PROPOSAL FOR

DESIGN, SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF 60 KWp GRID-TIED SOLAR ROOF TOP POWER PLANT

Submitted

To

Mahatma School- Madurai

By

GREENTEK

(AN ISO 9001-2015 & 14001-2015 CERTIFIED COMPANY)

GREENTEK INDIA PRIVATE LIMITED

Plot # 8, Lepakshi colony, West Marredpally, Secunderabad -500026

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Introduction, Vision & Mission of Greentek India Pvt Ltd

GIPL is an ISO 9001:2015 & 14001-2015 certified Company based at Hyderabad is one of the leading manufacturers of Solar Photo Voltaic Modules (SPV) in the Country. We are manufacturing modules in the range of 37W to 300W. Thus, our Module production line is geared to produce panels of any custom size or wattage having Certifications/Approvals from MNRE, IEC 61215, IEC 61701, IEC 61730.

GIPL is having strong presence in the field of Renewable Energy and provides complete turnkey solar EPC solutions. We have a team of highly skilled solar engineers to design and construct you solar project. GIPL offers Advisory Services, Engineering, Procurement & Construction (EPC) Services and Operation & Maintenance Services Solar Power Projects ranges KWp to MWp scale to domestic, industrial, commercial and government entities.

Incorporated in the year 2007 and expertise in all renewable energy systems. Joint ventured with many reputed companies throughout the India and having the best technical partners and supplier in their class throughout India.

To become one of the leading renewable energy equipments and turnkey solution provider. We always aim at one step ahead in the development of innovative and competitive solutions for the production and management of electrical power through Solar PV systems. Served & serving many esteemed organizations and individuals in India.

Solar Photovoltaic:

* Grid connected or Utility scale Solar Power Projects.
* Off-grid SPV Power Packs.
* Rooftop Solar Power Projects (Standalone & Grid-tied).
* Other Solar application

GIPL is a registered Solar PV Systems integrator in MNRE, NREDCAP & TNREDC.

GIPL tries not just to meet our customer's expectations; strive to exceed the customer's expectations. Every time, measure its success by its customer's trust and confidence in us. We always work with principle to provide up to date technology, the best quality equipment, error less workmanship and on time service to its clients.

Manufacturing Facility:

State of the art manufacturing facility at Shabhashpally(V), Shivampet(M), Medak(Dt) at a distance of 60 k.m from Hyderabad.

1. **Solar PV modules**
    a. **Polycrystalline**
    b. **Monocrystalline**

2. **Solar Water Heaters**
    a. **Flat Plate Collector (FPC)**
    b. **Evacuated Tube Collector (ETC)**

Corporate Office: Plot No. 8, Lepakshi Colony, West Marredpally, Secunderabad-26.
Manufacturing Unit : Sy No. 43/1A, Shabashpally(V), Shivampet(M), Medak(Dt).
North Branch : F-382, Sector-63, Noida – 201 307, Uttar Pradesh
Pune Branch : Shed No. 5, Sy. No. 25/3/2, Raikar Building, Satyam Industrial Estate, NandedPhata, Pune – 411 041, Maharashtra.

EPC - Services:

- **Megawatt scale ground mounted solar PV plants.**
- **Megawatt scale solar PV plants for third party sale.**
- **Megawatt scale solar PV plants for captive consumption.**
- **Large scale roof top solar PV plants for Hospitals, Hotels, Educational Institutions and other commercial buildings.**
- **Roof top Solar PV plants under net metering / Gross metering policies.**
- **Solar water heaters and Solar thermal projects.**
- **Solar powered LED street lights &Solar Fencing.**

Benefits of using solar power:

1. **Energy generation is for 25 years.**
2. **Payback period is 3-4 Years.**
3. **CFA Subsidy of 30% to the Hospitals, Educational Institutions, NGO's, Trusts and Societies those who are into non-profit making.**
4. **Accelerated depreciation for private / commercial / profit making organizations @ 40% in the first year and 20% in the second year.**
5. **Revenue from generation based renewable energy certificates.**
6. **Low maintenance cost.**
7. **Easy loan process from banks.**
8. **Free from power cuts.**
9. **Free from the DG expenses.**
10. **Quality power.**

