MEGHALAYA NON-CONVENTIONAL AND RURAL ENERGY DEVELOPMENT AGENCY

Near BSF Camp Mawpat, Shillong-793012.
Phone No.0364-2537343/2536138/2537611
E-Mail: mnreda_shg@bsnl.in # Website : www.mnreda.Gov.in

TENDER DOCUMENT

1. Work No. : MNREDA/1364/2010/126
2. Name of work

   (i)Design,Supply,Installation and Commissioning of 30 Kw Grid Interactive Solar Photovoltaic System and

   (ii) Design, Supply, Installation, Testing and Commissioning of 1000 LPD Solar Water Heating System consisting 2 units of 100 LPD, 1 unit of 200 LPD and 2 unit of 300 LPD at Raj Bhavan, Shillong.

3. Date of Issue of Tender : 20.10.2011 to 11.11.2011
4. Date of Submission of Tender : 14.11.2011 at 12.00 hours
5. Date of Opening of Tender : 14.11.2011 at 13.00 hours

6. Tender issue to M/s._____ against application vide letter No._____dated_____against payment of Rs.1000/- (Rupees one thousand) only vide cash Demand Draft/Banker's cheque No._____ dated_____ of Bank towards cost of Tender Documents(Non-refundable).

Issued by :_____
For Member-Secretary-Cum-Director
Meghalaya Non-Conventional and Rural Energy
Development Agency, Shillong.

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1. SHORT NOTICE INVITING TENDER

No.MNREDA/1364/2010/126 : Sealed Tender with 60(sixty) days validity are invited from any Approved Manufacturer or Supplier recognized by the Govt.of India, MNRE and as per Specification under JNNSM and also who had experienced in similar kind of works for Design, Supply, Installation and Commissioning of (i) 30 Kw Grid Interactive SPV Power Plant and (ii) 1000 LPD Solar water Heating System at Raj Bhavan, Meghalaya,Shillong.

The Tender paper will be issued with effect from 20-10-2011 to 11.11.2011 on payment of tender cost of Rs.1000/- (Rupees one thousand) only or it can be download from our website but tender cost has to be furnished before casting of tender.

Cost of Tender paper or document should be in the form of cash/Banker's cheque/Demand Draft (Non-Refundable) drawn in favour of Member Secretary-cum-Director, Meghalaya Non-Conventional and Rural Energy Development Agency, Shillong.

Tender paper/document will be issued by courier/speed post on request but extra payment of Rs.200/- (Rupees two hundred)only should be made by Demand Draft in favour of the undersigned towards cost of speed post/courier.

In the event of postal delayed, the undersigned shall not be held responsible.

Tender paper/document shall be issued on any working day within the specified date.

The last date of submission and opening of bids is on the 14th November, 2011 at 12.00 hours and 13.00 hours respectively.

Member-Secretary-Cum-Director
Meghalaya Non-Conventional and Rural
Energy Development Agency, Shillong.

Memo.No.MNREDA/1364/2010/126(a) Dated Shillong, the 13th October, 2011.

Copy to:

1. The Additional Chief Secretary to the Govt. of Meghalaya,
   Power Department, Shillong.

2. Shri Suresh Agarwal
   Scientist "F"
   Ministry of New and Renewable Energy,
   Block No. 14, C.G.O. Complex,
   Lodi Road, New Delhi-110003.

3. Shri Rajashi S. Choudhury,
   Assistant Manager,
   The Indian Express Ltd.,
   23, Dr. S.K. Buejan Road,
   Dighali Pukhuri (East),
   Guwahati-781001.
   E-mail : express.ne.@gmail.com

   } With a request to publish in one issue of Financial Express HI Editions, Mumbai/ Delhi/Kolkata/Chennai/Kochi/Bengalore/ Hyderabad/Pune/Chandigarh/Ahmedabad (Gujarat)/Eng and to be submitted a bill in duplicate alongwith all sample of Advertisement of all edition for necessary payment.

4. The State Informatics Centre,
   Meghalaya, Shillong.

   } With a request to display the NIT on our Website enclosed herewith both hard And soft copy.

5. The Directorate Information and
   Public Relation Department,
   Meghalaya, Shillong.

6. Notice Board

Sd/-
Member Secretary Cum Director,
Meghalaya Non Conventional and
Rural Energy Development Agency,
Shillong.

2.0 **Instruction to Tenderer :-**

2.1 **Site Location** :- Raj Bhavan, Shillong.

