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**Ref No: IIT/ EE/SMART CITY/SolarPV/2015/01**

**INVITATION FOR QUOTATIONS FOR SUPPLY & ERECTION OF THE FOLLOWING ITEMS REQUIRED FOR SMART CITY PILOT PROJECT AT IIT KANPUR**

S. No.	Brief Description of the Goods	Specifications	Qty.	Delivery Period	Place of Delivery	Installation Requirement if any
1.	Solar PV Systems.	Mentioned below	20	4-6 months	Department of Electrical Engineering IIT Kanpur-208016	Installation & integration with DB will be in scope of bidder

**To be included in scope of works: cabling, MCB's, Integration with DB's / UPS / Inverter. Foundation erection includes MS frame work & foundation as per approval of PI.**

**1. ROOF TOP GRID TIED SOLAR PV SYSTEMS FOR RESIDENTIAL BUILDINGS. (DETAILED SPECIFICATIONS OF SOLAR PV SYSTEMS):**

The technical features of the required system must satisfy the following specifications:

- A. Number of residential buildings : 20
- B. Nominal rating of installation on each building: 5kWp
- C. Nominal grid parameters: 230V, 50Hz, 1-phase.
- D. Specifications of Solar PV Panels:
  - i) Silicon monocrystalline solar cell modules, preferably 250-350 Wp ratings, with conversion efficiency not less than 14% at STC. All modules must be provided with their Flash sheets giving test reports of all important parameters. Requisite certification of conversion efficiency after statistical sample testing by a MNRE approved certifying agency must be provided.
  - ii) Panels should be of the same Type, Rating and Make.
  - iii) **Warranty of modules for 90% performance at 10 years, 80% at 20 years and 10 years for structures.**



- iv) Roof compatible galvanized structure in the layout shown in the drawing. It may vary as per rating & size of panels.
- v) Structural frames for panel monitoring must be grouted on the roof with adequate base area to ensure that maximum pressure on roof in any direction does not exceed 4.0 kgf/sq-ft after mounting of all panels, structures and PCC foundation base, under maximum 200kmph of wind speed.
- vi) Junction boxes with appropriate bypass diodes for each panel and cable entry should be IP65 compatible.
- vii) DC cables used for connection of panels to combiner box and from combiner box to inverters should be atleast 6mm solar grade wires covered with flexible galvanized iron cladding.
- viii) DC cable joints shall be capable of retaining contact pressure under ambient temperature cycling between -20°C to 50°C.
- ix) Panel body and mounting structure to be solidly earthed using non-corrosive conductor material with earthing resistance not exceeding 1 ohm at separate earthing pits adjacent to the building for every 5kWp of installed panel.
- x) RCD to prevent accidental live-wiring of casing and all exposed surfaces of panels and all accessories and support structures must be present which must be tuned to avoid spurious trips.