Executed projects by our team:

i. **4 MW Solar Grid tied plant at Kalwakurthy, Mahaboobnagar (DT).**
ii. **81.6 KW Solar Power Plant for Omega Hospital, Hyderabad.**
iii. **75 KW Solar Grid Tied System for DE-SHAW Jubillee Hills, Hyderabad.**
iv. **60 KW Solar PV System for Rajas Dental College- Nagarcoil. Tamilnadu**
v. **30 KW for Stanley Engineered Fastners , Chennai. Tamilnadu**
vi. **20 KW Solar Grid Tied system for CAL Public School, Hyderabad.**
vii. **20 KW for MJ Hospital, Armoor, Nizamabad.**
viii. **20 KW for Subbulakshmi Nursing Home, Tenkasi. Tamilnadu**
ix. **15 KW for 4S systems, A.S.Rao Nagar, Hyderabad.**
x. **14 KW for FHD Group Hyderabad.**
xi. **14 KW for Directorate of Sorghum Research, Hyderabad.**
xii. **12 KW for AKG Filling Station, IOCL, Sadasivpet.**
xiii. **10 KW for Aravinda Schools, Kottayam, Kerala**
xiv. **10 KW for S.S.Service Station, IOCL, Kallakal, Medak.**
xv. **10 KW for MadhuVidyalayam, Wyra, Khammam.**
xvi. **10 KW for Hotel Satya Inn, Ashok Nagar, BHEL, Hyderabad.**
xvii. **10 KW Solar Grid Tied System for Dr. Reddys Foundation, Hyd.**
xviii. **10 KW for Mr.Surendra Reddy, Champapet, Hyderabad.**
xix. **10 KW for Mr. Srininvas Reddy, Champapet, Hyderabad.**
xx. **10 KW for Pastoral Centre, Abids, Hyderabad.**
xxi. **10 KW for Mr. Mukul Chand, Agra, Uttar Pradesh.**
xxii. **6 KW for Dr Water Mineral Water Plant, Boduppal, Hyderabad.**
xxiii. **6 KW for Mr. B.V.Bhadrappa, Champapet, Hyderabad**
xxiv. **5 KW for Commissioner of Industries APIIC, Hyderabad.**
xxv. **5 KW for Mahathma Gandhi University, Nalgonda, Hyderabad.**
xxvi. **5 KW for Vrihat Solar Lucknow.**
xxvii. **5 X 2 KW(2X5Hp Motors) for KommuriPrathap ReddyEngg. College.**
xxviii. **5 KW for Mr.C.Shashidhar Reddy, Ashok Nagar, Hyderabad.**
xxix. **5 KW for Mr. GovardhanHeda, Uppal, Hyderabad.**
xxx. **5 KW for Mr. ArunSoundhi, Agra, Uttar Pradesh.**
xxxi. **5 KW for Mr. Krishna Singh, Noida, Uttar Pradesh.**

Prestigious Clients:

DETAILS OF THE PROPOSED 97KWpROOFTOP SOLAR PV POWER PLANT

Client	**Mahatma school-Madurai**
Location	**MADURAI (DT)**
Plant Size	**60 KWp**
Latitude	**9º54¹**
Longitude	**78º07¹**
Elevation	**462 Ft**
Type of Installation	**Rooftop**
Solar Radiation	**5.16 KW/ Hr / Sq. m**
Technology	**Poly Crystalline**

Energy Generation:

Solar Power Plant Capacity	**60 KWp**
Average Solar Energy Generated Per Day	**275 KW / UNITS**
Average Solar Energy Generated Per Year	**1,00,375 KW / UNITS**
Area Required	**6000 SFT**
Space required for the control room	**1 Sq.m**

System configuration:

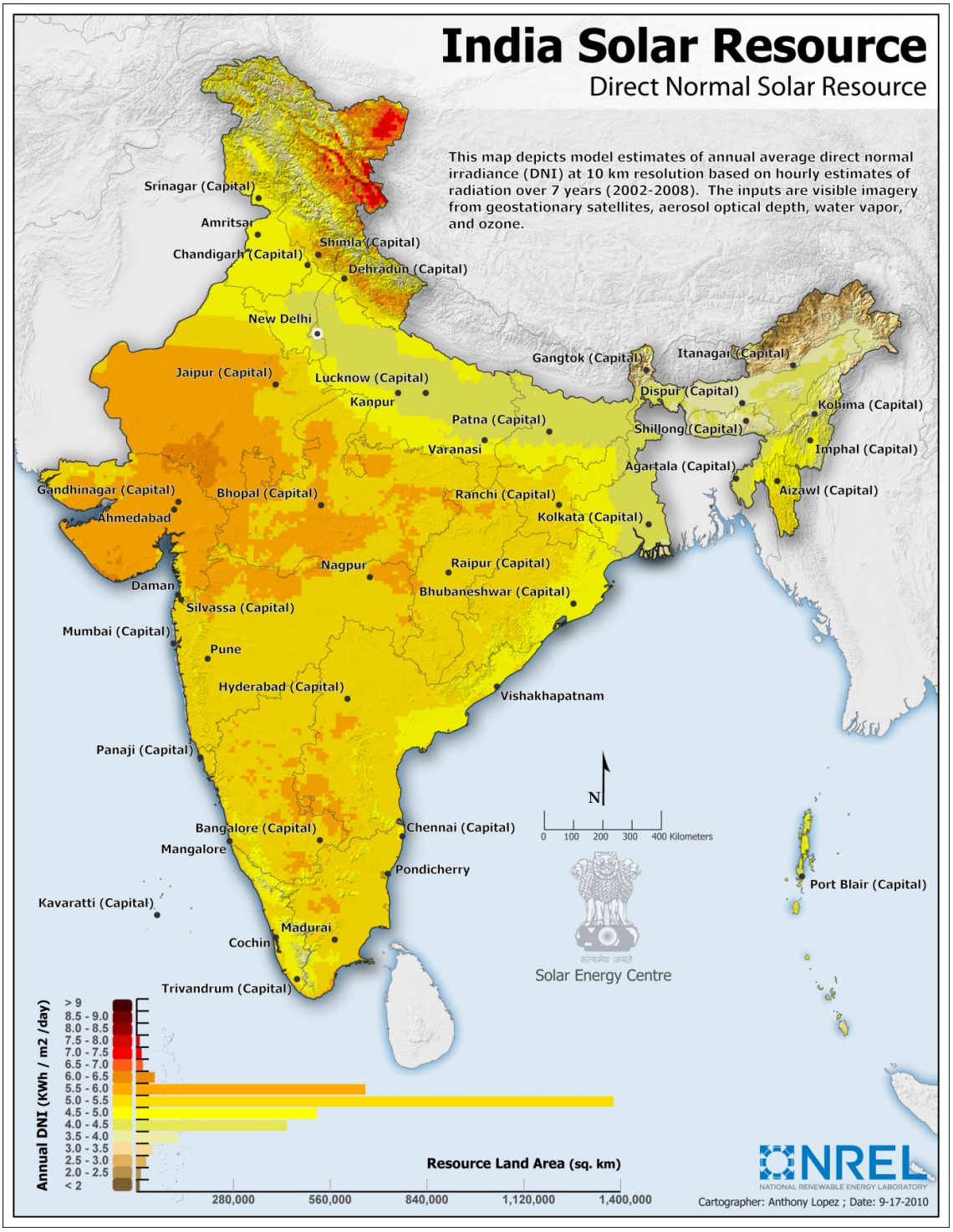
Equipment Description	Rating	Qty.
Solar Grid Tied UPS MPPT based	**20 KVA**	**3**
Polycrystalline PV panels	**325**	**185**
Mounting Structures	**GI/MS Galvanized**	**185**
AJB's/SCB's, Cables, ACDB, Transformers, L/A,Earthling & BOS etc.	**As per MNRE Spec**	

SATELLITE IMAGE OF PROPOSED SITE.

