EXPRESSION OF INTEREST (EOI)

For

Design, Approvals, Supply, Installation, Testing and commissioning of Grid Connected Net Metering Rooftop 90KW (Battery less) Solar Power Plant System (Including free unconditional comprehensive maintenance) at PUDA Complex, Urban Estate, Phase-2, Patiala.

Office:

Patiala Urban Development Authority
Urban Estate Phase 2 Patiala
Tel. No. 0175- 5030685, 5020558
Web: www.pdapatiala.in
Fax : 0175-2280299

Patiala Urban Development Authority
Urban Estate, Phase-II, Patiala.

Notice for Inviting Expression of Interest

Sealed EOI's are Invited from the PEDA enlisted manufactures, agencies or their authorized dealer / associates those having experience of similar nature of work detailed as under:-

Sr. No	Name of work	Estimated cost	Earnest Money	Tender documentation fee (Non refundable)	Time Period
1	Design, Approvals, Supply, Installation, Testing and commissioning of Grid Connected Net Metering Rooftop 90KW (Battery less) Solar Power Plant System (Including unconditional comprehensive maintenance) at PUDA Complex, Urban Estate, Phase-II, Patiala	To be quoted by agency	1.2 Lakh	10,000.00	3 Month

1. Availability of EOI documents, date and time of Pre bid & submission / opening of bid documentation as given below:

Sr. No	**Availability of EOI documents at**			**Pre bid meeting**	**Last date & time for submission**	**Date and time of opening of EOI**		
	Place	**From**	**To**			**Place**	**Technical Bid**	**Financial Bid**
1	Office of Divisional Engineer (Electrical) Room No. 207, PUDA Complex, Urban Estate, Phase-II, Patiala			Office of Superintending Engineer, Room No.104, PUDA Complex, Urban Estate, Phase-II, Patiala date: Time:		Office of Superintending Engineer, Room No.104, PUDA Complex, Urban Estate, Phase-II, Patiala		

1. EOI documents can be purchased from the PUDA office by paying document charges @ Rs. 10,000-00 in shape of DD in favour of Divisional Engineer (Electrical), PDA, Patiala payable at Patiala. The detailed EOI documents along with specifications, terms & conditions of the contract etc. can also be downloaded from website **www.pdapatiala.in** .Those who will download the EOI documents from website shall be required to submit DD of Rs. 10000.00 (Ten

Thousands only) in favour of Divisional Engineer (Electrical), PDA, Patiala payable at Patiala at the time of submission of bid. In case the bidder has directly purchased the EOI documents from department then the bidder will submit copy of receipt along with bid.

2. Earnest money and EOI document fee must be paid through DD in favour of Divisional Engineer (Electrical), PDA, Patiala payable at Patiala.
3. Any corrigendum/addendum/corrections, if any, can be seen on PDA website or at notice board of undersigned office.
4. **Submission of E.O.I. Documents**

   The bidder will submit the bid in three sealed Envelopes.

   Envelope marked 'A' shall contain :

   a) EOI documents fees (in the shape of Demand Draft payable at Patiala in favour of Divisional Engineer (Electrical) PDA, Patiala Or Proof for deposit of fee in case agency directly purchases EOI documents from this office.

   b) Earnest money in the shape of Demand Draft payable at Patiala in favour of Divisional Engineer (Electrical) PDA, Patiala,

   Envelope Marked 'B' shall contain :

   i) Experience certificate for similar nature of work duly certified by the concerned department.

   ii) PAN No.

   iii) GST No.

   iv) PEDA Enlisted Certificate for minimum 100 kW roof top solar plant.

   v) Authorization certificate for dealership. (if any)

   vi) Undertaking by the bidder as per **Annexure A**

   Envelope Marked 'C'shall contain :

   i) Financial bid.(To be quoted in attached prescribed performa-**Annexure-B**)
5. The agency must have experience in Rooftop Solar Power Plant System and should have completed satisfactory at least one rooftop solar power plant of minimum 100 KW capacity in the last 3 years. The copy of completion certificate duly signed by the concerned department must be attached
6. Bidder shall submit all the documents i.e. DD/Receipt of Document fee, DD of Earnest money, PEDA empanelment of minimum for 100KW, PAN Card, GST No. and other certificates as required in the eligibility criteria etc. , without which the tender would not be opened and would be rejected.
7. Conditional bids and the bids not meeting with the qualifying criteria shall be rejected same shall be treated as defunct abnitio.
8. If the date of opening of tenders happens to be a public holiday, than the EOI will be opened on next working day at the same time and place.