### E. Specifications for Inverter(per roof-top basis):

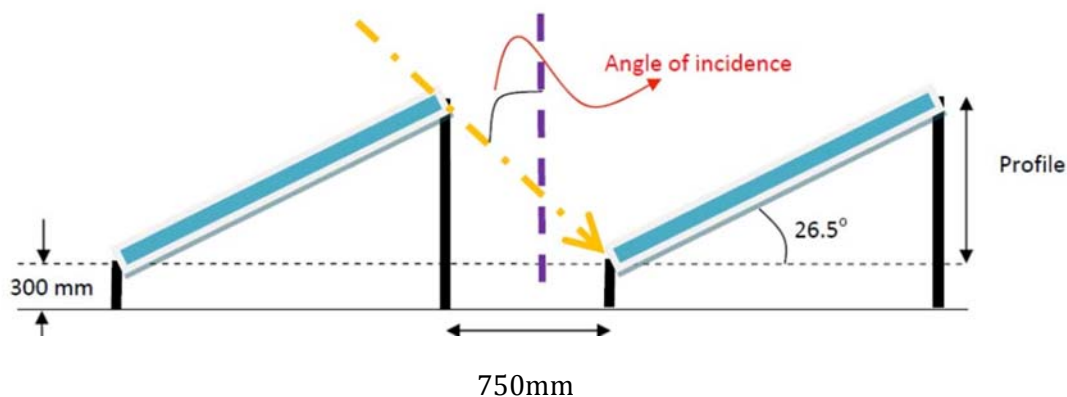
- i) Rating -5kVA, Single –phase AC grid tied string inverter. Quantity: 1 per Roof.
- ii) European weighted efficiency  $\geq 94\%$ (Euro Efficiency= $0.03 \times \text{Eff}5\% + 0.06 \times \text{Eff}10\% + 0.13 \times \text{Eff}20\% + 0.1 \times \text{Eff}30\% + 0.48 \times \text{Eff}50\% + 0.2 \times \text{Eff}100\%$ ).
- iii) Solar inverter should operate at unity power factor (+-2%)
- iv) Inverters nominally rated for full rated power injection into 230V, 50Hz, 1-phase, AC grid.
- v) Inverter should extract maximum power point (MPP) from solar PV string/array.
- vi) Inverters must incorporate all standard protection features including, but not limited to, overload, grid over/under voltage, incorrect phase sequence, frequency deviation, short-circuit, input dc over/under voltage, input cable disconnection, line surges etc.
- vii) Inverters should also be additionally capable of injecting full rated power under normal grid voltage fluctuations (210-260 V rms) and frequency variations (48.5 Hz – 51.5 Hz).
- viii) Harmonic injection under all operating conditions must adhere to IEEE-512, 1992 norms.
- ix) Inverter should be outdoor mountable with at-least IP55 weather protection.
- x) Residual current protection device (RCD) of 100mA would be connected on the AC panel. Inverter must operate in this arrangement without tripping the RCD.
- xi) Operating temperature (full load operation): -5°C to 50°C.
- xii) Inverter self-consumption during night should be less than 5W.
- xiii) Insolation sensitive auto-startup (on availability of daylight) and auto-shutdown (in absence of daylight) features must be incorporated.

- xiv) Galvanic Isolation between PV panels and AC Distribution Board must be provided in case any PV array output terminal is earthed.
  - xv) Connectivity through inverter owner's portal using web box/internet to make available DC voltage, currents, daily, weekly, monthly, yearly power & energy, AC voltage, current, frequency, power factor, temperature and Sun Global irradiance. This data should be made completely available to IITK without any additional charges for the entire operational lifetime of the inverter.
  - xvi) 6mm core double insulated solar grade wires passing through good quality flexible plastic conduit pipe between panels and Combiner Boxes.
  - xvii) Combiner Boxes with proper fuses and surge protectors. 10mm core double insulated solar grade wires passing through good quality galvanic insulation conduit pipe.
  - xviii) DC, AC grounding and lightning arrestors along with civil work as required.
  - xix) Warranty at least 5 years, 10 years will be preferred.**
- F. No damage to roof top is allowed during civil work. Support structure should be fixed using concrete or other means. The structure should be able to withstand possible maximum wind load at respective height of the buildings.
- G. Depending on the size of panel and other technical/administrative requirements, the site for installation will be confirmed after order of tender.
- H. Unless otherwise stated, technical requirements of supplied system must conform to the minimum technical requirements as per MNRE guidelines, which is reproduced here in Annexure-1.

