:

- a) Danger boards should be provided as and where necessary as per IE Act

15. FIRE EXTINGUISHERS:

The firefighting system for the proposed power plant for fire protection shall be consisting of:

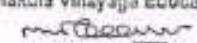
- a) Portable fire extinguishers in the control room for fire caused by electrical short circuits
- b) Sand buckets in the control room
- c) The installation of Fire Extinguishers should conform to TAC regulations and BIS standards. The fire extinguishers shall be provided in the control room housing PCUs as well as on the Roof or site where the PV arrays have been installed.

16. PLANNING AND DESIGNING:

- a) The CONTRACTOR should carry out Shadow Analysis at the site and accordingly design strings & arrays layout considering optimal usage of space, material and labor. The CONTRACTOR should submit the array layout drawings along with Shadow Analysis Report to the CUSTOMER for approval.

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b) The CUSTOMER reserves the right to modify the landscaping design, Layout and specification of sub- systems and components at any stage as per local site conditions/requirements.

c) The CONTRACTOR shall submit preliminary drawing for approval & based on any modification or recommendation, if any. The CONTRACTOR submit three sets and soft copy in CD of final drawing for formal approval to proceed with construction work.

17. DRAWINGS & MANUALS:

Two sets of Engineering, electrical drawings and Installation and O&M manuals are to be supplied. CONTRACTORS shall provide complete technical data sheets for each equipment giving details of the specifications along with make/makes with basic design of the power plant and power evacuation, synchronization along with protection equipment.

18. DRAWINGS TO BE FURNISHED BY CONTRACTOR AFTER AWARD OF CONTRACT

- a) The CONTRACTOR shall furnish the following drawings Award/Intent and obtain approval.
- b) General arrangement and dimensioned layout
- c) Schematic drawing showing the requirement of SV panel, Power conditioning Unit(s)/ inverter, Junction Boxes, AC and DC Distribution Boards, meters etc.
- d) Structural drawing along with foundation details for the Structure.
- e) Itemized bill of material for complete SV plant covering all the components and associated accessories.
- f) Layout of solar Power Array
- g) Shadow analysis of the roof.

19. SAFETY MEASURES:

The CONTRACTOR shall take entire responsibility for electrical safety of the installation(s) including connectivity with the grid and follow all the safety rules & regulations applicable as per Electricity Act, 2003 and CEA guidelines, etc.

20. TESTING PROCEDURES

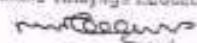
Testing procedures shall take into consideration relevant standards. The testing procedure for testing of the installed capacity during commissioning will be at the interconnection point will be back calculated based on the electricity generated.

21. QUALITY CERTIFICATION, STANDARDS AND TESTING FOR GRID-CONNECTED ROOFTOP SOLAR PV SYSTEMS/POWER PLANTS

Quality certification and standards for grid-connected rooftop solar PV systems are essential for the successful mass-scale implementation of this technology. It is also imperative to put in place an efficient and rigorous monitoring mechanism, adherence to these standards. Hence, all components of grid-connected rooftop solar PV system/ plant must conform to the relevant standards and certifications given below:

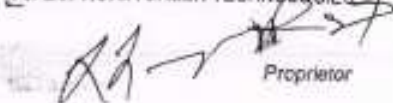
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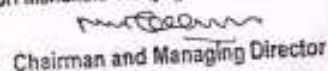
Solar PV Modules/Panels	
IEC 61215/ IS 14286	Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
IEC 61701	Salt Mist Corrosion Testing of Photovoltaic (PV) Modules
IEC 61853- Part 1/ IS 16170: Part 1	Photovoltaic (PV) module performance testing and energy rating –: Irradiance and temperature performance measurements, and power rating
IEC 62716	Photovoltaic (PV) Modules – Ammonia (NH ₃) Corrosion Testing
IEC 61730-1,2	Photovoltaic (PV) Module Safety Qualification – Part 1: Requirements for Construction, Part 2: Requirements for Testing
Solar PV Inverters	
IEC 62109-1, IEC 62109-2	Safety of power converters for use in photovoltaic power systems – Part 1: General requirements, and Safety of power converters for use in photovoltaic power systems Part 2: Particular requirements for inverters. Safety compliance (Protection degree IP 65 for outdoor mounting, IP 54 for indoor mounting)
IEC/IS 61683 (as applicable)	Photovoltaic Systems – Power conditioners: Procedure for Measuring Efficiency (10%, 25%, 50%, 75% & 90-100% Loading Conditions)
IEC 62116/ UL 1741/ IEEE 1547 (as applicable)	Utility-interconnected Photovoltaic Inverters - Test Procedure of Islanding Prevention Measures
IEC 60255-27	Measuring relays and protection equipment – Part 27: Product safety requirements
IEC 60068-2 / IEC 62093 (as applicable)	Environmental Testing of PV System – Power Conditioners and Inverters
Fuses	
IS/IEC 60947 (Part 1, 2 & 3), EN 50521	General safety requirements for connectors, switches, circuit breakers (AC/DC): a) Low-voltage Switchgear and Control-gear, Part 1: General rules b) Low-Voltage Switchgear and Control-gear, Part 2: Circuit Breakers c) Low-voltage switchgear and Control-gear, Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units d) EN 50521: Connectors for photovoltaic systems – Safety
IEC 60269-6	Low-voltage fuses - Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems.
Surge Arrestors	
BFC 17-102:2011	Lightening Protection Standard

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IEC 60364-5-53/ IS 15086-5 (SPD)	Electrical installations of buildings - Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control
Cables	
IEC 60227/IS 694, IEC 60502/IS 1554 (Part 1 & 2)/ IEC69947 (as applicable)	General test and measuring method for PVC (Polyvinyl chloride) insulated cables (for working voltages up to and including 1100 V, and UV resistant for outdoor installation)
BS EN 50618	Electric cables for photovoltaic systems (BT(DE/NOT)258), mainly for DC Cables
Earthing Lighting	
IEC 62561 Series (Chemical earthing) (as applicable)	<p>IEC 62561-1 Lightning protection system components (LPSC) - Part 1: Requirements for connection components</p> <p>IEC 62561-2 Lightning protection system components (LPSC) - Part 2: Requirements for conductors and earth electrodes</p> <p>IEC 62561-7 Lightning protection system components (LPSC) - Part 7: Requirements for earthing enhancing compounds</p>
Junction Boxes	
IEC 60529	Junction boxes and solar panel terminal boxes shall be of the thermo-plastic type with IP 65 protection for outdoor use, and IP 54 protection for indoor use
Energy Meter	
As per IS or as specified by the DISCOMs	A.C. Static direct connected watt-hour Smart Meter Class 1 and 2 — Specification (with Import & Export/Net energy measurements)
SolarPV Roof Mounting Structure	
IS2062/IS4759	Material for the structure mounting

Any supplies which have not been specifically mentioned in this Contract but which are necessary for the design, engineering, manufacture, supply & performance or completeness of the project shall be provided by the without any extra cost and within the time schedule for efficient and smooth operation and maintenance of the SPV plant.