9. After the completion of repayment period the assets created would become encumbrance free and shall be the property of PDA.
10. In case of default on the part of the agency during the installation and repayment period,the PDA shall retain assets created as part of this project.
11. The firm must not have been debarred/blacklisted/defaulted by any Govt. Dept. agency,PSUs/institution/agencies/autonomous organisations.
12. The earnest money deposited by the successful bidder has to be considered as security deposit against this work and shall be refunded after the completion of contract period.
13. The bidder shall operate and maintain the plant free of cost during the payback period. Any repair/replacement etc required for the optimum and successful operation of the plant shall be carried out by the bidder free of cost.
14. The agency will be responsible for taking permissions/approvals at their own level and at their own cost from State Nodal agency PEDA (Punjab Energy Development Agency) as well as from State Power Distribution Agency i.e PSPCL (Punjab state Power Corporation Ltd).
15. PDA, Patiala is not responsible for any postal delays/loss of documents in transit.
16. PDA , Patiala reserves the right to reject any or all EOI without assigning any reason.
17. In case of any dispute, The Additional Chief Administrator PDA Patiala shall be the sole arbitrator whose decision shall be final and binding on both parties.

Other compliances :

a) While installing solar power plants on rooftops the physical condition of the roof should be taken in to consideration.
b) In case small damages are inevitable for erecting the footings for the module mounting structure etc.the roof top may be given a suitable grading plaster with suitable leak proof compound so as to render the roof entirely leak proof.
c) The solar PV array must be installed on the roof top in such a way that there is sufficient space on the roof top for maintenance of other services etc.
d) If the roof top does not hae any access such as stairs or Ladder,a proper and safe lader must be provided to ensure easy access to the roof top mainly for the purpose of maintenance and inspection.
e) While cabling the array care must be taken such that no loose cables lie on the rooftops.The roof top should look clean and tidy after installation of the array. Display board is to be fixed in a prominent place,if required.

Divisional Engineer (Electrical),
PDA, Patiala.

Patiala Development Authority
Urban Estate, Phase-II, Patiala.

Expression of Interest

Divisional Engineer (Electrical), PDA, Patiala on behalf of Patiala Development Authority, Patiala invites Expression of Interest (EOI) from the PEDA enlisted manufactures, agencies or their authorized dealer / associates.

1. **Invitation for"Expression of Interest (EOI) for Design, Approvals, Supply, Installation, Testing and commissioning of Grid Connected Net Meeting Rooftop 90KW (Battery less) Solar Power Plant System (Including unconditional comprehensive maintenance) at PUDA Complex, Urban Estate, Phase-II, Patiala"**

1.1 Keeping in view the increasing stress on the environment on account of Pollution and further in order to increase the use of renewable energy, PDA has decided to introduce the concept of renewable energy in the shape of solar power in the office building of Patiala Development Authority (PDA),which would not only reduce the burden on PSPCL, but would also ensure an improved environment.

2. **PDA authority invites the agencies to come forward for Expression of Interest (EOI) for Design, Approvals, Supply, Installation, Testing and commissioning of Grid Connected Net Metering Rooftop 90KW (Battery less) Solar Power Plant System (Including unconditional comprehensive maintenance) at PDA Complex, Urban Estate, Phase-II, Patiala.**

Considering the following concept.

2.1 The successful agency will install and commission the complete setup of 90 KW of rooftop solar grid system.

2.2 After completion of setting up this rooftop solar grid system , PDA authority will pay Rs. 90000.00 (Ninety Thousands only) per month to the successful bidder on "**recurring payment mode**". This amount will be in lieu of setting up , running and comprehensive free maintenance for the period quoted in financial bid (ie Annexture B) by the agency.

2.3 The site for installation of the solar plant would be provided by PDA to the successful bidder, free of cost.

3. Detail of components of the solar power plant

The solar power voltaic (SPV) shall be supplied and installed by the bidders as per the specifications which shall comply with the MNRE, GOI guidelines. The following parts/components for each SPV are required to be supplied:-

1. Solar Module of capacity of suitable ranging as per guide lines of MNRE as well as PEDA norms.
2. Power conditioning unit (PCU)
3. PVC insulated copper cables as per latest BIS codes for AC & DC inter connections.
4. Junction with SPD as per approved make list
5. Structure for solar PV project - Galvano sheet and channel
6. ACDB with SPD and MCB/MCCB unidirectional solar meter and necessary protection as per CED rules and safety regulations
7. Lighting arrestors as per MNRE and BIS standards
8. Danger notice boards/plates
9. Earthing as per BIS required for SPV power plant
10. Remote monitoring system
11. O&M manual and warranty cards
12. The process and expenditure of meter testing and electrical inspection
13. Any other component/part as per requirement at site to the entire satisfaction of the client.