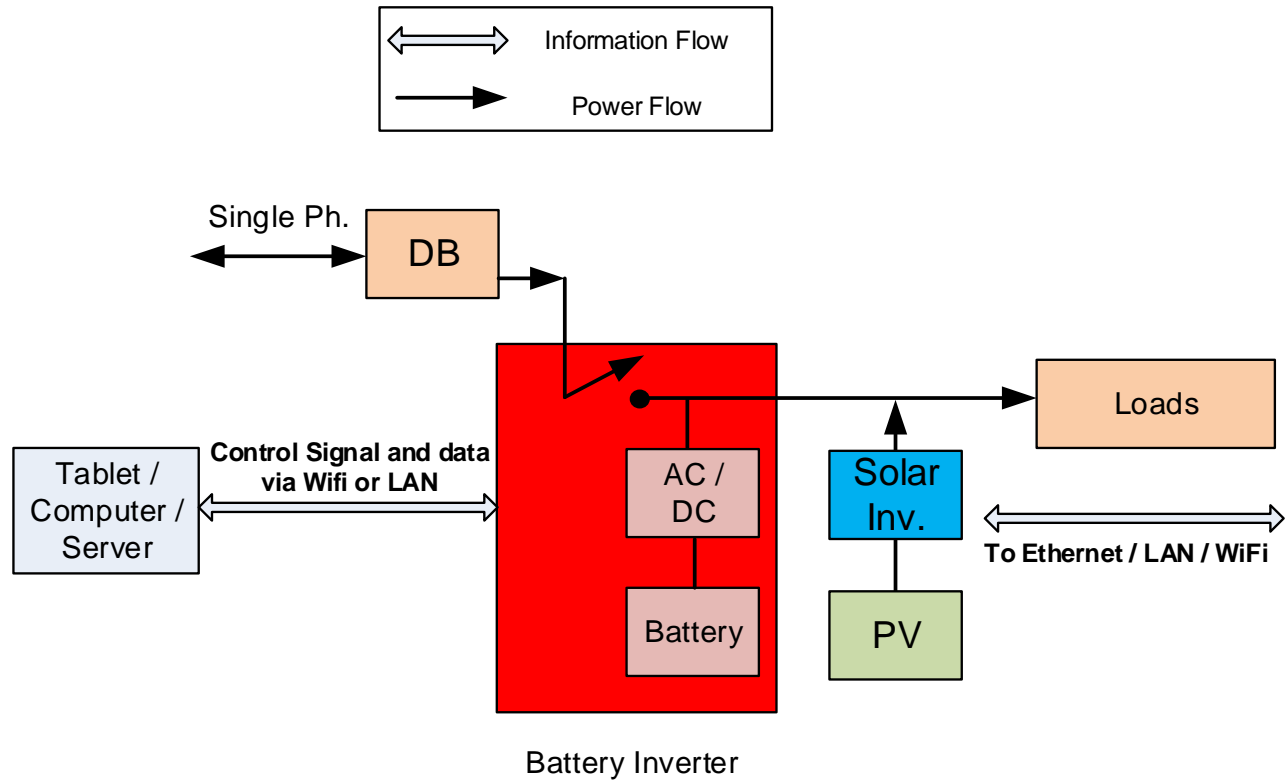
**Last date of receipt of Quotation will be 30 November 2015.**

**DRAWINGS:**

**Layout Drawing:**



**Connection schematic of proposed installation (for single roof-top) . Solar inverter is highlighted in blue color.**



**Annexure-1**

**BOUNDARY CONDITIONS FOR SUPPORT TO GRID Connected SOLAR PV APPLICATIONS**

S.NO.	Category of beneficiaries	Size
1	All Categories including Individuals, Industrial/Commercial/ Non Commercial entities	1kWp to 500kWp

**Minimal Technical Requirements /Standards for SPV Systems to be deployed under the SMART CITY PILOT PROJECT at IIT Kanpur:**

**1. PV MODULES:**



- 1.1 The PV modules must conform to the latest edition of any of the following IEC /equivalent BIS Standards for PV module design qualification and type approval: Crystalline Silicon Terrestrial PV Modules IEC 61215 / IS14286, Thin Film Terrestrial PV Modules IEC 61646 / Equivalent IS (Under Dev.), Concentrator PV Modules & Assemblies IEC 62108.
- 1.2 In addition, the modules must conform to IEC61730 Part 1- requirements for construction & Part 2 – requirements for testing, for safety qualification or Equivalent IS (Under Dev.)
- 1.3 PV modules to be used in a highly corrosive atmosphere (coastal areas, etc.) must qualify Salt Mist Corrosion Testing as per IEC 61701/ IS 61701.