Schedule D Interconnection Scheme

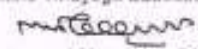
22. Interconnection Requirements: Scope of Work for the CONTRACTOR

- A. The project aims to develop a replicable model of decentralized power generation using photovoltaic plants that feed energy to the grid. The scope would include design, manufacture, supply, install and commission, operate and maintain for a period of 5 years from the date of commissioning.
- B. All work must be carried out as per the following:

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- Indian Electricity Act and rules therein
- Indian Electricity Grid Code

Besides the above measures, certain precautions prescribed by the CEA shall also be incorporated into the solar PV system design:

- PV systems shall be provided with adequate rating fuses, fuses on inverter input side (DC) as well as output side (AC) side for overload and short circuit protection as well as disconnecting switches to isolate the DC and AC system for maintenances.
- Fuses of adequate rating shall also be provided in each solar array module to protect them against short circuit.

C. Energy Meter and Statutory Clearances

Energy Meter

- a) Each power pack will be provided with an inbuilt energy meter for accurate periodical readings of AC energy generated and fed to the grid.

b) Statutory clearances to be arranged by the CONTRACTOR

- a) Building and Architectural Drawings approval
- b) Factory Inspector approval on drawings, wherever necessary
- c) Electrical System approval (Electrical Inspector)
- d) Fire System approval (CFO)
- e) All statutory requirements for working at the Project Site like Labour Registration, Workman Compensation Policy, ESIC etc.
- f) Any other approval/clearances required to be obtained from local body/Govt.

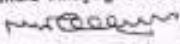
Cost involved in obtaining the clearances shall be borne by the CONTRACTOR.

23. OBLIGATIONS OF THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF CONSTRUCTION WORK OF THE PROJECT:

Prior to commencement of Construction Works, the CONTRACTOR shall:

- (a) submit to the CUSTOMER the detailed project plan including the system design, construction methodology and procedures, quality assurance procedures, and the procurement, engineering and construction, time schedule for completion of the facility.
- (b) undertake, do and perform all such acts, deeds and things as may be necessary or required before commencement of design, development and construction work under and in accordance with this Agreement, the Applicable Laws and Applicable Permits; and
- (c) acquire and maintain in effect all approvals and clearances from Government of Puducherry, Electricity Department of Puducherry, Local Bodies or from any other Government Agencies AT HIS COST in order to enable it perform its obligations under the Agreement. CUSTOMER will render all reasonable assistance to the CONTRACTOR to enable the latter to obtain such Approvals on or before the Scheduled SDC without any legal obligation or cost on the part of the CUSTOMER.

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- (d) the CONTRACTOR shall prepare and submit, with reasonable promptness and in such sequence as is consistent with the Project Completion Schedule, 3 (three) copies each of all Drawings to the CUSTOMER for review.
- (e) Review and/or observation of the CUSTOMER or CUSTOMER's failure to review and/or convey its observations on any Drawings shall not relieve the CONTRACTOR of his obligations and liabilities under this Agreement in any manner nor shall the CUSTOMER be liable for the same in any manner.

24. Construction of the Solar Rooftop Power System

- a. On or after the Appointed Date, the CONTRACTOR shall undertake the construction of the Solar Rooftop Power System as specified in Schedule A and Schedule B, and in conformity with the Specifications and Standards set forth in Schedule C. The CONTRACTOR shall complete the work and commission the Plant within 90 days from the date of signing of this Agreement.
- b. The CONTRACTOR shall construct the Solar Rooftop Power System with the objective of commissioning the project by the proposed commissioning date (90 days from Appointed date) or meet the commissioning milestones as set out in the phased commissioning section, which would all be laid down in a mutually agreed project completion schedule. In the event that the CONTRACTOR fails to achieve any Project Milestone within a period of 90 (ninety) days from the date set forth for such milestone in project completion schedule, unless such failure has occurred due to Force Majeure or for reasons solely attributable to CUSTOMER, it shall pay Damages to the CUSTOMER in a sum calculated at the rate of 0.2% (zero point two per cent) of the amount of Performance Security for delay of each day until such milestone is achieved; with the provision that these damages shall be limited to 20 percent of the cost of project and provided that if any or all project milestones are extended in accordance with the provisions of this Agreement.
- c. In the event that the Solar Rooftop Power System is not completed within 90 (ninety) days from the Scheduled Completion Date, unless the delay is on account of reasons solely attributable to the CUSTOMER or due to Force Majeure, the CUSTOMER shall be entitled to forfeit the Performance Guarantee.

25. Progress reports

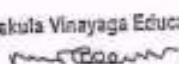
During the Construction Period, the CONTRACTOR shall, furnish to the CUSTOMER a weekly report on progress of the Development Works and shall promptly give such other relevant information as may be required by the CUSTOMER.

26. Inspection

During the Development Period, the CUSTOMER or his Authorised Representative shall inspect the Solar Rooftop Power System at least once a week or any time as decided by the CUSTOMER and make a report of such inspection (the "Inspection Report") stating in reasonable detail the defects or deficiencies, if any, with particular reference to the Scope of the Project and Specifications and Standards. CUSTOMER shall send a copy of the Inspection Report to the CONTRACTOR and the CONTRACTOR within 2 (THREE) days of such inspection and upon receipt thereof, the CONTRACTOR shall rectify and remedy the defects or deficiencies, if any, stated in

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the Inspection Report. Such inspection or submission of Inspection Report by the CUSTOMER shall not relieve or absolve the CUSTOMER of his obligations and liabilities hereunder in any manner whatsoever.

27. TESTING PROCEDURES

a. For determining that the Construction Works conform to the Specifications and Standards, the CUSTOMER shall require the CONTRACTOR to carry out or use to be carried out tests, at such time and frequency and in such manner as may be specified by the CUSTOMER from time to time, in accordance with the programme submitted by the CONTRACTOR for quality assurance. The CONTRACTOR shall, with due diligence, carry out or cause to be carried out all the tests in accordance with the instructions of the CUSTOMER and furnish the results thereof to the CUSTOMER. For the avoidance of doubt, the costs to be incurred on any test including tests undertaken for determining the rectification of any defect or deficiency in construction shall be borne solely by the CONTRACTOR.

b. In the event that results of any tests conducted under this Clause 27(a) establish any defects or deficiencies in the Development Works, the CONTRACTOR shall carry out remedial measures and based on the remedial actions taken furnish a report to the CUSTOMER in this behalf. The CUSTOMER shall require the CONTRACTOR to carry out or cause to be carried out these tests again to determine that such remedial measures have brought the development Works into compliance with the Specifications and Standards, and the procedure set forth in this Clause 13.3 shall be repeated until such work conforms to the Specifications and Standards.

28. Delays during Development

Without prejudice to the provisions of Clause 13.3.2, if the CONTRACTOR does not achieve any of the Project Milestones or the CUSTOMER shall have reasonably determined that the rate of progress of development Work is such that the Solar Rooftop Power System is not likely to be completed by the Scheduled Completion Date, it shall notify the CONTRACTOR to this effect, and the CONTRACTOR shall, within 7 (seven) days of such notice, by a communication inform the CUSTOMER in reasonable detail about the steps it proposes to take to expedite progress and the period within which it shall achieve SDC.

29. Safety Certification [and Commercial Service Certificate]/prior to SDC

The Contractor has to obtain the Safety Certificates wherever necessary, from the appropriate Authorities before the date of commissioning.

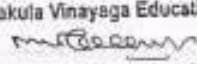
30. Completion Certificate

Upon completion of Development Work, the CUSTOMER or the Representative of the CUSTOMER determining the Tests to be successful, the CUSTOMER shall forthwith issue to the CONTRACTOR a certificate certifying the completion of the Solar Rooftop Power Systems (the "Completion Certificate").