4. Warranty

4.1 The solar power project shall be warranted up to repayment after the successful commissioning of the plant and after obtaining completion certificate from the Engineer in Charge; the bidder shall operate and maintain the solar plant, free of cost for up to the repayment period.

4.2 The PV modules shall have efficiency warranty for a minimum period of 25 years from the date of commissioning of the project. The modules must be warranted for their output peak watt capacity and should not be less than 90% at the end of Ten years and 80% at the end of twenty five years.

4.3 Repayment period shall be as quoted by the successful bidder in the financial bid.

5. Comprehensive maintenance contract during warranty period

5.1 Visit to the site on call basis to provide maintenance service within 48 hours of the lodging of complaint.

5.2 Corrective & remedial maintenance services to set right the malfunction of the solar project including supply and replacement of all damaged parts/components including electronics, Inter connected bales/pars and fuse etc with new parts.

6. Operation & Maintenance Manual

6.1 An Operation, Instruction and Maintenance manual in English/Punjabi language should be provided with the Solar PV Projects. The following minimum detail must be provided in the Manual.

6.2 Type, Model number, Voltage and capacity of inverter, used in the system.

6.3 The make, model number, country of origin and technical characteristics of all the component are required to be provided.

6.4 Clear Instructions on regular maintenance and trouble shooting of the solar project.

6.5 Name, address and mobile no. of the contact person for repair and maintenance in case of non-functionality of the project.

7. Write-Up & Diagrams

7.1 Basic principles of Photovoltaic.

7.2 A small write-up on the Solare PV project – its components, PV module, inverter, Junction boxes and expected performance shall be provided including with a block diagram and single line diagram wherever applicable as per entire satisfaction of EIC.

7.3 Minimum 2 no block diagrams/single line diagram on A1 Size sheet in colored print duly laminated.

General Technical Specification

1. Solar Modules

Each solar PV plant array capacity should not be less than the capacity of the same SPV Plant capacity and it should comprise of Poly crystalline module of high efficiently of minimum 250 watts, to be approved by IECQ approved certification before erection at site. The modules must be tested & approved by one of the IEC authorized test centers, test certificates can be form any of the NABL/BIS 14286 accredited testing/ calibration laborites the module type must be qualified as per IEC 61215 In addition modules must qualify to IEC 617030 for safety qualification testing . Module conversion efficiently should not be less than 16.0% under STC.

The open circuit voltage of the PV module under STC should be atleast 21.0 Volts.The PV modules must be warranted for their output peak watt capacity which should be less than 90% at the end of 10 years and 80% at the end of 25 years period.The bidder will have to furnish a CORPORATE GURANTEE on a required stamp paper for the same.

Identification and Traceability

Each module used in any solar power project must use a PF identification Tag (RFID), Which must contain the following information:

i. Name of the manufacturer of module
ii. Name of the manufacturer of solar cells
iii. Month and year of the manufacturer (separately for solar cells and modules.)
iv. Country of Origin (separately for solar cells and modules).
v. I-V Curve for the module.
vi. Peak wattage, Im, Vm and FF for the module
vii. Unique serial no and Model no of the Module
viii. Date and year of obtaining IEC PV module qualification certificate
ix. Name of the test lab issuing IEC certificate.

2. SPV Panel Array Structures

The supplier shall specify installation detail of the modules and the support structures with appropriate diagram and drawings. Such details shall include, but not limited to the following:

- Determination of true south at the site,
- Array tilt angle to the horizontal, with permitted tolerance,
- Details with drawings for fixing the modules
- Details with drawings of fixing the junction/terminal boxes,
- Interconnection detail inside the junction/terminal boxes,
- Structure installation details and drawings,
- Electrical grounding (earthing),
- Inter-panel/Inter-row distances with allowed tolerances and
- Safety precautions to be taken

The array structure shall support modules at a given orientation to absorb and transfer the mechanical loads to the roof properly. The portion of array structure if any lying within the column shall be of Galveno or Alluminium as per scope of supply. All nuts and bolts shall be of very good quality stainless steel. Detailed design and drawing of the module mounting structures shall have to be submitted to PEDA for acceptance before execution of work. Strict care should be

taken during execution to avoid any damage to the roof surface of the buildings and to ensure no leakage should occur.