#### 1.4 IDENTIFICATION AND TRACEABILITY

Each PV module must use a RF identification tag (RFID), which must contain the following information:

- i) Name of the manufacturer of PV Module.
- ii) Name of the Manufacturer of Solar cells.
- iii) Month and year of the manufacture (separately for solar cells and module).
- iv) Country of origin (separately for solar cells and module).
- v) I-V curve for the module.
- vi) Peak Wattage,  $I_m$ ,  $V_m$  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.
- x) Other relevant information on traceability of solar cells and module as per ISO 9000 series.

The RFID can be inside or outside the module laminate, but must be able to withstand harsh environmental conditions.

#### 1.5 VALIDITY:

*The validity of the existing Certificates/Reports in the old format/procedure shall be valid till \_\_\_\_\_ only. Manufactures are advised to get their samples tested as per the new format/procedure before \_\_\_\_\_, whose validity shall be for five years.*

#### 1.6 AUTHORIZED TESTING LABORATORIES/ CENTERS



PV modules must qualify (enclose test reports/ certificate from IEC/NABL accredited laboratory) as per relevant IEC standard. Additionally the performance of PV modules at STC conditions must be tested and approved by one of the IEC / NABL Accredited Testing Laboratories including Solar Energy Centre of MNRE. For small capacity PV modules upto 50 Wp capacity STC performance as above will be sufficient. However, qualification certificate from IEC/NABL accredited laboratory as per relevant standard for any of the higher wattage regular module should be accompanied with the STC report/ certificate.

**1.6.1** Details of Test Labs shall be given separately.

(Any other Test Lab that has set – up for testing and wants to get included may contact Director, MNRE)

**1.6.2** While applying for Testing, the Manufacturer has to give the following details:

- A copy of registration of the company particularly for the relevant product/ component/ PV system to be tested
- An adequate proof from the manufacturer, actually showing that they are manufacturing product by way production, testing and other facilities
- Certification as per JNNSM standards for other bought out items used in the system.

Without above proof test centers are advised not to accept the sample.

**1.7 WARRANTY**

PV modules used in solar power systems must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 12years and 80% at the end of 25 years.

**2. BALANCE OF SYSTEM (BOS) ITEMS/ COMPONENTS:**

**2.1** The BOS items /components of the SPV power systems deployed under the Mission must conform to the latest edition of IEC/ equivalent BIS Standards / MNRE specifications / as specified below:

BOS Item / System	Applicable BIS /Equivalent IEC Standard Or MNRE Specifications	
	Standard Description	Standard Number

**INDIAN INSTITUTE OF TECHNOLOGY, KANPUR**  
DEPARTMENT OF ELECTRICAL ENGINEERING



Power Conditioners/ Inverters**including MPPT and Protections  (more than 100 Wp and up to 20 KWp Capacity only) :	Efficiency Measurements  Environmental Testing	IEC 61683 / IS 61683  IEC 60068-2 (1, 2, 14, 30) / Equivalent BIS Std.
Charge Controller/MPPT units	Environmental Testing	IEC 60068-2 (1,2,14,30) /Equivalent BIS Std.
Storage Batteries	General Requirements & Methods of Testing Tubular Lead Acid / VRLA / GEL Capacity Test Charge/Discharge Efficiency	As per relevant BIS Std.
Cables	General Test and Measuring Method PVC insulated cables for working voltage up to and including 1100 V and UV resistant for outdoor installation	IEC 60227 / IS 694  IEC 60502 / IS 1554 (Pt. I & II)
Switches/Circuit Breakers /Connectors	General Requirements Connectors –safety  A.C./D.C.	IEC 60947 part I,II, III /IS 60947 Part I,II,III  EN 50521
Junction Boxes /Enclosures for Inverters/Charge Controllers/Luminaries	General Requirements	IP 54(for outdoor)/ IP 21(for indoor) as per IEC 529
Meters	As per CEA Guidelines issued from time to time	
Grid Connectivity	As prevalent in the State	