2.2. The cost of tender papers or document should be in the form of Cash/Bankers Cheque No./Demand Draft (Non-refundable) drawn in favour of Member-Secretary, Meghalaya Non-Conventional and Rural Energy Development Agency, Shillong.

2.3. Tender Document will be issued by Courier or Speed Post on request but extra payment of Rs.200/- (Rupees two hundred) only should be made by Demand Draft towards cost of Speed Post or Courier.

2.4. Local Dealer of any manufacturer or supplier will be issued Tender document but on furnishing of their Dealership Certificate and tender document will be issued in Principal's name.

2.5. In the event of postal delayed, MNREDA shall not be held responsible.

2.6. Tender document will be issued on any working days within the specified date.

2.7. In case the opening date is declared as holiday tender shall be open in the next working day at the same time and hour.

2.8. Tenderers can submit the tender by down loading from the website but cost of tender document has to be furnished before casting of tender.

2.9. Tenderer are to furnish their offer in a seal cover envelope. For price bid a separate envelope should be enclosed and price bid of only those found Technically qualifies will be opened.

2.10. Commercial Terms and Conditions specifically indicating deviations to the terms and conditions stipulated in detailed tender papers including payment terms etc. must be clearly specify the deviation.

2.11. **Basis price quoted** :- The price quoted should be firm and as per the format provided in the tender document. Price break up of various components must be clearly indicated in the format, failing to comply to the above will result in cancellation or rejection of the tender.

2.12. Any other particular information, which are required to be furnished as per detailed tender papers but which have not been specifically indicated.

2.13. The rate should be legible written in English both in figure and in words. In case of any dispute between the figure and words the letter shall be indicated.

2.14. Earnest Money Deposit of 1% for Schedule Tribe and Scheduled Cast and backward classes and 2% for general on the amount quoted in the form of Bank Guarantee/Call Deposit/FDR from any Scheduled or Nationalized Bank of India pledged in favour of Director, MNREDA, Shillong should be furnished without which tenders will be rejected.

3. **General/Commercial terms and conditions :-**

3.1 **Signing of Tender Paper** :- The tender document as issued by MNREDA should be sealed and signed by the Authorized person of the firm and it will be view as acceptance of each and every conditions containing therein.

3.2 **Attestation** :- All Xerox supporting papers which is not original should be duly attested by the Government official not below the rank of Magistrate.

3.3 **VAT :-** VAT Registration and VAT clearance certificate upto March, 2011 should be furnished along with the Bid.

3.4 **Time of Completion** :- The work should be completed within 60(sixty) days from the date of issue of final work order.

3.5 **Supplier** :- The Supplier who are not the Module Manufacturer are required to produce a letter from the Manufacturer of Module for commitment of supplying the Module without which offer will be rejected.

3.6 **Trading License** :- The successful bidder has to produce a Trading License from the proper authority before starting of work at sites.

3.7 **Agreement** :- An Agreement has to be signed within 7(seven) days of issues of final work order. The Agreement shall be prepared by the purchaser on a stamp paper duly signed by the authorize person of the firm and purchaser. The tender document as issued along with the Bid as submitted by the bidders along with supporting papers shall be part and parcel of the agreement. The maintenance contract agreement shall be separately signed on completion of installation and commissioning work of the system.

3.8 **Division of work :-** The work may be allotted to more than one party so as to enable to complete the work within the set target date by the Government of India, MNRE.

3.9 **Warranty** :- The System supplied should be guarantee for a period of 2 years and after that maintenance of system should be 5(five) years after date of commissioning.

3.10 **Payment Terms and Conditions** :- The Bidders shall be entitled to the following payment terms:-

(a) **Mobilization Advance** : The contractor shall be paid 30% (thirty percent) of value as mobilization advance against a Bank Guarantee of equivalent/like amount from any Nationalized Bank or Scheduled valid for a period of 60(Sixty) days from the date of acceptance of work.

(b) 40% (forty percent) of the contract value of the plant/equipment shall be paid against receipt of materials at site in good conditions.

(c) 20(twenty percent) of the contract value of the plant/equipment shall be paid on complete installation and commissioning.

(d) Balance 10% (ten percent) to be paid at the end of 2(two) years of warranty period or against submission of Bank Guarantee of equivalent/like amount valid for a period of two years from the date of commissioning.

(e) The Annual/comprehensive maintenance contract payment shall be made on percentage of 30%, 30% and 40% at the end of 3rd, 4th and 5th years basis.