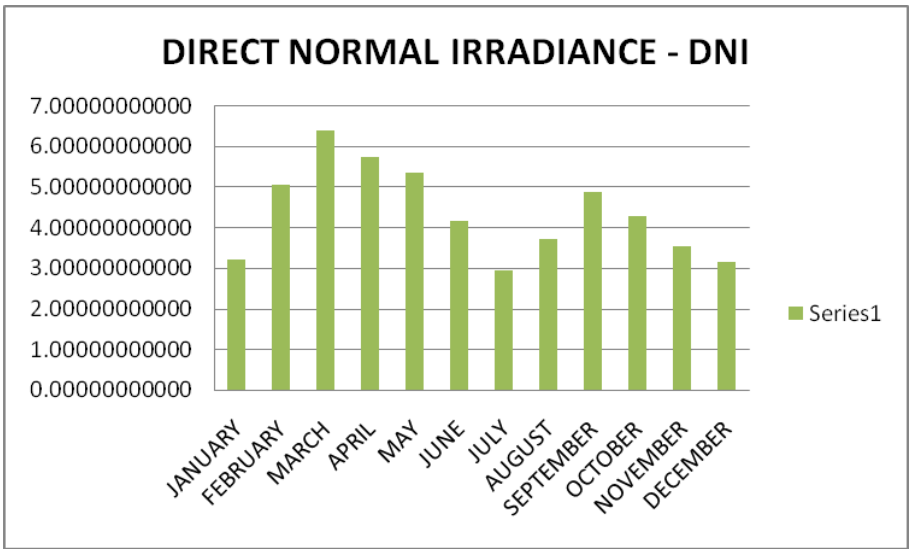
Physical parameters:

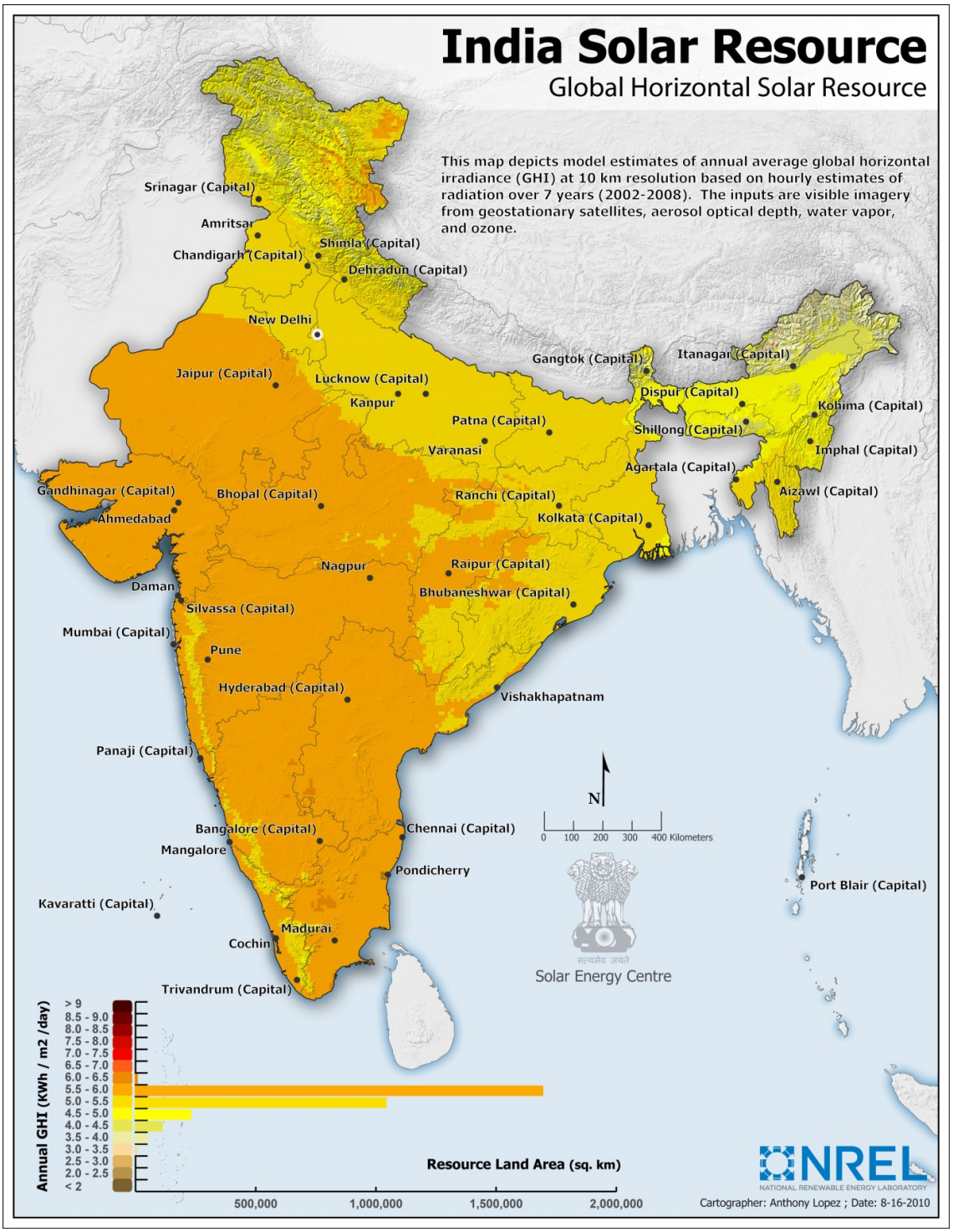
Latitude : 9°54¹
Longitude : 78°07¹
Elevation : 462 Ft