31. INSURANCE

a. The CONTRACTOR shall be responsible and take an Insurance Policy for transit-cum-storage-

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cum- erection for all the materials to cover all risks and liabilities for supply of materials on site basis, storage of materials at site, erection, testing and commissioning. The CONTRACTOR shall also take appropriate insurance policy for the total value of the Project during O & M period which commences from the date of commissioning of the Project for a period of five years against natural calamities which includes fire, cyclone, earth quake, lightning, etc.

- b. The CONTRACTOR shall also take insurance for Third Party Liability covering loss of human life, engineers and workmen and also covering the risks of damage to the third party/material/equipment/properties during execution of the Contract. Before commencement of the work, the CONTRACTOR will ensure that all its employees and representatives are covered by suitable insurance against any damage, loss, injury or death arising out of the execution of the work or in carrying out the Contract. Liquidation, Death, Bankruptcy etc., shall be the responsibility of CONTRACTOR.

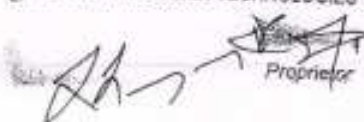
32. WARRANTIES AND GUARANTEES

- a. The CONTRACTOR shall warrant that the goods supplied under this contract are new, unused, of the most recent or latest technology and incorporate all recent improvements in design and materials. The CONTRACTOR shall provide warrantee covering the rectification of any and all defects in the design of equipment, materials and workmanship including spare parts for a period of 10 years in respect of Solar Panels and 27 years Performance warranty and 05 years for other items & projects. The CONTRACTOR has to transfer all the Guarantees/ Warrantees of the different components to the CUSTOMER.
- b. The CONTRACTOR hereby warrants to the CUSTOMER that the Scope of Work as executed by the shall be of good workmanship for a period of 25 years from Acceptance. In respect components other than Solar panels, during the period of 5 years from the date of completion of work ("Warranty Period") the CUSTOMER shall replace any part of the Works done found defective due to faulty materials and workmanship with new one. For Solar Panels, Warranty period is 10 years from the date of commissioning of the Project and performance guarantee is for 27 years.
- c. The CONTRACTOR will obtain manufacturers' warranties on the PV modules, inverters, as well as other components of the Power System for which manufacturer's warranties are available, in the name of the CUSTOMER/BENEFICIARY. Until Acceptance, the CONTRACTOR will exercise any rights under the manufacturers' warranties on behalf of the CUSTOMER/BENEFICIARY.

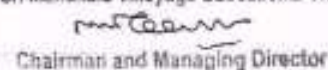
33. TYPE AND QUALITY OF MATERIALS AND WORKMANSHIP

- a. The design, engineering, manufacture, supply, installation, testing and performance of the equipment shall be in accordance with latest appropriate IEC/ Indian Standards as detailed in the ANNEXURE. Where appropriate Indian Standards and Codes are not available, other suitable standards and codes as approved by the MNRE shall be used.
- b. Any supplies which have not been specifically mentioned in this Contract but which are necessary for the design, engineering, manufacture, supply & performance or completeness of the project shall be provided by the CONTRACTOR without any extra cost and within the time schedule for efficient and smooth operation and maintenance of the SPV plant.

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34. **METERING AND GRID CONNECTIVITY**

Metering and grid connectivity of the roof top solar PV system under this scheme would be the responsibility of the CONTRACTOR in accordance with the prevailing guidelines of the concerned DISCOM and / or CEA the CUSTOMER could facilitate the connectivity; however, the entire responsibility lies with the CONTRACTOR only. Cost involved in purchase or Net meter, necessary approvals shall be borne by the CONTRACTOR and the same is already included in the Cost of Project.

34. **Performance Bank Guarantee:** The CONTRACTOR has to furnish an Unconditional, Irrevocable Bank Guarantee for Rs 15,00,000/- (Rupees Fifteen Lakh only) for a period of 5 years and three months from the date of commissioning of the Project.

The purpose of this bank guarantee is for timely completion of the project and for the Operation & Maintenance for a period of 5 years from the date of commissioning. Format of Bank Guarantee will be furnished by the Customer.

In case of delay on the part of the CONTRACTOR in completion of Project or commissioning of the Project or failure to Operate and Maintain the Plant as agreed in this Agreement, the CUSTOMER is at liberty to invoke the Bank Guarantee partly or fully, as it may deem fit. In such case, the CONTRACTOR has to recoup the Bank Guarantee to the agreed level to ensure the adequate Bank Guarantee is in place.

35. **PLANT PERFORMANCE EVALUATION**

The CONTRACTOR shall be required to meet minimum guaranteed generation with Performance Ratio (PR) at the time of commissioning and related Capacity Utilization Factor (CUF) as per the GHI levels of the location during the O&M period. PR should be shown minimum of 75% at the time of inspection for initial commissioning. Minimum CUF of 18% should be maintained for a period of 5 years for fulfilling one of the conditions for release of Performance Bank Guarantee. The CONTRACTOR should send the periodic plant output details to the CUSTOMER for ensuring the CUF. The PR will be measured at Inverter output level during peak radiation conditions.

36. **PROGRESS REPORT**

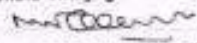
The CONTRACTOR shall submit the progress report weekly to the CUSTOMER in the Prescribed Performa. The CUSTOMER will have the right to depute its representatives to ascertain the progress of contract at the premises of works of the CONTRACTOR.

37. **OPERATION & MAINTENANCE (O&M) GUIDELINES TO BE MANDATORILY FOLLOWED BY CONTRACTOR**

- a. The CONTRACTOR shall be responsible for all the required activities for successful operation and maintenance of the Rooftop Solar PV system for a period of 5 years from the date of commissioning of the plant.
- b. O&M of Solar Power Plant shall be compliant with grid requirements to achieve committed energy generation.
- c. Deputation of qualified and experienced engineer/ technicians till the O&M period at project site.
- d. Periodic cleaning of solar modules shall be done. The modules shall be cleaned with a



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periodic interval of 15 days or as and when required as per actual site conditions. Record of cleaning shall be maintained by successful CONTRACTOR and shall be countersigned by rooftop owner.

- e. Periodic checks of the Modules, PCUs and BoS shall be carried out as a part of routine preventive and breakdown maintenance.
- f. Immediate replacement of defective Modules, Invertors/PCUs and other equipment as and when required.
- g. Supply of all spares, consumables and fixtures as required. Such stock shall be maintained for all associated equipments and materials as per manufacturer's/supplier's recommendations.
- h. All the testing instruments required for Testing, Commissioning and O&M for the healthy operation of the Plant shall be maintained by the CONTRACTOR. The testing equipments must be calibrated once in a year from NABL accredited labs and the certificate of calibration must be kept for reference as required.
- i. If negligence/ mal-operation on part of the CONTRACTOR's operator results in failure of equipment, such equipment should be repaired/ replaced by the CONTRACTOR free of cost.
- j. Co-ordination with Owner / as per the requirement for Joint Metering Report (JMR). The person in charge present at site from CONTRACTOR's side shall take a joint meter reading in the presence of the Representative of the CUSTOMER on a monthly basis. Furnishing generation data (JMR) each month to the CUSTOMER positively by 1st week of every month for the previous month.
- k. Online Performance Monitoring, controlling, troubleshooting, maintaining of logs & records.