In the event of contractor not being able to supply or to carry out the work or a part of the work assigned to him in accordance with the terms of this contract, the purchaser shall have the right to recover any sums advanced from the contractor from his/its assets/amount submitted as mobilization advance.

3.11 **Write up of System** :- The write up in English about the system functioning along with Block Diagram of installation of the system should be furnished along with the Bid.

3.12 **Experience** :- The bidders are required to submit the detailed experience during the last 3 years of the work completed of the same system. A statement in this respect has to be compiled in a comprehensive form along with work orders and completion certificate. Due weightage will be given or considered to the bidders who have any experience in installation of demonstration systems on Renewable Energy at only Raj Bhavan, in the Country.

3.13 **Subletting of Contract** : - The Contractor shall not without the prior consent in writing of the purchaser, assign or sublet or transfer his contract, or a substantial part thereof other than raw materials or for any part of the work of which makers are named in the contract provided that any such consent shall not relieved the contractor from any obligation duty or responsibility under the contract.

3.14 **Price Quoted** :- The price quoted as per the bidding scheduled i.e. cost of the system, transportation, installation and commissioning and maintenance contract should be realistic and practical in nature and conform to the actual work to be done. Any figure which is not practically practicable, offer will be rejected.

3.15 **Contractor to Inform Himself fully** :-

(a) The Contractor shall be deemed to have carefully examined the general conditions, specification and schedules and also to have satisfied himself as to the nature and character of the plant and equipment to be supplied and installed under the contract, the site conditions and all relevant matter and detailed.

(b) If he shall have any doubts as to the meaning of any portion of the contract/work order, he shall before signing/accepting it, set forth the particulars thereof and submit them to the Engineer-in-charge in writing in order to remove such doubts.

3.16 **Financial Soundness** : Documentary evidence in support of Financial Soundness of the Tenderer should be furnished.

3.17 **Submission of Bids :-** The submission of Bids should be strictly in the following order:-

(i)Tender paper as issued by the Agency duly signed and seal by the Authorized persons of the firm.

(ii)Design and Technical Specification duly filled in as per Tender Document.

(iii)Experience in similar kind of works.

(iv)VAT Registration and latest clearance certificate upto March, 2011

(i) Any deviation with justification thereof.

(ii) Price Bid should be in a separate envelope and can be quoted on plain paper but it should be in for Format as given in the NIT.

(iii) Earnest Money Deposit.

3.18 **Service Centre** :- It is mandatory that the manufacturer or Supplier should have a local service centre in the state, and preference will be given to those firm.

3.19 **Exemption of EMD** :- The Manufacturer or Supplier who claim exemption shall have to submit an SSI Registration Certificate issued by NSIC.

3.20 **Breach/cancellation of the contract** :-

(a) In case of Non-performance in any form or change of the convenants and conditions in this contract by the contractor, MNREDA shall have the power to annual, rescind, cancel or terminate the contract and upon its notifying in writing to the contractor that it has so done, this contract shall absolutely determine. The decision of MNREDA in this regard shall be final and binding.

(b) The purchaser may cancel the contract or a portion thereof and if so purchaser or authorized purchase of the plant/equipment not so delivered or order plant equipment of similar description (opinion of the purchaser shall be final) at the risk and cost of the contract. If the contractor had defaulted in the performance of the original contract, the purchaser shall have the right to ignore his tender for risk purchaser even through lowest.

3.21 **Responsibility of the Contractor** :-

The contractor shall guarantee and be entirely responsible for the execution of the contract in accordance with the specification, schedules and appendices. He shall further guarantee and be responsible for the quality and workmanship of all materials and completed works, correct design and drawings, correct delivery of materials, erection, testing and commissioning, within the guaranteed completion and warranty period of 5(five) years from the date of commissioning on completion of commissioning a separate agreement shall have to be signed in their respect for comprehensive maintenance contract.

3.22 **Tools and Tackles** :-

The contractor shall provide all tools and tackles conforming to relevant BIS safety and technical standard for proper execution of work, MNREDA shall in no way, he responsible for supply of any tools and tackles for implementation of the work.

3.23 **Safety Measures** :-

The Contractor shall have to undertake necessary measures for providing adequate safety and precautions to avoid any accident which may cause damage to any equipment/material or injury to workmen. MNREDA shall not responsible for any such accidents.

3.24 **Delivery of system** :-

(i) The contractor shall deliver the plant/systems in accordance with the terms of the contract at the time/times at the place/places and in the manner specified in the contract. The contractor shall comply with instructions that may be given by the purchaser from time to time regarding the transit of the plant and material.