SOLAR INSOLATION AT PROPOSED SITE

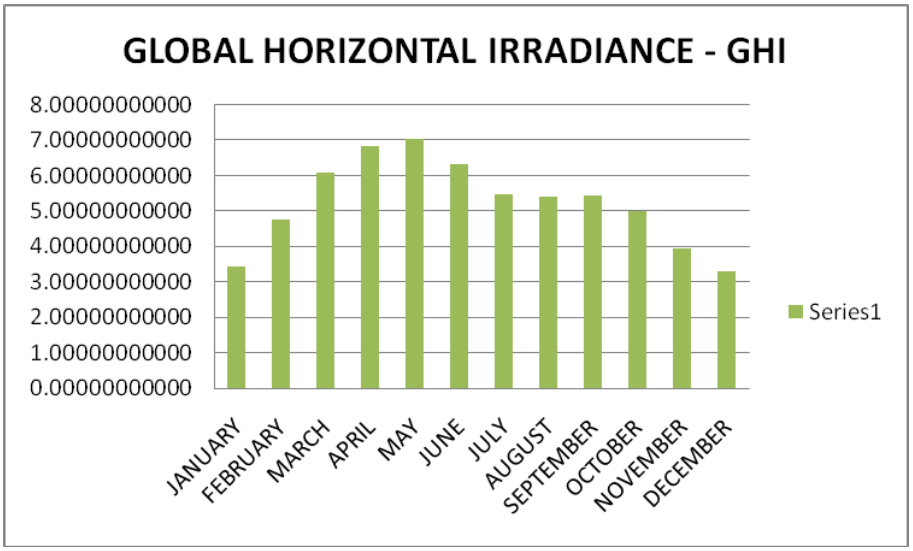


DNI	DIRECT NORMAL IRRADIANCE
LATTITUDE:	9°54¹
LONGITUDE:	78°07¹
ELEVATION:	462 Ft
CLIENT	Mahatma school
MONTH	SOLAR INSOLATION KWh/Sq.M/DAY
JANUARY	3.22789990234
FEBRUARY	5.05600000000
MARCH	6.39170019531
APRIL	5.74810009766
MAY	5.35570019531
JUNE	4.16389990234
JULY	2.96310009766
AUGUST	3.71230004883
SEPTEMBER	4.89529980469
OCTOBER	4.27729980469
NOVEMBER	3.53030004883
DECEMBER	3.15530004883
ANNUAL DNI	4.36560009766