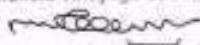
A maintenance record register is to be maintained by the operator with effect from Commissioning to record the daily generation, regular maintenance work carried out as well as any preventive and breakdown maintenance along with the date of maintenance, reasons for the breakdown, duration of the breakdown, steps taken to attend the breakdown, etc. *Mobile app will be generated for live monitoring of Solar PV Plant.*

- m. For any issues related to operation & maintenance, number shall be made available to the rooftop owner/ plant owner to resolve within 24 hours. If any complaint is not attended within such stipulated time, a penalty of Rs. 1,000/- per day shall be imposed. Further, if the outage of the plant is more than 7 days continuously, then the 50% PBG amount shall be encashed by the CUSTOMER and if the outage is exceeding more than 15 days, then complete PBG amount shall be encashed by the CUSTOMER. This will be applicable till 5 years of O&M.
- n. If any jobs covered in O&M Scope are not carried out by the CONTRACTOR during the O&M period, the Engineer-In-Charge or any other authorized representative of the CUSTOMER shall make recommendation to the CUSTOMER to take appropriate action as deemed fit. The CUSTOMER reserves the right to make surprise checks/ inspection visits at its own or through authorized representative to verify the O&M activities being carried out by the CONTRACTOR. Failure to adhere to above guidelines will result in penal action.

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Proprietor

For Sri Manahula Vinayaga Educational Trust


Chairman and Managing Director

38. In addition to the above, following O & M Guidelines shall be strictly followed:

OPERATION AND MAINTENANCE GUIDELINES OF GRID CONNECTED PV PLANTS

For the optimal operation of a PV plant, maintenance must be carried out on a regular basis. All the components should be kept clean. It should be ensured that all the components are fastened well at their due place.

Maintenance of the various components viz. solar panels, inverter, wiring etc. has to be carried out as per the guidelines given below:

a. SOLAR PANELS

Although the cleaning frequency for the panels will vary from site to site depending on soiling, it is recommended that

The panels are cleaned at least once in fifteen days.

Any bird droppings or spots should be cleaned immediately.

Use water and a soft sponge or cloth for cleaning.

Do not use detergent or any abrasive material for panel cleaning.

Iso-propyl alcohol may be used to remove oil or grease stains.

Do not spray water on the panel if the panel glass is cracked or the back side is perforated. Wipe water from module as soon as possible.

Use proper safety belts while cleaning modules at inclined roofs etc.

The modules should not be cleaned when they are excessively hot. Cleaning of modules should be carried out in early morning.

Ensure that the module terminal connections are not exposed while cleaning; this poses a risk of electric shock.

Ensure that monkeys or other animals do not damage the panels.

b. CABLES AND CONNECTION BOXES

Check the connections for corrosion and tightness.

Check the connection box to make sure that the wires are tight, and the water seals are not damaged.

There should be no vermin inside the box.

Check the cable insulating sheath for cracks, breaks or burns. If the insulation is damaged, replace the wire.

If the wire is outside the building, use wire with weather-resistant insulation.

Make sure that the wire is clamped properly and that it should not rub against any sharp edges or corners.

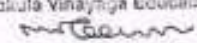
If some wire needs to be changed, make sure it is of proper rating and type.

c. INVERTER

The inverter should be installed in a clean, dry, and ventilated area which is separated from, and not directly above, the battery bank.

Remove any excess dust in heat sinks and ventilations. This should only be done with a dry cloth or brush.

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For Sri Manakula Vinayaga Educational Trust

 Chairman and Managing Director

Check that vermin have not infested the inverter. Typical signs of this include spider webs on ventilation grills or wasps' nests in heat sinks.

Check functionality, e.g. automatic disconnection upon loss of grid power supply, at least once a month.

Verify the state of DC/AC surge arrestors, cable connections, and circuit breakers.

d. **SHUTTING DOWN THE SYSTEM**

Disconnect system from all power sources in accordance with instructions for all other components used in the system.

Completely cover system modules with an opaque material to prevent electricity from being generated while disconnecting conductors.

To the extent possible, system shutdown will not be done during day time or peak generation.

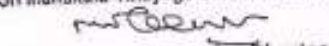
39. **INSPECTION AND MAINTENANCE SCHEDULE**

Component	Activity	Description	Interval	By
PV Module	Cleaning	Clean any bird droppings/dark spots on module	Immediately	CONTRACTOR
	Cleaning	Clean PV modules With plain water Do not use brushes, Any types of solvents, abrasives, or harsh detergents.	Fortnightly	CONTRACTOR
	Inspection	Use infrared camera to inspect for hot spots; bypass diode failure	Monthly	CONTRACTOR
PV Array	Inspection	Check the PV module for any damage. Note down location and serial number of damaged modules.	Monthly	CONTRACTOR
	Inspection	Determine if any new objects, such as vegetation growth, are causing shading of the array and move them if possible	Annual	CONTRACTOR
	Vermin Removal	Remove bird nests or vermin from array and rack area.	Monthly	CONTRACTOR
Junction Boxes	Inspection	Inspect electrical boxes for corrosion or intrusion of water or insects. Seal boxes if required.	Monthly	CONTRACTOR
		Check position of Switches and breakers. Check operation of all protection devices.	Monthly	CONTRACTOR
Wiring	Inspection	Inspect cabling for signs of cracks, defects; loose connections, overheating, arcing, short or open circuits, and ground faults.	Monthly	CONTRACTOR

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Chairman and Managing Director

Inverter	Inspection	Observe instantaneous operational indicators on the face plate of the inverter to ensure that the amount of power being generated is typical of the conditions. Inspect inverter housing or shelter for physical maintenance, if required.	Monthly	CONTRACTOR
Inverter	Service	Clean or replace any air filters.	As needed	CONTRACTOR
Instruments	Validation	Spot-check monitoring instruments (Pyranometer etc.) with standard instruments to ensure that they are operational and within specifications.	As needed based on Output Reports	CONTRACTOR PV Specialist
Plant	Monitoring	Daily Operation and Performance Monitoring	Daily	CONTRACTOR/ Site in charge
Spare Parts	Management	Manage inventory of spare parts.	As needed	CONTRACTOR /Site in charge
Log Book	Documentation	Document all O&M activities in a workbook available to all service personnel	Continuous	Site in charge /CONTRACTOR

40. Submission of O&M Report (OMR)

The CONTRACTOR shall submit the Monthly O&M Report mandatorily to the CUSTOMER in prescribed format. Non-submission of the report shall be considered as "Breach of Contract" and shall attract punitive actions as per the relevant provisions of the Contract.

The Customer shall nominate a Team of Engineer/s for inspection the work in progress to till completion of Project.

41. PROVISION OF DATA

The CONTRACTOR shall be under an obligation to provide all data pertaining to Works and Power System for 5 years to the CUSTOMER about PV array energy production, solar irradiance, wind speed, temperature, etc. The customer/beneficiary as such will allow the to install a data logging system for power system monitoring.

The parameters of Works, and/or Power System shall be measured by using solar monitoring system to maintain and to study the performance of Power System.

For access to real-time data, the CUSTOMER agrees to provide the right to install any additional online monitoring equipment(s) on the Power System.

42. GUARANTEED POWER GENERATION:

The CONTRACTOR has to ensure Annual Generation of 1600 units/ kWp.