i. Wherever required, suitable number of panel structures shall be provided. Structures shall be of flat-plate design and can be with combination of I, C and L or any sections as per structure design requirement.
ii. Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame should be of Galveno, its fasteners, nuts and bolts of stainless steel.
iii. Structures with adequate strength and in accordance with relevant BIS standards and the design of structures can withstand a wind speed upto 170KM per hour.
iv. Structures shall be supplied complete with all members to be compatible for allowing easy installation at the rooftop site.
v. Each structures should have angle of inclination as per the site condition to take maximum insulation.
vi. The base plate and vertical section of the structure should be minimum of 2.5 mm thickness.
vii. Each panel frame structures be so fabricated as to be fixed on the rooftop column/wall structures. The structures shall be designed from simple mechanical and electrical installation. There shall be no requirement of welding or complex machinery at the installation site. If prior civil work or support platform is absolutely essential to install the structures, the supplier shall clearly and unambiguously communicate such requirements along with their specification in the bid. Detailed engineering drawings and instructions for such prior civil work shall be carried out prior to be supply of Goods. All units and bolts shall be of very good quality stainless steel except foundation bolts which will be of MS (GI Coated)
viii. The structures should be non-If penetrating and low height. The entire structure should be connected to each other in a grid form so as to sustain the wind speed up to 170KM/hr.
ix. No damage in any way should be caused to the building rooftops while installation of power plant.

3. Power conditioning Unit (String Invertors)

Inverter should comply with IEC 61683/IS 61683 for efficiency and measurements and should comply IEC 60068-2(1,2,14,30)/ Equivalent BIS Standard for environmental testing. Inverter should supervise the grid condition and in the event of grid failure (or) under voltage (or) over

voltage,Solar System should be disconnected by the circuit Breaker/ Auto switch provided in the inverter.

The power conditioning units of each different capacity should be able to efficiently run the each SPV power plant capacity and it should be provided to to convert DC power produced by SPV modules, in to AC power. A multi-function power conditioning system combining the functionality of a grid interactive solar inverter with a highly efficient conversion unit having following Technical Specification:

Type	Self commuted, current regulated, high frequency IGBT based with Trench Gate Structure
Output Voltage	Single Phase, 230V, AC (1kWp to upto 10KWp) and 3 phase, 415 V, AC (More than 10kWp to upto 500kWp) (+12.5%, -20%V, AC)
Frequency	50 Hz ± 1Hz
Continuous rating	Not less than system capacity individually
DC input Operating range	500V to 5000V nominal
Total Harmonic Distortion	less than 3%
Operating temperature Range	0-55 deg C
Housing cabinet with	PCU to be housed in suitable cabinet Minimum IP65 standard
Inverter efficiency	>95% at full load
Power Control	MPPT

The bidder shall use original parts in case of any fault in PCU/Inverter during CMC period. Other important features/protections required in the PCU.

- Authentic tracking of the solar arrays maximum power point tracking (MPPT)
- Array ground fault detection.

- PCU should be rated to operate at 0 to 55 deg. centigrade above ambient temperature
- All parameters should be accessible through an industry standard communication link.
- PCU should go sleep mode when there is no grid supply.String inverter should have display of adequate size on its front panel to show various parameters.

- Overload capacity (for 10 sec) should be 150 % of continuous rating

a) Since the PCU is to be used in solar energy system, it should have high operational efficiency. The idling current at no load must not exceed 2 % of full load current.
b) A suitable surge Protection Device separately at output (A.C. side)shall be provided for each SPV Power Plant.
c) PCU output shall be 230 V, AC for single phase and 415 V, AC, 50 Hz for 3 phase.
d) PUC shall include appropriate self-protective and self-diagnostic features to protect itself and array from damage in the event of PCU component failure or from parameter beyond the PCU safe operating range due to internal or external cause. The self-protective features shall not allow signals from the PUC front panel to cause the PCU to be operated in manner which maybe unsafe or damaging. Fault due to malfunctioning within the PCU including commutation failure, shall be cleared by the PCU Protective devices and not by the existing site utility grid service circuit breaker. The PCU shall go to shut down/standby mode, with its contacts open, under the following conditions before attempting an automatic restart after an appropriate time delay, in sufficient solar power output etc.

When the power available from the PV array is insufficient to supply the losses of the PCU, the PCU shall go to a standby/shutdown mode. The PCU control shall prevent excessive cycling during rightly shut down or extended periods of insufficient solar radiation. The power conditioning units/inverters should be applicable IEC/equivalent BIS standard for efficiency measurement and environmental testing. The charge controller/MPPT units should qualify IEC 62093 and IEC 60068. The junction boxes/enclosures should be IP 65 (for outdoor)/PI 54 (Indoor) and as per IEC 62208 specifications. The PCU's should be tested from the MNRE approved test centers/NABL/BIS accredited testing calibration laboratories. In case of imported power conditioning units, these should be approved by international test houses.