India Solar Resource
Global Horizontal Solar Resource
This map depicts model estimates of annual average global horizontal irradiance (GHI) at 10 km resolution based on hourly estimates of radiation over 7 years (2002-2008). The inputs are visible imagery from geostationary satellites, aerosol optical depth, water vapor, and ozone.
Srinagar (Capital)
Amritsar
Chandigarh (Capital)
Shimla (Capital)
Dehradun (Capital)
New Delhi
Jaipur (Capital)
Lucknow (Capital)
Kanpur
Patna (Capital)
Varanasi
Gangtok (Capital)
Itanagar (Capital)
Dispur (Capital)
Kohima (Capital)
Shillong (Capital)
Imphal (Capital)
Agartala (Capital)
Aizawl (Capital)
Gandhinagar (Capital)
Bhopal (Capital)
Ahmedabad
Ranchi (Capital)
Kolkata (Capital)
Nagpur
Raipur (Capital)
Daman
Bhubaneshwar (Capital)
Silvassa (Capital)
Mumbai (Capital)
Pune
Hyderabad (Capital)
Vishakhapatnam
Panaji (Capital)
N
0 100 200 300 400 Kilometers
Bangalore (Capital)
Chennai (Capital)
Mangalore
Pondicherry
Port Blair (Capital)
Kavaratti (Capital)
Madurai
Cochin
Trivandrum (Capital)
सत्यमेव जयते
Solar Energy Centre
Annual GHI (KWh / m2 /day)
> 9
8.5 - 9.0
8.0 - 8.5
7.5 - 8.0
7.0 - 7.5
6.5 - 7.0
6.0 - 6.5
5.5 - 6.0
5.0 - 5.5
4.5 - 5.0
4.0 - 4.5
3.5 - 4.0
3.0 - 3.5
2.5 - 3.0
2.0 - 2.5
< 2
Resource Land Area (sq. km)
500,000
1,000,000
1,500,000
2,000,000
NREL
NATIONAL RENEWABLE ENERGY LABORATORY
Cartographer: Anthony Lopez ; Date: 8-16-2010

GHI	GLOBAL HORIZONTAL IRRADIANCE
LATTITUDE:	9°54¹
LONGITUDE:	78°07¹
ELEVATION:	462 Ft
CLIENT	Mahatma school
MONTH	SOLAR INSOLATION KWh/Sq.M/DAY
JANUARY	3.43889990234
FEBRUARY	4.75610009766
MARCH	6.09129980469
APRIL	6.85839990234
MAY	7.03310009766
JUNE	6.34389990234
JULY	5.48470019531
AUGUST	5.41470019531
SEPTEMBER	5.45910009766
OCTOBER	5.00729980469
NOVEMBER	3.95760009766
DECEMBER	3.29189990234
ANNUAL GHI	5.26089990234



TECHNICAL DETAILS:

SOLAR PV PANELS:

Make : GREENTEK
Model : 325 Wp – 72 Cells
RFID : Internal
Approvals :MNRE, UL, IEC
Warranty : 25 Years
Wattage :325Wp
Voltage : 46.6 V
Current :8.85 A
Size : 1961 X 991 X 40 mm
Weight : 24 KG

CERTIFICATIONS:

IEC – 61215, 61730, 62716& UL CERTIFIED

MNRE APPROVED

Solar Grid – Tied Inverter:

Make:Growatt / Delta / Sungrow
Model : 20 KVA
MPP Range :480-850 V
Operating Range :200-950 V
Min DC Voltage/Starting Voltage:200/250V
No-Load Voltage :1000V
Maximum input Current :3*18.0A
No of MPP Trackers :4
Max Power /Tracker :20KW
No of strings :3*4
Rated Output :19900 VA
Supply Voltage :According to requirement
Rated Current : 50 A
Rated Frequency :50/60Hz
Cos Phi :0.80 inductive,capacitive
No of Grid Phases :3
Protection Class :IP-65
Weight :50 Kg

SAFETY/STANDARDS	
Anti-islanding Protection / Grid Regulation	VDE-AR-N 4105; VDE 0126-1-1
EMC	EN 61000-6-2; EN 61000-6-4
Safety	IEC 62109-1/-2
Efficiency	IEC 61683:1999
Environmental Testing	IEC 60068-2-1; IEC 60068-2-2; IEC 60068-2-14; IEC 60068-2-30; IEC 60068-2-6; IEC 60068-2-21; IEC 60068-2-27; IEC 60068-2-75; IEC 60068-2-78 (As Per MNRE and SECI Requirement)
Ingress Protection	IEC 60529