(ii) Notification of delivery or dispatch in regard toe ach and every consignment shall be made to the purchaser immediately after dispatch or delivery. The contractor shall supply to the consignee invoice in duplicate and packing account of all stores delivered or dispatch by him.

(iii) In case of any occurrence of loss or damage in transit upto destination, it shall be liability of the contractor to initiate or pursue the claim with Insurance Company. He should take immediate steps to repair the damaged apparatus or replacement thereto. Any extension of time limit required in such contingency will be considered by the purchaser on merit.

3.25 **Arbitration** :-

(i) Except where otherwise provided if anytime question dispute or difference whatever shall arise between the contractor and the purchaser upon or in the relation to or 1(one) connection with this contract either of the parties may give to the other notice in writing of the existence of such a question on rejection of the matter, the dispute or difference shall be referred to the sole arbitration appointed by MNREDA at the time of dispute after ascertaining the terms of reference mutually.

(ii) The Arbitration will preferably be a member of Arbitration Council and arbitration proceeding will take place as per provision or arbitration Act 1940 or any statutory modification or re-enactment thereof and the rules made there under and for the time being in force shall apply.

(iii) The contractor will ensure that the work under this contract shall continue during arbitration proceeding and dispute and no payments due from or payment by the purchaser shall be withhold on account of such proceeding except to the extent which may be in dispute.

3.26 **Court of Competent Jurisdiction** :-

The Courts of Gauhati High Courts, Shillong Bench will only have jurisdiction in this case.

4. **Scope of work and Technical Design and Specification** :-

4.1 **The Scope of work** :- The Scope of work is to (i) 30 Kw Grid Interactive Solar PV Power Plant which will supply the Power the existing outside lighting inside Raj Bhavan and Power Plant connected the existing grid connected excess Power from Solar connected to the Grid and (ii) To install 1000 LPD Solar Water Heating System consisting 5 units i.e. 2 units of 100 LPD, 1 units of 200 LPD and 2 units of 300 LPD.

4.2 **SPV Power Plant** :-

The proposal aims at providing 30 Kwp SPV Power Plants to be installed on the kitchen garden of Raj Bhavan. The Plant shall cater all the Street Lights and path lights loads inside Raj Bhavan.

Sl. No.	Description	Quantity	Total watt
1.	Tube lights	28	1120
2.	CFL	52	936
3.	LED Street Lights	20	1120
4.	CFL (Walkway Fitting)	350	2450

The system shall consist :-

- Solar PV Modules : 30 Kwp (24V, 230 Wp each)
- Input DC voltage : 240 V DC
- Total No.of Modules : 130
- Modules connected in series : 10
- No.of parallel strings : 13
- No.of Array of Junction Box : 3
- Distribution Box : 1
- Battery Bank : 240V, 600 AH. (Tubular Pb-acid)
- Power conditioning Unit : 240V, 30 KVA, three phase
- Import & Export metering : As required
- Other BOS Item : As required.

The MPPT charger shall power the DC bus from the PV array. The micro processor control circuit shall automatically adjust the DC-DC converter to ensure that it should always match to the PV array under varying conditions and transfers the maximum possible power. The battery bank shall get charged from this DC bus, the charging rate and other parameters being controlled by the supervisory circuit.

A bidirectional inverter shall sit between the DC and the AC bus. The DC power shall be converted to AC and exported to the grid. The inverter output shall match the grid in voltage, frequency and phase.

4.3 System Configuration :-

4.3.1 **PV Modules** :-

(i) Individual Solar PV Module should be of capacity 230 Wp conforming to IEC : 61215 Ed 2 or latest – Edition II, IEC: 61730-I : 2007, IEC : 61730-II: 2007, manufactured in India in a part certified under ISO 9001 : 2008 & ISO 14001 and also type tested by any one of the accredited test Laboratories under Ministry of New & Renewable Energy, Govt.of India.

(ii) The Solar PV Module construction will be of 60 Nos. 156x156 mm mono/poly crystalline Silicon Solar Cell connected in series.

(iii) Crystalline high power cells will be used in the Solar Photovoltaic module.

(ii) To connect the solar modules interconnection cables will be provided. Photo electric conversion efficiency of SPV module will be greater than 14%. Modules will be made of high transmitted glass front surface giving high encapsulation gain and silicon rubber edge sealant for module protection and mechanical support.