Utility-Grid-Over or Under Frequency

a) The PCU shall restart after an over or under frequency shutdown when the utility grid voltage has returned to the within limits for minimum of two minutes.
b) The PCU generated harmonics measures at the point of connection to the utility services when operating at the rated power shall not exceed a total harmonic current distortion of 3 percent, a single frequency current distortion of 3 percent and single frequency voltage distortion of 1 percent, when the first through the fiftieth integer harmonics of 50Hz are considered.
c) The PCU Power factor at the point of utility service connection shall be 0.95 lagging or leading when operating at above 25 percent of the rated output, but may be less than 0.95 lagging below 25 percent of the rated output.
d) The high voltage and power circuits of the PCU shall be separated from the low voltage and control circuits. All conductors shall be made of standard copper.
e) The PCU shall withstand a high voltage test of 2000 V rms, between either the input or the outpur terminals and the cabinet (chassis).
f) Full protection against accidental open circuit and reverse polarity at the input shall be provided.
g) The PCU shall not produce Electromagnetic Interference (EMI) which may cause malfunctioning of electronic and electrical instruments including communication equipment, which are located within the facility in which the PCU is housed.
h) The PCU shall have an appropriate display on the front panel to display the instantaneous AC power output and the DC voltage, current and power input. The display shall be visible from outside the PCU enclosure. Operational status of the PCU, alarms, trouble indicators and ac and the dc disconnect switch positions shall also be communicated by appropriate massage or indicator lights on the front cover of PCU enclosure.

I. Electrical Safety, Earthing and Protection

i. Internal Faults: In built protection for internal faults including excess temperature, commutation failure, overload and cooling fan failure (if fitted) is obligatory.
ii. Over Voltage Protection: Over Voltage Protection against atmospheric, lightning discharge to the PV array is required. Protection is to be provided against voltage fluctuations in the grid itself and internal faults in the power conditioner, operational errors and switching transients.
iii. Earth fault supervision: An integrated earth fault device shall have to be provided to detect eventual earth fault on DC side and shall send massage to the supervisory system.

iv. Cabling practice: Cable connection must be made using PVC cu cables, as per BIS standards. All cable connections must be made using suitable terminations for effective contact. The PVC Cu cables must be in conduit pipes for protection.

v. Fast acting semiconductor type current limiting fuses at the main bus-bar to protect from the grid short circuit contribution.

J. The PCU shall include an easily accessible emergency off button located at an appropriate position on the unit.

K. The PCU shall include ground lugs for equipment and PV array grounding. The DC circuit ground shall be a solid single point ground connection in accordance with WEC 69042

L. All exposed surfaces of ferrous parts shall be thoroughly cleaned, primed, and painted or otherwise suitable protected to survive a nominal 10 years design life of the unit.

M. The PCU enclosure shall be weatherproof and capable of surviving climatic changes and should keep the PCU intact under all conditions. Moisture condensation and entry of rodents and insects shall be prevented in the PCU enclosure.

N. Components and circuit boards mounted inside the enclosures shall be clearly identified with appropriate permanent designations, which shall also serve to identify the items on the supplied drawings.

O. All doors, covers, panels and cable exists shall be gasket or otherwise designed to limit the entry of dust and moisture. All doors shall be equipped with locks. All openings shall be provided with grills or screens with openings no larger than 0.95 cm.

P. The design and fabrication of the PCU the site temperature (0° to 70° C), incident sunlight and the effect of ambient temperature on component life shall be considered carefully. Similar consideration shall be given to the heat sinking and thermal for blocking diodes and similar components.

Q. Factory Testing

i. Preparation of all controls, protective and instrumentation circuits shall be demonstrated by direct test if feasible or by simulation operation conditions for all parameters that cannot be directly tested.

ii. Operation of startup, disconnect and shutdown controls shall also be tested and demonstrated. Stable operation of the PCU and response to control signals shall also be tested and demonstrated.

iii. Factory testing shall include measurement of phase currents, efficiencies, harmonic content and power factor.

iv. A factory Test Report (FTR) shall be supplied along with the unit. The FTR shall include detailed description of all parameters tested qualified and warranted.

R. Operating Modes

The following operating modes are to be made available. Night or Sleep mode: Where the inverter is almost completely turned off, with just the timer and control system still in operation, losses should not exceed 2 watts per 5 kilowatt.

In case of Grid Failure, the PCU should go in sloop mode/turned off immediately.

Standby mode: Where the control system continuously monitors the output of the solar generator until pre-set value is exceeded (typically 20 watts). Operational or MPP tracking mode: The control system continuously adjust the voltage of the generator to optimize the power available. The power conditioner must automatically re-enter stand-by mode when input power reduces below the standby mode threshold. Front Panel display should provide the status of the PCU, including AC Voltage, Current, Power output & DC Current, Voltage and power input, power factor and fault indication (if any).