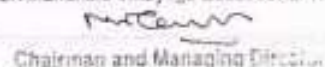
43. INDEMNITY

Both Parties shall fully indemnify and hold harmless both parties and its affiliates, associates, directors and employees from and against, any and all losses, costs, damages, injuries, liabilities, claims and causes of action, including without limitation arising out of or

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Proprietor

For Sri Manakula Vinayaga Educational Trust


Chairman and Managing Director

resulting from claims by third Parties, acts, omissions or breach of any of the both parties affiliates, suppliers, employees, agents or contractors in the performance of both parties obligations under this Agreement or otherwise arising out of the Power System or its usage

44. NOTICES

Any notice through facsimile/e-mail/post and other communication provided for in this Agreement shall be in writing and sent to the address mentioned on the first page of the agreement

45. FORCE MAJEURE

46. Force majeure shall mean any cause, existing or future, which is beyond the reasonable Control of any of the parties including acts of God, storm, fire, floods, explosion, epidemics, quarantine, earthquake, strike, riot, lock out, embargo, interference by civil or military authorities, acts, regulations or orders of any governmental authority in their sovereign capacity, acts of war (declared or undeclared) including any acts of terrorism.

All questions concerning the construction, validity and interpretation of this Agreement will be governed by the laws of India, and the courts at Puducherry shall have exclusive jurisdiction with respect to any Dispute that occurs according to, or in relation to, the Agreement.

47. NON DISCLOSURE & CONFIDENTIALITY

Any information (whether oral, written, visual or otherwise, hard or soft copy as may be provided by either Parties, provided the same is reduced in writing immediately and marked and identified as confidential information) disclosed or made known by the Parties to each other, shall be considered "Confidential Information" unless otherwise specified. Both the Parties commit to a strict maintenance of confidentiality, of any information shared by either of the Parties. Any confidential information shared as a result of this Agreement shall remain in force until that particular Confidential Information falls into the public domain through no act or omission on part of the Parties or for a period of two (2) years from the last disclosure, whichever is later.

48. COMPLETION PERIOD

The due date of completion period for the Execution of the Project shall be 90 days from the date of entering into this Agreement AND the period of Operation & Maintenance (O&M) will be for a period of FIVE years from the date of commissioning of the Project.

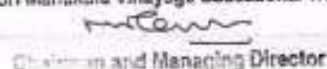
49. COST OF THE PROJECT:

The Project cost shall include all the costs related to above Scope of Work. CONTRACTOR has quoted @ Rs 5.3 Crore per MW and agreed by the CUSTOMER, for the entire facilities on a "single responsibility" basis such that the above Project Cost of Rs 5.3 Crore per MW covers all the obligations in respect of Survey, Design, Supply, Erection, Testing and Commissioning including Warranty, apart from Operation & Maintenance for a period of 05 years from the date of commissioning of the System, goods and services including spares required, if any, during O&M period. The CONTRACTOR has to take all permits, approvals and licenses from appropriate Government Departments/Local Bodies, Government Agencies,

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Chairman and Managing Director

Safety Certificates, Insurance for the men and material from the date of commencement of execution of the Project till completion of O&M period i.e. till Five years from the date of commissioning of the project, etc., at his own cost and provide training and such other items and services required to complete the scope of work mentioned above.

In case of any statutory variations in the rate of applicable taxes and duties or imposition of new taxes & duties, during the tenure of the Agreement, which will impact the Contract Price, the same shall be borne by the CONTRACTOR.

Price shall remain fixed and will not be subject to revision during the Agreement duration.

PRICE

Total project cost	=	Rs 5.3 Crore per 1MW.
Subsidy amount @ 30%	=	Rs 1.59 Crore to be directly received by the Contractor from the REAP
Balance to be paid by the CUSTOMER	=	Rs 3.71 Crore

50. PAYMENT TERMS

Out of the total Project cost of Rs 5.3 Crore [Rupees Five Crore and Thirty Lakh only] per MW, total amount payable by the CUSTOMER is Rs 3.71 Crore only per MW and the balance amount of Rs 1.59 Crore per MW is to be received by the CONTRACTOR directly from the REAP by way of subsidy. Payment may vary according to the actual installed capacity of the Project.

The CUSTOMER shall make payment for the Project to the CONTRACTOR in a phased manner by availing Loan from Indian Bank. Payment will be released based on supply of materials at site and completion of work as per the following milestones:

a. On Supply of Mounting Structures	=	15%
b. On Supply of Solar Panels	=	40%
c. On Supply of Inverters and Switches, Cables, etc	=	15%
d. On completion of Installation work and completion of testing and Commissioning	=	10%
e. On establishment of Net metering & completion of pending works, training of manpower, etc	=	20%


Payment for the Project work for 0.5MW at SMVMCH campus and for the Project work for 0.5MW at SMVEC campus will be made separately based on the actual progress of the work in each location as per the above mentioned milestones.

Rs. 15,00,000/- [Rupees Fifteen thousand only] towards performance Guarantee will be retained towards Performance Guarantee for a period of 5 years from the date of commissioning of the Project. Amount of Rs 15,00,000/- so retained towards Performance Guarantee will be released on production of an unconditional, irrevocable Bank Guarantee for Rs 15,00,000/-.

For EUPHORIA GREEN TECHNOLOGIES


Proposer

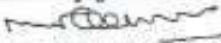
For Sri Manakula Vinayaga Educational Trust


Chairman and Managing Director

51. **BINDING AGREEMENT**

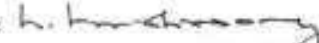
This Agreement, along with its Schedules, in and of itself is an enforceable binding contract and constitutes the entire agreement between the Parties with respect to the subject matter hereof to the exclusion of all other understandings and assurances, either written or oral. The clauses contained in this Agreement shall not be construed as creating a partnership or joint venture, agency or employment relationship among the Parties. The relationship between the Parties under this Agreement is as principal to principal basis.

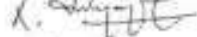
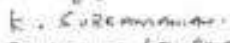
IN WITNESS WHEREOF the authorized signatories of the Parties hereto have signed this Agreement on the day, month and year first above written:

For and on behalf of the
Sri Manakula Vinayaga Educational Trust
For Sri Manakula Vinayaga Educational Trust

Chairman and Managing Director
Authorized Signatory
Name: M. DHANASEKARAN
Chairman and Managing Director

For and on behalf of the
Euphoria Green Technologies
For EUPHORIA GREEN TECHNOLOGIES

Authorized Signatory Proprietor
Name: S. SAGAYARAJU
CEO

Witness:
Signature: 
Name: K. KARISHNAVASANTH
Address: SAO / EMVMCH
No 15, 4th Street
Nanganallur
Chennai - 600061.

Witness: 
Signature: 
Name: K. SURESH
Consultant / EUPHORIA
Address: No. 6, III Cross St.
Sankarapuram
Pondicherry - 605011.

Sri
MANAKULA  **VINAYAGAR**

————— Medical College and Hospital —————

No.SMVMCH/A2/Estt/Solar Power Project/ 2018-19

Date.10.07.2018

CIRCULAR

Sub: SMVMCH – Implementation of 1 MW Grid Connected Rooftop
Solar Power Project – Commencement of work - Regarding.

It is hereby informed that we are in the process of implementation of "1MW Grid Connected Rooftop Solar Power Project" in our Campus. We are commencing the work on 11.07.2018 and a Pooja will be held at the Rooftop of the MVIT Building on 11.07.2018 at 9.15 A.M.

All are cordially invited to attend the Pooja.