(iii) All materials used will have a proven history of reliable and stable operation in external applications. It will perform satisfactorily in relative humidity up to 100% with temperatures between -30 deg C and + 85 deg C and with stand gust up to 200 km/h from the back side of the panel.

(iv) Solar module will be crystalline type, employing lamination technology using establish polymer (EVA) and TEDLAR laminate.

4.3.2. Other General Features of PV Modules :-

i) The rated output power of any supplied module will not vary more than 5% from the average power rating of all modules.

(ii) The module frame will be made of corrosion resistant materials, which are electrolytically compatible with the structural material used for mounting the module.

(ii) Protective devices against surges at the PV module will be provided, if required. Low voltage drop bypass and /or blocking diode(s) may also be provided, if required.

(iii) Module Junction Box (weather resistant) will be designed for long life outdoor operation in harsh environment.

(iv) PV modules used in solar power plants must be warranted for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.

(v) The solar modules will have suitable encapsulation and sealing arrangements to protect the silicon cells from the environment. The arrangement and the material of encapsulation will be compatible with the thermal expansion properties of the silicon cells and the module framing arrangement/material. The encapsulation arrangement will ensure complete moisture proofing for the entire life of the solar modules.

(vi) Each module will have low iron tempered glass front for strength and superior light transmission. It will also have tough multi layered polymer back sheet for environment protection against moisture and provide high voltage electrical insulation.

(vii) The fill factor of modules will not be less than 0.70

(viii) Other balance of systems components (BOS) must qualify to the latest edition of BIS or IEC standards issued in this regard.

(ix) Array capacity will not be less than the designed capacity and number of modules required will be worked out accordingly.

(x) Each PV module must use a RF identification tag. The following information must be mentioned in the RFID used on each module (this can be inside or outside the laminate, but must be able to withstand harsh environment conditions.)

a) Name of the manufacturer of PV Module

b) Name of the Manufacturer of Solar Cells

c) Month and year of the manufacturer (separately for solar cells and module)

d) Country of origin (separately for solar cells and module)

e) I-V curve for the module

f) Wattage, Im, Vm and FF for the module

g) Unique Serial No. and Model No. of the module

h) Date and year of obtaining IEC PV module qualification certificate

i) Name of the test lab issuing IEC certificate

j) Other relevant information on traceabibility of solar cells and module as per ISO 9000 series.

MODULE TECHNICAL SPECIFICATION	
Solar Cell/Module type	
Rated Power	
Power Tolerance	
No.of solar cells per module	
Peak power voltage (Vmp) at 25 deg C	
Peak power current (Imp) at 25 deg C	
Open circuit voltage (Voc) at 25 deg C	
Short circuit current (Isc) at 25 deg C	
Weight of each module	
Module Efficiency	
Operating temperature range	
Standard	IEC : 61215 – II, IEC:61730-I : 2007, Confirming to MNRE guidelines of 2011 Under JNNSM.
Identification	RFID
Solar module frame material	
Fill factor	

4.3.3. Module Mounting Structure :-

i) The array structure will be made of hot dip galvanized. The minimum thickness of galvanized will be at least 100 microns. All nuts and bolts will be made of very good quality stainless steel. The minimum clearance of the lowest part of the module structure and the developed ground level will not be less than 500 mm.

ii) The SPV panel will have a provision for angular adjustment (0-50 degree with 10 degree interval) of the mounting structure to get maximum utilization of incident sunlight. It will be mounted facing south and tilted to an angle equal to the latitude where being used for optimum performance.

iii) Leg assembly of module mounting structure made of different diameter galvanized tubes may be accepted. The work should be completed with supply, fitting fixing of clamps, saddles, nut and bolts etc. While quoting the rate, the bidder may mention the design and type of structure offered. All nuts and bolts will be made of high quality stainless steel.

iv) The structure will be designed to allow easy replacement of any module and will be in line with site requirements.

v) The structure will be designed for simple mechanical and electrical installaiton. It will support SPV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly. There will be no requirement of welding or complex machinery at site.

vi) The array structure will be so designed that it will occupy minimum space without sacrificing the output from SPV panels. At the same time it should withstand wind speed up to maximum 150 km/h.

vii) PCC array foundation base :- The legs of the structures made with GI angles will be fixed and grouted in the PCC foundation columns made with 1:2:4 mix of cement concrete. The minimum clearance of the lowest part of any module structure will not be less 500 mm from ground level. While making the foundation design, due consideration will be given to weight of module assembly, maximum wind speed of 150 km/h.