S. HARMONICS STANDARD

As per the standard of IEEE 519, the permissible individual harmonics level shall be less than 3% (for both voltage and current harmonics) and Total Harmonics Distortion (THD) for both voltage and current harmonics of the system shall be less than 5%

Technical and interconnection requirements

Parameter	Reference	Requirement
Overall conditions of service	State Distribution/Supply code	State Distribution/Supply Code
Overall Grid Standards	Central Electricity Authority (Grid Standard) Regulation 2010	Central Electricity Authority (Grid Standard) Regulation 2010
Equipment	BIS/IEC/IEEE	BIS/IEC/IEEE
Meters	Central Electricity authority (Installation & operation of meters) Regulation 2006 as amended time to time	Central Electricity authority (Installation & operation of meters) Regulation 2006 as amended time to time
Safety and supply	Central Electricity	Central Electricity

	Authority (Measures of safety and electricity supply Regulations 2010	Authority (Measures of safety and electricity supply Regulations 2010
<u>Harmonic requirement</u> Harmonic Current	IEEE 519 CEA(Technical standards for connectivity of the distributed generation resources) Regulations 2013	IEEE 519 CEA(Technical standards for connectivity of the distributed generation resources) Regulations 2013
Synchronization	IEEE 519 CEA (Technical standards for connectivity of the distributed generation resources) Regulations 2013	Photovoltaic system must be equipped with a grid frequencysynchronization device. Every time the generating station is synchronized to the electricity system. It shall not cause voltage fluctuation greater than +/- 5% point of connection.
Voltage	IEEE 519 CEA (Technical standards for connectivity of the distributed generation resources) Regulations 2013	The voltage-operating window should minimize nuisance tripping and should be under operating range of 80% to 110% of the nominal connected voltage, Beyond a clearing time of 2 second, the photovoltaic system must isolate itself from the grid.
Flicker	IEEE 519 CEA (Technical standards for connectivity of the distributed generation resources) Regulations 2013	Operation of Photovoltaic system should not cause voltage flicker in excess of the limits stated in IEC 61000 standards or other equivalent indian standards,if any.
Frequency	IEEE 519 CEA (Technical standards for connectivity of the distributed generation resources)	When the Distribution system frequency deviates outside the specified conditions (50.5

	Regulations 2013	Hz on upper side and 47.5 Hz on lower side), There should be over and under frequency trip functions with a clearing time of 0.2 seconds.
DC Injection	IEEE 519 CEA (Technical standards for connectivity of the distributed generation resources) Regulations 2013	Photovoltaic system shoul not inject DC power more than 0.5% full rated output at the interconnection point or 1% of rated inverter output current into distribution system under any operating conditions.
Power Factor	IEEE 519 CEA (Technical standards for connectivity of the distributed generation resources) Regulations 2013	While the output of the inverter is greater than 50%, a lagging power factor of greater than 0.9 should operate.
Islanding and Disconnection	IEEE 519 CEA (Technical standards for connectivity of the distributed generation resources) Regulations 2013	The photovoltaic system in the event of fault, voltage or frequency variations must island/disconnect itself within IEC standard on stipulated period.
Overload and overheat	IEEE 519 CEA (Technical standards for connectivity of the distributed generation resources) Regulations 2013	The Inverter should have the facility to automatically switch off in case of overload or overheating and should restart when normal conditions are restored.
Paralleling Device	IEEE 519 CEA (Technical standards for connectivity of the distributed generation resources) Regulations 2013	Paralleling device of photovoltaic system shall be capable of withstanding 220% of the normal voltage at the interconnection point

Note:- The standards/specifications shall be subject to amendments/revisions from time to time as duly notified by PEDA on its website.

Energy Meter Configuration options

The metering system for rooftop solar system, under net-metering arrangement, shall be as under:-

One Bi-directional as main meter and one No. Uni-Directional as solar meter with necessary CTs as requirement.

The metering system for rooftop solar system, under gross-metering arrangement, shall be as under:

One Bi-directional as export meter and one no. Bi-directional as check meter with necessary

Sr. No	Meter Description	Accuracy	Load of Consumer	Voltage
1	Single Phase 10-60 Amp	Class-I	Up to 10 Kw	Single Phase LT 230V Grid system stability: to be examined by the distribution licensee.
2	3 Phase 10-60 Amp, Whole current	Class-I	More than 10kW & up to 25kW	Three Phase LT 400 V
3	LT AC 3 Phase 4 Wire CT operated static DLMS AMR Compliant energy meter	Class-0.5s or better	More than 25kW & up to 100kW	Three Phase LT 400V
4	HT TPT meter,DLMS Compliant & AMR Compatible	Class-0.5s or better	More than 100kW	Three Phase HT (11KV)

The Solar power generated at rooftops will be collected at one central point in the same building from where it will be fed on LT side. If required, any protection device/adapter panel/breaker/switchgear be provided to terminate the each SPV power plant output on LT side by the party at its own cost.