CHAIRMAN AND MANAGING DIRECTOR

To

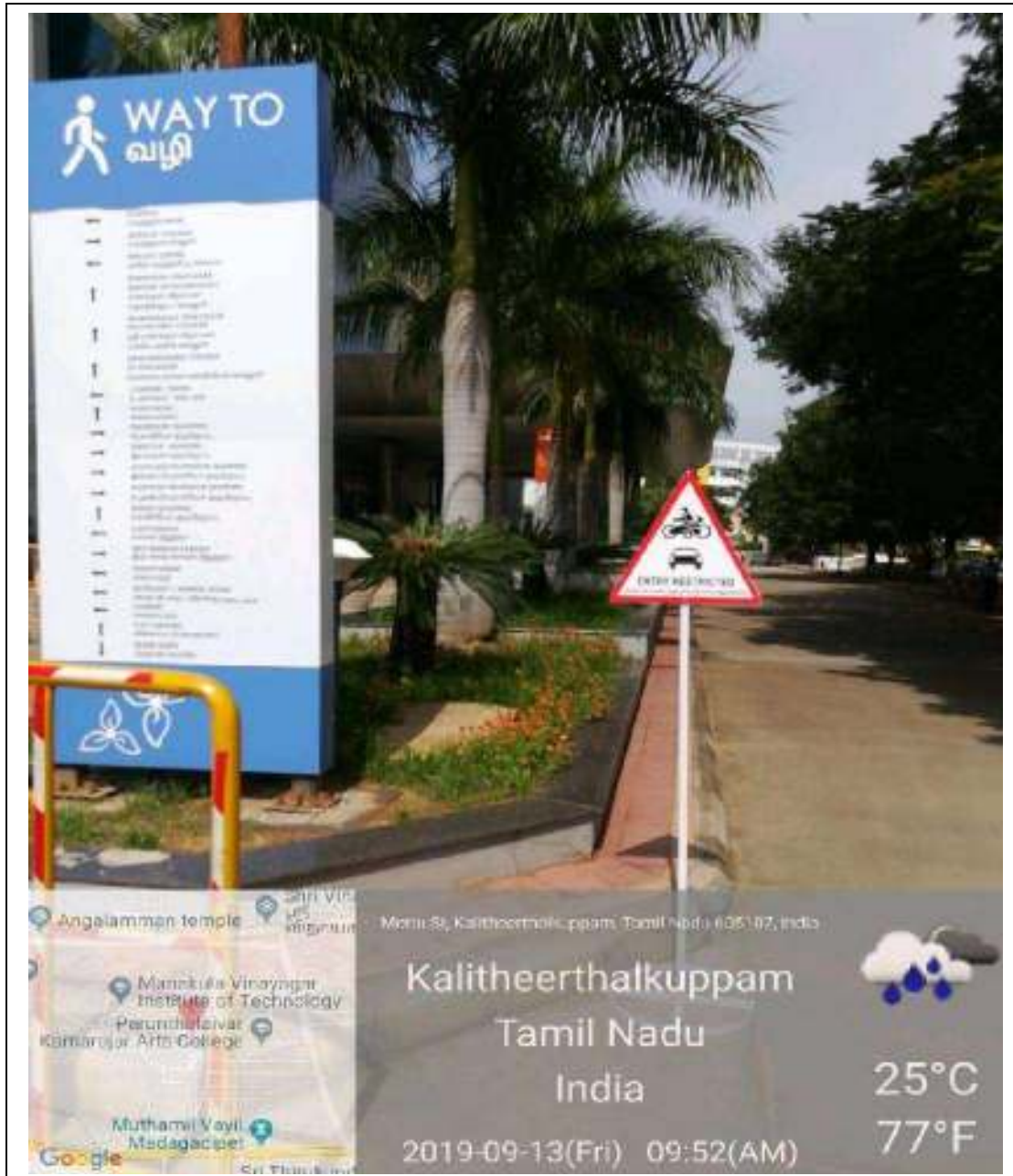
- (i) The Vice Chairman, SMVET
- (ii) The Secretary, SMVET
- (iii) The Director, SMVMCH
- (iv) The Deputy Director, SMVMCH
- (v) The Dean (Academic), SMVMCH
- (vi) The Dean (Research), SMVMCH
- (vii) The Medical Superintendent, SMVMCH
- (viii) The Deputy Medical Superintendent (Medicine), SMVMCH
- (ix) The Deputy Medical Superintendent (Surgery), SMVMCH
- (x) The Director, SMVEC
- (xi) The Principal, MVIT
- (xii) The Principal, SMVNC
- (xiii) The Principal, SMVPTC
- (ix) The Project Manager (Civil Admin)
- (x) The Project Manager (Civil Execution)

7.1.6 (QnM) Green campus initiatives of the Institution include:

Restricted entry of automobiles		Battery-powered vehicles		Pedestrian-friendly pathways		Ban on the use of plastics		Landscaping with trees and plants	
Yes		Yes		Yes		Yes		Yes	

GEOTAG PHOTOS- GREEN INITIATIVES

Restricted entry of automobiles





Mettu St, Kalitheerthalkuppam, Tamil Nadu 605107, India

Kalitheerthalkuppam
Tamil Nadu
India



25°C
77°F

2019-09-13(Fri) 09:49(AM)



Andiarpalayam Madagadipet Road, Andiarpalayam, Tamil Nadu 605107, India

Andiarpalayam

Tamil Nadu

India

2019-09-13(Fri) 10:23(AM)



27°C

81°F



Mettu St, Kalitheerthalkuppam, Tamil Nadu 605107, India

Kalitheerthalkuppam

Tamil Nadu

India

2019-09-13(Fri) 09:52(AM)