PPV MODULE MOUNTING STRUCTURE TECHNICAL SPECIFICATION	
Parameters	**Specifications**
Type	
Configuration	
Material	
Coating	
Wind rating	
Tilt angle	
Foundation	
Fixing type	

4.3.4. Battery & Battery Bank :-

i) The batteries should be of gelled electrolyte type, positive tubular plate, maintenance free lead batteries and shall confirm to IEC/EN 60896-21 & 22.

j) The batteries shall be of 2V cells with end cut off voltage 1.8 per cell and battery terminal should be provided with covers.

k) Design voltage of system should be 240V system.

l) Battery capacity of each plant should be designed taken as a full rated load capacity available from the solar array with two days autonomy taking into consideration.

m) Batteries should be provided with explosion proof vent plugs with complete assembled set.

n) The batteries shall be suitable for recharging by means partial state of charge.

o) Bidder shall mentioned the design cycle life of batteries at 80% depth of discharge at 27 degree C. Details for 20% DOD shall be provided.

p) The batteries shall be designed for operating in ambient temperature of site.

q) The battery container shall be made of polypropylene.

r) The self discharge of batteries shall be less than 3% per month at 20 degree C and less than 6% per month at 30 degree C.

s) The batteries shall consist of individual cells, which can be carried separately with case while transporting.

t) Bidders to specify capacity & end cell voltage at different discharge rates.

u) Battery rack and accessories.

Battery interconnecting links shall be provided for interconnecting the cells in series and in parallel as needed. Connectors for inter cell connection (series/parallel) shall be maintained.

v) Specification should consist of :

i) Manufacturer :

ii) Type battery :

iii) Nominal voltage :

iv) End cell voltage :

v) Capacity of battery system :

vi) Depth of discharge :

vii) Efficiency of battery :

viii) Duty cycle :

ix) Combination of battery series and parallel :

x) Structural details : As per product leaflet :

xi) Battery guarantee :

4.3.5. Inverter :

i) A multi-function Grid connected Inverter combines the functionality of a Grid-Interactive solar inverter with a highly efficient solar conversion unit. Inverters achieve their distinguished efficiency factor through the use of IGBTs (insulated gate Bipolar transistors) with Trench Gate Structure, and through the use of efficient chokes and transformers whose losses are less than 1%. Inverters operate on MPPT (Maximum Power Point Tracnking) mode to ensure maximum output from the solar generators at different ambient conditions. Central inverters use higher system voltages to reach very high plant efficiency.

ii) With the use of wide range of input inverter allows the largest possible range of solar module connection possibilities. For larger installations, the proposed inverters can be easily combined to provide higher performance.

iii) The inverter must have the following features :-

- Unique system design with the MIX concept
- High yield power electronics
- Intelligent cooling
- Simple planning and easy installation
- Comprehensive system monitoring

INVERTER/PCU TECHNICAL SPECIFICATION	
INPUT DATA	30 KW
DC maximum power at cos ϕ = 1	3 Nos. of 10 Kw
Max. input current (Idc max)	
Min.input voltage (Udc min)	
Feed-in starting voltage(Udc start)	
Nominal input voltage (Udc, r)	
Max. input voltage (Udc max)	
MPP voltage range	
(Umpp min-umpp max)	
OUTPUT DATA	
AC nominal output (pac,r) at cos ϕ= 1	
Maximum output power	
Grid connection	
Min.output voltage (Uac min)	
Max. output voltage (Uac max)	
Frequency (fr) & Frequency range (fmin- fmax)	
Harmonic distortion	
Power factor (cos ϕ ac,r)	
GENERAL DATA	
Degree of protection	
Protection class	
Inverter concept	
Cooling	
Installation	
Ambient temperature range	
Permitted humidity	
Standards for grid interface	
SAFETY EQUIPMENT	
DC Insulation measurement	
Overload behavior	
DC circuit breaker	
INTERFACE	
2X RJ45 sockets (RS 485)	

4.3.6. Junction Boxes :-

i) The Junction Boxes shall be dust, vermin and waterproof and made of ABC/Thermo Plastic. The terminals shall be connected to copper bus bar arrangement of proper sizes. The junction boxes shall have suitable cable entry points fitted with cable glands of appropriate size for both incoming and outgoing cables.