Meter testing & Electrical Clearance

All installation work should be done as rules & regulations of Indian Electricity Act. & Electricity Departments, Solar Power-Grid connected ground mounted and solar rooftop and metering regulation-2015. The bidder/empanelled agency shall have to take the clearance from concerned SDO/Electrical Inspector as the case may be at its own cost before connecting to the Grid. The process and expenditure of meter testing and electrical inspection to be met by bidder/empanelled agency.

Surge Protection Device (SPD)

There should be a separate surge Protection Device to be provided on D.C and A.C Side.

Common AC Distribution Panel Board (ACDPB)

i. Common AC Distribution Panel Board (DPB) shall control the AC power from inverter. AC Distribution panel (ACDP) should consist of appropriate sixe of MCB/MCCB with appropriate breaking capacity as incomer and suitable number of MCB/MCCB with appropriate size breaking capacity out going switches.
ii. The panel should have space for Energy Meter.

Cables

i. ISI marked as per given brands PVC insulated copper cond. Cable of various sizes as per load requirement for connecting all the modules/arrays to Jn. Boxes and from Jn. Boxes to AJB and from AJB to inverter. Copper/Aluminum armored cables of appropriate size from Inverter onwards in A.C side.
ii. **Cabling** : Cabling shall be carried out as per IE Rules. All other cabling above ground should be suitably mounted on cable trays with proper covers.
iii. **Wires:** Only copper wires of appropriate size based on load requirements of reputed make as specified in DNIT shall have to be used. However aluminum cables can be used on A.C side of transmission. However on D.C Side, only solar D.C Cable should be used. PVC/XLPE insulated armoured sheathed cables required for the plant will be provided by the manufacturer. All cable schedules/layout drawings have to be got approved from the purchaser prior to installation.
iv. **Cables Ends:** All connections are to be made through suitable cable/lug/terminals, crimped properly & with use of cable Glands.
v. **Cable Marking** : All cable/wires are to be marked with proper manner by good quality ferule or by other means so that the cable can be easily identified. Cu/Al. PVC insulated armoured sheathed cables required for the plant will be provided by the manufacturer. However Cables for both D.C/A.C as per brands are specifications mentioned can be used. All cable schedules/layout drawings have to be got approved from the purchaser prior to installation.

Lightning Protection

There shall be required number of suitable lightning arrestors installed in the array area. Lightning protection shall be provided by the use of metal oxide arrestors and suitable earthing such that induced transients find an alternate route to earth. Protection shall meet the safety rules as per Indian Electricity Act and Electricity Departments as per entire satisfaction of EIC.

Earthing Protection

Each array structure of the PV yard should be grounded/Earthing properly as per IS:3043:1987. In addition the lighting arrester/masts should also be provided inside the array field. Provision should be kept for shorting and grounding of the PV array at the time of maintenance work. All mental casing/shielding of the plant should be thoroughly grounded in accordance with Indian electricity Act./IE Rules and Electricity Departments. Earth Resistance should be tested in presence of the representative of department after earthing by calibrated earth tester. PCU and ACDB should also be earthed properly.

Comprehensive Maintenance

All the equipment's shall be provided with comprehensive maintenance up to the payback period against unsatisfactory performance and/or break down due to defective design, workmanship of material. The equipments or components, or any part thereof, so found defective during comprehensive maintenance period shall be forthwith repaired or replaced free of cost to the satisfaction of the IEC

Scope of CMC of SPV Power plant during warranty period from date commissioning.

a. Proper CMC of the SPV power plant for a period up to repayment after commissioning along with supply of consumable items as and when necessary and the break down maintenance of the entire system including supply of necessary spare parts, if any, are already under the coverage of warranty clause of the specific condition of contract from date of commissioning of power plant. The CMC schedule of the SPV power plant during contract period shall be as detailed below.
b. The security of the power plant will rest with the supplier/agency till such time operation and maintenance of the power plant is not handed over to the purchaser/department.
c. The deputed personnel shall be qualified and well trained so that they can handle any type of operation hazard quickly and timely.

d. The deputed personnel shall be in a position to check and test all the equipment regularly, so that, preventive actions, if any, could be taken well in advance to save any equipment from damage. Any abnormal behavior of any equipment shall be brought to the notice of Divisional Engineer (Electrical) EIC immediately for appropriate action.
e. Normal and preventive maintenance of the power plant such as cleaning of module surface, tightening of all electrical connections etc. During CMC period the power plant, if there is any loss or damage of any component of the power plant due to miss management/miss handling or due to any other reasons, what-so-ever, the supplier/firm shall responsible for immediate replacement/rectification. The damaged component may be repaired, if it is understood after examination the after repairing performance of the component shall not be degraded, otherwise the defective component shall have to be replaced by new one without any extra cost.