25°C

77°F

Battery powered vehicle



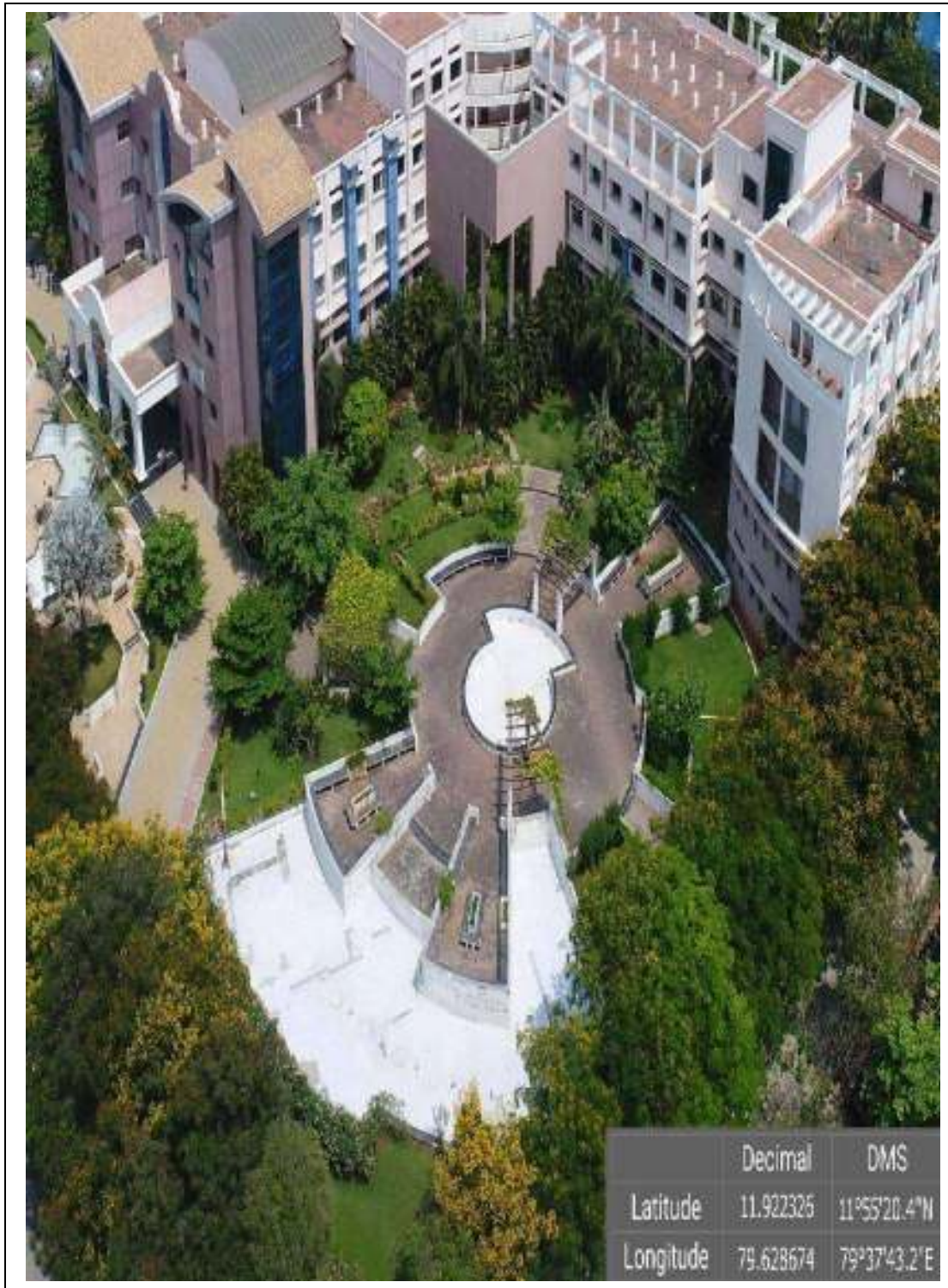
Pedestrian friendly pathways

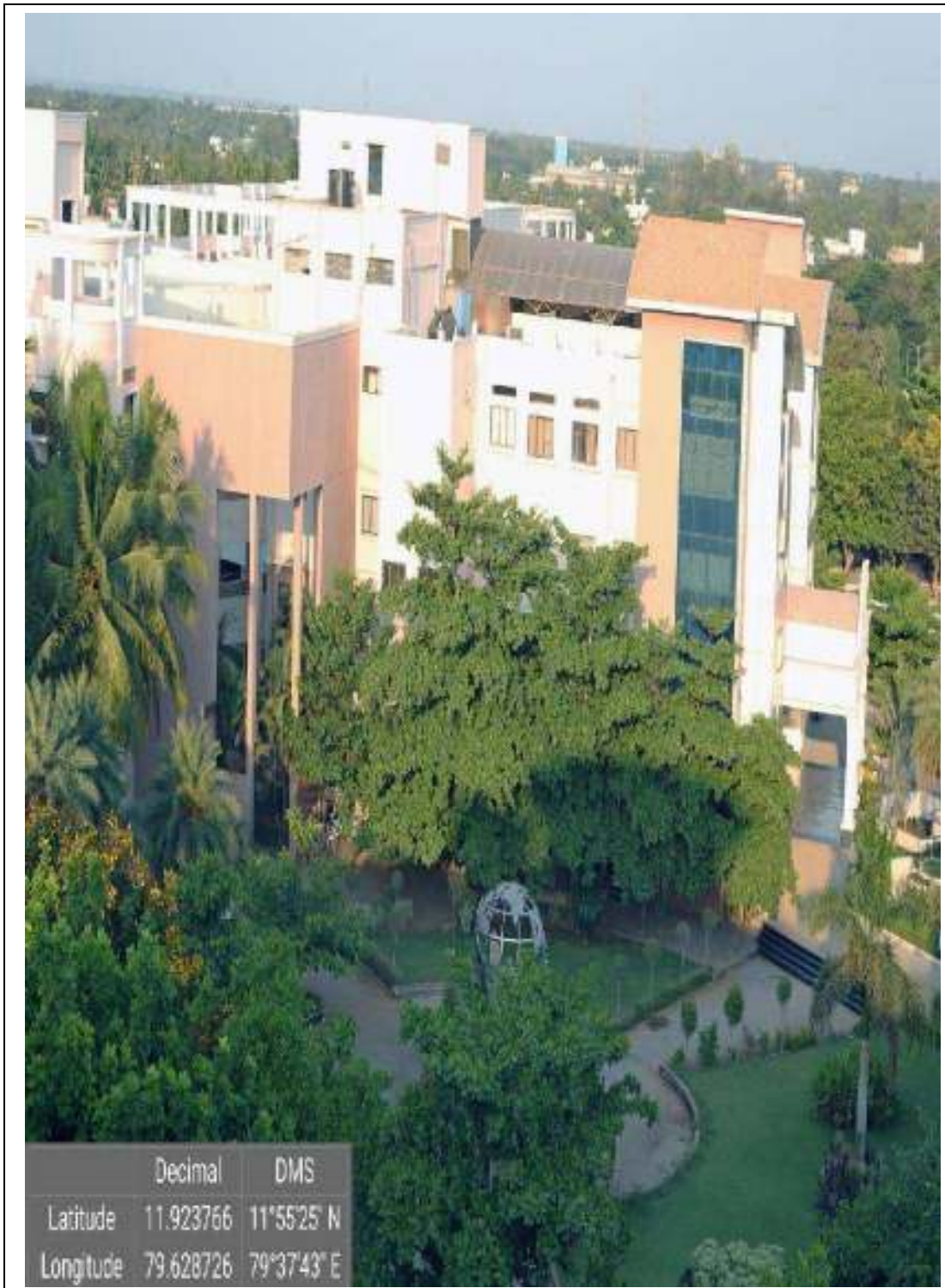


Ban on use of plastics

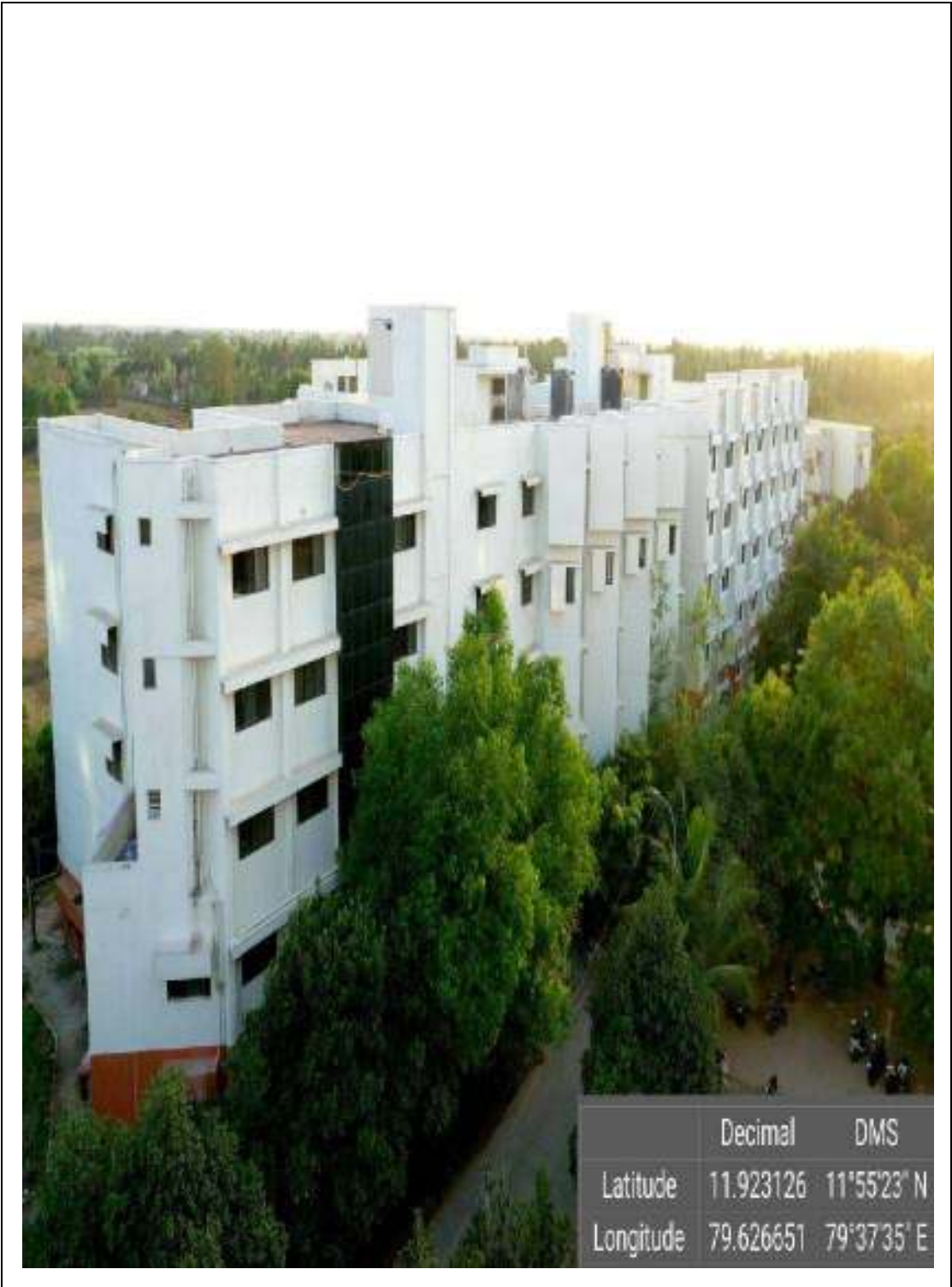


Landscaping with trees and plants





	Decimal	DMS
Latitude	11.923766	11°55'25" N
Longitude	79.628726	79°37'43" E



	Decimal	DMS
Latitude	11.923126	11°55'23" N
Longitude	79.626651	79°37'35" E



Unnamed Road, Kalitheerthalkuppam, Tamil Nadu 605107, India

Kalitheerthalkuppam

Tamil Nadu

India

2019-06-21 (Fri) 03:28 (PM)



37°C

99°F



Unnamed Road, Kalitheerthalkuppam, Tamil Nadu 605107, India

Kalitheerthalkuppam

Tamil Nadu

India

2019-06-21(Fri) 03:28(PM)



37°C

99°F



Mettu St, Kalitheerthalkuppam, Tamil Nadu 605107, India

Kalitheerthalkuppam

Tamil Nadu

India

2019-06-21(Fri) 03:31(PM)



37°C

99°F



To,
The Chairman
Sri Manakula Vinayagar Medical College and Hospital
Kalitheerthalkuppam, Madagadipet,
Puducherry, 605107

Subject: -Green Audit Report

We, P V Greentech Pvt Ltd. are a Renewable Energy organization providing a high class, end-to-end service for clients seeking services within the renewable/clean energy technology markets. Our services extend throughout the value chain from origination to implementation of projects. We have sourced, qualified and implemented projects across geographic locations.

Our team is involved in promoting renewable energy generation through sustainable processes, either with existing or new green/clean technologies and also working with clients to make the process viable for all concerned. Programs such as subsidies, sale of extra energy generated to the electricity board etc have helped clients in installing and creating a greener environment thereby reduce the carbon footprint. We aim to create a more sustainable energy environment for the community and be the specialist agency in the renewable energy space.

Here is the Green Audit Report with all the Recommendations.

ONE STOP SOLUTIONS FOR NON-CONVENTIONAL ENERGY SOLUTIONS

Date of Issue

10/06/2019



phone : 98444 91334 / 98867 60584
email : enquiry@pvgtech.com
web : www.pvgtech.com

No. 20, 4th Main
AG's Layout, Arehalli
Bangalore 560061

few recommendations are added to curb the menace of waste management using eco-friendly and scientific techniques. This may lead to the prosperous future in context of Green Campus and thus sustainable environment and community development.

It has been shown frequently that the practical suggestions, alternatives, and observations that have resulted from audits have added positive value to the audited organisation. An outside view, perspective and opinion often helps staff who have been too close to problems or methods to see the value of alternative approaches. A green audit report is a very powerful and valuable communications tool to use when working with various stakeholders who need to be convinced that things are running smoothly and systems and procedures are coping with natural changes and modifications that occur.