Suitable markings shall be provided on the bus bar for easy identification and cable ferrules shall be fitted at the cable termination points for identification. The junction boxes shall have suitable arrangement for the following :-

ii) Combine groups of modules into independent charging sub-arrays that shall be wired to the controller.

iii) Provide arrangement for disconnection for each of the groups.

iv) Provide a test point for each sub-group for quick fault location

v) To provide group array isolation

vi) The rating of the JB's shall be suitable with adequate safety factor to inter connect the Solar PV array.

vii) Metal oxide variators shall be provided inside the array junction boxes

viii) Array junction boxes should meet IP 65 certification norms

ARRAY JUNCTION BOX TECHNICAL SPECIFICATION	
Parameters	Specifications
Type	
Construction	
Earthing provision	
Hardware	
Mounting	
protecting	

4.3.7. Copper Cables :-

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 power plant to the minimum.

The bright annealed 99.97% pure bare copper conductors that offer low conductor resistance are used in the power plant. They result in lower heating of the cable thereby increase in life of the cable and also reduction in power losses in the system. These cables are insulated with a special grade FRLS compound formulated for outdoor use. The skin coloration offers high insulation resistance and long life.

Cables are flexible and are used with annealed electrolytic grade copper conductors. They are suitable for outdoor and for 600 VDC application.

CABLES TECHNICAL SPECIFICATION	
Parameters	Specifications
Type	
Material	
Working voltage	
Test voltage	
Color	
Temperature	
Standard	

4.3.8. DC Distribution Board/Isolator Box :-

TECHNICAL SPECIFICATION	
Parameters	**Specifications**
Type of box	
Make	
Material	
Busbar	
MCB/MCCB	
Finish	

4.3.9. AC Distribution Board/Isolator Box :-

The AC distribution board should be designed in such a way that…..

i) Bus Bar minimum 3 times capacity of Solar Power Plant.

ii) Input Grid line should come from such distribution Board of client so that power can feed the load or feed power to the grid even when grid fails (DG runs) in day time and solar insulation is available.

iii) The Solar Power should be exported to the bus bar inside the ACDB through LCD Energy Meter.

iv) The Designated load should be routed through ACDB and Energy Meter to register the load Energy consumption from Solar Grid during week days and holiday.

v) Co2 meter to be used in AC DB to measure reduction of carbon emission using SPV.

TECHNICAL SPECIFICATION	
Parameters	**Specifications**
Type of box	
Make of the box	
No.of outputs	
Export Energy meter	
Import energy meter	
Co2 meter	
MCB & fuses	
MCB/MCCB	

4.3.10. Earthing & Lighting Protection :-

Earthing :- The array structure of the PV yard will have to be grounded properly using adequate number of earthing kits. All metal casing/shielding of the plant will be thoroughly grounded to ensure safety of the power plant.

Lightning :- The SPV power plant shall have to be provided with lightning and over voltage protection. The main aim in this protection will be to be 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. Metal oxide variators will be provided inside the array junction boxes. In addition suitable MOV's also will be provided in the inverter to protect the inverter from over voltage.

LIGHTING ARRESTOR TECHNICAL SPECIFICATION	
Parameters	**Specifications**
Diameter of lightning arrestor	
GI spike	
Earth pit	
Protection	
Case material	
Type	
Leak current	
Enclosure	

4.3.11. Load Evacuation :- The power plant site is about 200m distance from the actual load centres. Load has to be evacuated through underground cable to respective load evacuation points. S three Nos. of inverter of 10 Kw each are to be provided, the details size of cable, lining, material, type, test wattage standard should be furnished by the offerer.

4.3.12. Civil Work :-

i) **For Module mounting** :- The Modules are to be ground mounted and a clear clearance of about 1.5 m from bottom edge of modules of the ground level should be designed for mounting Modules Structure.

ii) **Control Room** :- The control room to house the battery, PCU & Inverter, Control Unit, ACDB, DCDB, and inclusive of operator room along with toilet should be RCC make with tiles floor and provision of 3 phase grid power of capacity 415V, 100A input line with window frame of sal wood/equivalent, window panel made of wood/PVC door along with lighting facilities inside the control room and outside lighting. The offer are to design the size as per requirement.

iii) **Fencing** :- The Solar Modules are to ground mounted and should be fenced with cross jar fencing all around the area and provision of gate.