Mounting Structure:

Protection:Galvanized
Longevity:Rust proof
Material:Mild steel
Warranty : 30 years

Cables:

Polycab
UV Resistant
Type 1 cable
ISO 9001:2008 and 14001:2004 certified
Flame Retardant Low Smoke
High temperature resistant (Up to 120 ^{0}C)

Tasks and Scope of work:

TASK DESCRIPTION	SCOPE	
PRE-CONTRACT STAGE		**REMARKS**
AGREEMENT	CLIENT&GREENTEK	
GATHER REQUIREMENTS	GREENTEK	
SITE SURVEY	GREENTEK	
PROJECT PROPOSAL	GREENTEK	
FEASIBILITY REPORT	DISCOM	
EXECUTION STAGE		
DESIGN – Civil, Electrical and Mechanical	GREENTEK	
SOURCE ALL COMPONENTS	GREENTEK	
CIVIL WORKS	GREENTEK	
MOUNTING STRUCTURE'S ERECTION	GREENTEK	
PV MODULE MOUNTING	GREENTEK	
DC WIRING FROM PV MODULES TO INVERTER & TERMINATION	GREENTEK	
AC WIRING FROM SOLAR INV. TO LOADS& TERMINATION	GREENTEK	
EARTHLING & LIGHTINING ARRESTORS	GREENTEK	
COMMISSIONING	GREENTEK	
POST-EXECUTION STAGE		
TRIAL RUN	GREENTEK	
INSPECTION	DISCOM	
GRID SYNCHRONISATION	DISCOM	
TRAINING CLIENT PERSONNEL	GG Enterprises	
SUBMISSION OF MANUALS & WARRANTIES	GG Enterprises	
HANDING OVER	GREENTEK & GG Enterprises	
OPERATIONS& MAINTENANCE	GG Enterprises	

Financials:

Cost of the project	**INR. 43,20,000/-**
Taxes (VAT-5%)	**Inclusive**
SECI SUBSIDY 30%	**INR. 10,80,000/-**
NET PAYABLE BY CUSTOMER	**INR. 32,40,000/-**
Transportation to Site	**At actual**
Cost of Grid Synchronization	**At actual**
Cost of Bi-Directional meter	**At actual**

(Rupees: Fifty two lakhs thirty eight thousand only)

Note:

1. **Cost of Liasoning with DISCOM, MNREfor getting approvals and processing fee will be INR. 1,00,000/-.**
2. **Subsidy 30% applicable only to Educational Institutions, Hospitals, Residential and nonprofit making organizations (Trusts and Societies).**
3. **Total plant insurance – Customer scope.**
4. **AMC free for first 1 years.**

Payment Terms:

Advance along with PO	**30%**
After getting DISCOM feasibility	**50%**
Before the dispatch of material	**10%**
Upon commissioning	**10%**

Warranty:

Solar PV module Performance warranty	**25 years**
Grid tied Inverter	**5 years**

Key Features of the Plant:

Expected Power Generation from 97 KW solar power plant per day	**275 Units**
Net Export to the Grid (Month)	**8,250Units**
Net Generation Cost@Rs. 8.5(Monthly)	**INR 72,180-00**
Peak Generation cost per year	**INR 8,66,160-00**

CASH FLOW – ANALYSIS FOR 60 KW SOLAR PV PLANT:

YEAR	GENERATED UNITS	TARIFF	SAVING	CUMULATIVE SAVINGS	Cum Int on Surplus	TOTAL SAVING
1	99000	7.5	742500	742500	0	742500
2	98010	7.875	771828.75	771828.75	29328.75	1543657.5
3	97029.9	8.26875	802315.9856	802315.9856	59815.986	2405789.47
4	96059.6	8.682188	834007.4671	834007.4671	91507.467	3331304.41
5	95099	9.116297	866950.762	866950.762	124450.76	4322705.93
6	94148.01	9.572112	901195.3171	901195.3171	158695.32	5382596.56
7	93206.53	10.05072	936792.5321	936792.5321	194292.53	6513681.63
8	92274.47	10.55325	973795.8372	973795.8372	231295.84	7718773.3
9	91351.72	11.08092	1012260.773	1012260.773	269760.77	9000794.85
10	90438.21	11.63496	1052245.073	1052245.073	309745.07	10362785
11	89533.83	12.21671	1093808.754	1093808.754	351308.75	11807902.5
12	88638.49	12.82755	1137014.199	1137014.199	394514.2	13339430.9
13	87752.1	13.46892	1181926.26	1181926.26	439426.26	14960783.4
14	86874.58	14.14237	1228612.348	1228612.348	486112.35	16675508.1
15	86005.84	14.84949	1277142.535	1277142.535	534642.54	18487293.2
16	85145.78	15.59196	1327589.665	1327589.665	585089.67	20399972.5
17	84294.32	16.37156	1380029.457	1380029.457	637529.46	22417531.4
18	83451.38	17.19014	1434540.621	1434540.621	692040.62	24544112.7
19	82616.86	18.04964	1491204.975	1491204.975	748704.98	26784022.6
20	81790.69	18.95213	1550107.572	1550107.572	807607.57	29141737.8
21	80972.79	19.89973	1611336.821	1611336.821	868836.82	31621911.4
22	80163.06	20.89472	1674984.625	1674984.625	932484.63	34229380.7
23	79361.43	21.93946	1741146.518	1741146.518	998646.52	36969173.7
24	78567.81	23.03643	1809921.805	1809921.805	1067421.8	39846517.3
25	77782.14	24.18825	1881413.717	1881413.717	1138913.7	3020327.43
					TOTAL SAVINGS	3020327.43

Annual Maintenance Contract (AMC)

FREE FOR 1 YEARS

SCOPE OF WORK

We offer the following services as a part of solar plant annual maintenance contract:

1) Facility Management: Maintenance and
Implementation of official requirements for technical operation,

2) Plant Monitoring: Monthly analysis and evaluation of operational plant data
Remote monitoring
Plausibility test of current yield and weather data(If available)
Energy meter value management
Service Hot line from 8.00 hr-17.00 hr.

3) Preventive Maintenance: Preventive inspection and maintenance of system according to
Manufacturer's specifications
Documentation of events and measures
Provision of small parts and operating material
Conduction of regulatory tests according to technical standards

4) Fault detection and analysis: Function check after fault message is received
Immediate start of fault removal measurers
Long term trend analysis

5) Management of repairs: Analysis of interruptions and incidents and claims
Supply chain management for spare parts i.e. modules, inverters,
Cabling and mechanical components

6) Documentation and Data management:
Documentation of plant energy output and system availability
Electronic plant logbook
Detailed information about main events measures
Customer reports on a quarterly/yearly basis

7) Warranty and service management:
Monitoring and tracking of warranty rights
Support with insurance cases
Coordination and managing of external (3rd party) service providers (If any)

AMC – COST AFTER 1 YEARS

OPTION - 1

AMC – Service without spares

AMC COST FOR 100 KW SOLAR POWER PLANT	INR. 45,000-00
SERVICE TAX @ 18%	INR. 8,100-00
NET PAYABLE	INR. 53,100-00
ESCALATION	5% P.A

OPTION – 2:

As the solar power plant is maintenance free, as and when there is a problem, our service team will attend within 24 hours to resolve the issue. We will be charging per visit INR. 5,000/- + Tax as service charge per visit. If any part replaced during service, it will be charged extra at actual.

With all the attributes of a reliable group, we take the opportunity to approach you for giving us the opportunity to serve you with quality and expertise.

Looking forward to receive your valuable order on which we will give our prompt attention for smooth execution.

Dr. N.V. VIJAYAPRASAD M.Sc., M.Phil., Ph.D.
G M (Projects - R&D)

S.SANDHOSH KUMAR
Regional Manager – Projects & Sales | South India

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