List of approved makes for solar power plant

Sr. No	Item	Makes
1	Solar Panels	As per Guide lines of MNRE & PEDA
2	Inverters	Delta, KACO, Kstar, Zeversollar
3	DC Solar Cables	Polycab, Lapp, Siechem
4	AC Copper XLPE FR Cable	Havells, Polycab, KEI
5	Structure for Solar PV	Galvano sheet
6	MCCB/MCB/DBs	L&T, Schneider, Siemens, Legrand, ABB, Hager
7	Steel	Tata,Sail, JSPL
8	Cement	Ambuja, ACC, Ultratech
9	SPD's	Citel, Phonix, Mulson

Divisional Engineer (Electrical),
PDA, Patiala,

DNIT for Design, Approvals, Supply, Installation, Testing and commissioning of Grid Connected Net Meeting Rooftop 90KW (Battery less) Solar Power Plant System (Including unconditional comprehensive maintenance) at PUDA Complex, Urban Estate, Phase-II, Patiala

BID DOCUMENT

Sr. No	Description	Qty	Unit
1	Design, Approvals, Supply, Installation, Testing and commissioning on Grid Connected Net Meeting Rooftop 90KW (Battery less) Solar Power Plant System (Including unconditional comprehensive maintenance up to repayment)	90	KW
	Design : The agency will design solar rooftop Grid connected Net Metering system for maximum power generation capacity throughout the day as per the space available at the Rooftop of PUDA office, Patiala without any affecting structure of the building, its astheics and water tanks, its pipeline system.		
	Approvals : The agency will be responsible for taking permissions/approvals at their own level and at their own cost from State Nodal agency from implementations of Solar Rooftop System in Punjab State i.e PEDA (Punjab Energy Development Agency) as well as from State Power Distribution Agency i.e PSPCL (Punjab state Power Corporation Ltd)		
	Supply : The agency shall supply Super High Efficient Premium Quality Solar Panels as per design and approvals/guidelines of MNRE as well as PEDA norms to the entire satisfaction of EIC.		
	Installation : The agency shall be responsible for proper installation of Solar panels on frame so that they can withstand wind upto 170Km/hr, as per specifications and complete in all respects as per entire satisfaction of EIC.		
	Testing : The agency shall be liable for complete testing of the Solar Panels, their full load performance, voltage, current and frequency measurement. The Engineer of agency shall also perform open circuit and short circuit test to calculate its rated output. The agency shall also responsible for submitting various test certificates, genuinty certificates complete in all respects as per entire satisfaction of EIC		
	Commissioning : The agency shall be liable to commission the Solar Power Plant after approvals from PEDA as well as PSPCL and installation of Bi-directional energy meter.		

	Maintenance : The solar power projects shall be maintained un conditional free of cost up to comprehensive maintaince period of project after the date of commissioning of the project. It includes free of cost replacement warranty/ guarantee of all parts including any failure, non performance as per design standards. The PV module(s) shall be warranted for a minimum period of 25 years from the date of commissioning of the project. The PV modules must be warranted for their output peak watt capacity, which should not be less than 90% at the end of ten (10) years and 80% at the end of Twenty five (25) years. Details as per specifications attached.		

Divisional Engineer (Electrical)
PDA, Patiala

Annexure-A

UNDERTAKING BY THE BIDDER

I/We here by undertake that

1. I/We have throughly read and examined the notice inviting E O I and E O I document along with all its schedules, annexure etc.
2. In case we fail to commence or complete the installation as per the time schedules or fail to fulfill any of the terms and conditions given in the E O I, PDA shall, without prejudice to any other right or remedy, be at liberty to forfeit the security deposit made by us against the award of the installation and can also blacklist our firm.
3. I/We abide by all the laws prevailing at the time of the execution of the supply/installation and shall be responsible for making payments of all the taxes,duties,levies and othe Govt. dues etc. to the appropraite Govt. departments.
4. We are not involved in any litigation that may have an impact of affecting or compromising the delivery of services as required under this E O I.
5. We are not blacklisted/defaulted in any manner by any Central/State Government/Public Sector Undertaking in India.
6. In case any false documents submitted and even found any time in future than our firm shall liable to be blacklisted and proceeded against as per prevailing laws.
7. I/We have read and understand all the terms & conditions of this work.

Signature of bidder
with stamp & date