4.3.13. Solar Water Heating System :-

i) The Solar Plate collector should be of a flat plate collector.

ii) The solar collector along with hot water tank are to be installed on the ground.

iii) Solar Collector Area Design :-
The requirement of space for installation of solar collector are to be provided along with the details drawing and design separately for all units of system at each Institute without which tender will be rejected.

iv) **Internal Piping** :-
The requirement of cold water pipe and hot water pipe along with accessories required for average quantity quoted for price of the system should be specified and the details size of pipe and accessories were the excess quantity from the average estimation should be furnished clearly and individually for each system. While quoting the tender, details piping with size for each system and along with accessories should be forwarded separately along with unit price.

v) **Technical Specification** :-

Specification of capacity 100,200 and 300 LPD unit capacity should be furnished below as per Technical Specification required :-

1.	**System capacity**
2.	System output temperature
3.	Type & made of solar collector
4.	No.of collectors
5.	Application
6.	Circulation
7.	Electrical back up
8.	Tank type and made
9.	Sacrificial anode
10.	Internal piping
11.	Angle wheel valve
13.	Temperature gauge
13.	Water meter
14.	Float chamber
15.	Tank and collector stand
16.	Collector painting
17.	Operating and maintenance manual
18.	Permissible total hardness of water
19.	Hot water and cold water piping
20.	Make
21.	Tank weight
22.	Collector weight
23.	Space required
24.	Pipeline of cold water and hot water average estimation
25.	Any other details

a) Technical Specification as per Format above should be furnished for each system capacity.

b) The details structure drawing for each capacity for Installation should be furnished along with write up on the system.

vi) The Solar Collector Test Certification should be furnished for the system supply and water Tank should be of ISI marking and certification.

5. Bidding Scheduled :-

i) 30 Kw Grid Interactive SPV Power Plant

Sl. No.	Description of item	Quantity	Unit	Rate (Rs.)	Amount (Rs.)
A.	**Equipments cost :-**				
1.	Solar Photovoltaic Modules 230 Wp Minimum.				
2.	Modules Mounting Structure and Post.				
3.	Battery 2V, 600AH, 120 Nos. as required.				
4.	PCU and Inverter complete 3 x 10 KVA.				
5.	Array Junction Box				
6.	Inter connection cable as per required size.				
7.	DCDB				
8.	AC DB				
9	Energy meters.				
10.	Earthing system.				
11.	Lighting Arrestor.				
12.	Cable for load Evacuation including of Trench digging complete.				
13.	Import & Export metering System.				
14.	Installation tools & kits				
15.	Any other accessories add on (please specify)				
	TOTAL (A)				
B.	Installation & commissioning				
C.	Civil work :- i)Modules Mounting structure ii)Control Room as required inclusive of internal and outside lighting. iii)Fencing of Power house				
D.	Transportation, Taxes etc.				
E.	Operation and Maintenance For 5(five) years				
	Grand Total (i)				

(Rupees_____)only

Note : 1. Quantity of each item should be clearly specify in the bidding scheduled.

2.Any additional add on equipments as per design of power plant should be clearly mentioned in price bidding.

3.Bidding Scheduled in plain paper but as per format may be submitted in a separate envelope inside the offer.

ii) **For 1000 LPD Solar WaterHeating System** :-

Sl. No.	Description of Items	Unit	Quantity	Unit per system (Rs.)	Amount (Rs.)
1	2	3	4	5	6
A.	100 LPD – 2 Nos.				
i.	Design, manufacture supply of 100 LPD solar water heating system for individual user.	Nos.of system			
ii.	Average cold & hot water piping with accessories supplied with system	L.S.			
iii.	Super structure work for collector	L.S.			
iv.	Installation & commissioning	L.S.			
v.	Annual maintenance Contract.	L.S.	3 years		
	TOTAL (A)				
B.	200 LPD - 1 No.				
i.	Design, manufacture supply of 200 LPD solar water heating system as required.	Nos.of system			
ii.	Average cold & hot water piping with accessories supplied with system.				
iii.	Super structure work for collector	L.S.			
iv.	Installation & commissioning	L.S.			
v.	Annual maintenance Contract.	L.S.	3 years		
	TOTAL (B)				

C.	300 LPD – 2 Nos.				
i.	Design, manufacture supply of 300 LPD solar water heating system as required.	Nos.of system			
ii.	Average cold & hot water piping with accessories supplied with system.				
iii.	Super structure work for collector	L.S.			
iv.	Installation & commissioning	L.S.			
v.	Annual maintenance Contract.	L.S.	3 years		
	TOTAL (C)				
	Grand total (ii)	-	-	-	-
	Total amount quoted (i) + (ii)	-	-	-	-

(Rupees_____)only.

Dated :-

Seal & Signature of authorized person
of the Firm.