Common Recommendations

- ❖ Adopt an environmental policy for the college
- ❖ Establish a purchase policy towards environmental friendly materials
- ❖ Conduct more seminars and group discussions on environmental education
- ❖ Students and staff can be permitted to solve local environmental problems
- ❖ Renovation of cooking system in the canteen to save gas
- ❖ Establish water, waste and energy management systems

Criteria Wise Recommendations

Water Management

- Remove damaged taps and install sensitive taps if possible.
- Drip irrigation for gardens and vegetable cultivation can be initiated.
- Establish rain water harvesting systems for each building.
- Establish water treatment systems.
- Awareness programs on water conservation to be conducted.
- Install display boards to control over use of water.

Energy Management

- Employment of more solar panels and other renewable energy sources.
- Conduct more save energy awareness programs for students and staff.
- Replace computers and TVs with LED monitors.
- More energy efficient fans should be installed.
- Observe a power saving day every year.
- Automatic power switch off systems may be introduced.

Waste Management

- Establish a functional bio gas plant.
- A model solid waste treatment system to be established.
- Practice of waste segregation to be initiated.
- A model vermicomposting plant to be set up in the college campus.
- Establish a plastic free campus.
- Avoid paper plates and cups for all functions in the college.

Green Campus Management

- All trees in the campus should be named scientifically.
- Create more space for planting.
- Grow potted plants in both verandah and classrooms.
- Create automatic drip irrigation system during summer holidays.
- Not just celebrating environment day but making it a daily habit.
- Beautify the college building with indoor plants
- Provide funds to nature club for making campus more green
- Encourage students not just through words, but through action for making the campus green
- Conduct competitions among departments for making students more interested in making the campus green.

Carbon footprint

- Establish a system of car pooling among the staff to reduce the number of four wheelers coming to the college.

- Introduce college bus services to the students and staff.
- Encourage students and staff to use cycles.
- Establish a more efficient cooking system to save gas.
- Discourage the students using two wheelers for their commutation.
- More use of generators every day should be discouraged.

Name of the Auditor:- Girish S Kulkarni

Date of Audit



Signature with Seal