\*\*In case if the Charge controller is in-built in the inverter, no separate IEC 62093 test is required and must additionally conform to the relevant national/international Electrical Safety Standards wherever applicable



## 2.1 AUTHORIZED TESTING LABORATORIES/ CENTERS

Test certificates / reports for the BoS items/components can be from any of the NABL/ IEC Accredited Testing Laboratories or MNRE approved test centers. The list of MNRE approved test centers will be reviewed and updated from time to time.

## 2.2 WARRANTY

The mechanical structures, electrical works including power conditioners/inverters/charge controllers/maximum power point tracker units/ distribution boards/digital meters/switch gear/storage batteries, etc. and over all workmanship of the SPV power plants/ systems must be warranted against any manufacturing/ design/ installation defects for a minimum period of 5 years.

## 2. General Terms & Condition

### 1. The scope includes:

- a) Supply of Solar PV Systems for smart home system under smart city pilot project at IIT Kanpur.
- b) Open source code availability for future modification for R&D and installation support services.

### 2. Bid Price

- a) The contract shall be for the full quantity as described above. Corrections, if any, shall be made by crossing out, initialing, dating and re writing.
- b) All duties, taxes (including sales tax) and other levies payable on the raw materials and components shall be included in the total price, **Except Central Excise Duty & CDEC** (custom duty), as IIT Kanpur is exempted from these duty.
- c) The rates quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.
- d) The Prices shall be quoted in Indian Rupees only.
- e) The service tax has not to be included into rate. It will be reimbursed by the institute as per reverse mechanism.





3. Each bidder shall submit only one quotation.
4. Criteria of Eligibility
  - a) The supplier has turnover of 100% of the value for last 3 financial years.
  - b) **Authorization from manufacturer:** In the case of a bidder offering to supply goods under the contract which the bidder did not manufacture or otherwise produce, the bidder has been duly authorized by the goods manufacturer or producer to supply the goods in India. The manufacturer will have to endorse guarantee of the supplied goods in favor of IIT Kanpur.
  - c) Details of the experience of supplying similar equipments during the last 2 years.

#### 5. Validity of Quotation

Quotation shall remain valid for a period not less than 60 days after the deadline date specified for submission.

#### 6. Evaluation of Quotations

**Note: The bidder has to submit their quotation/offers in two envelopes. One envelope will contain technical particulars/technical bid. The second envelope will contain the quoted offers/financial bid (please see table 1 below).**

Quotations from bidders will be evaluated only if the quotations satisfy the following:

- (1) Quotations are properly signed.
- (2) Conform to the terms & conditions and specifications.
- (3) The filled Technical particular/technical bid will be evaluated as per the specifications and quotations of only vendor meeting the technical specifications will be shortlisted for opening of their quoted offers/financial bid.

#### 7. Award of contract

The Purchaser will award the contract to the bidder whose quotation has been determined to be substantially responsive (includes technically suitable) and who has offered the lowest evaluated quotation price.



- 7.1** Notwithstanding the above, **the Purchaser reserves the right to accept or reject any quotations and to cancel the bidding process and reject all quotations at any time prior to the award of contract.**
- 7.2** The bidder whose bid is accepted will be notified of the award of contract by the Purchaser prior to expiration of the quotation validity period. The terms of the accepted offer shall be incorporated in the purchase order.
- 8.** Payment shall be 75% against the delivery, 15% against the installation and 10% after final completion.
- 9.** Warranty/ guarantee shall be 60 months to the supplied goods.
- 10.** You are requested to provide your offer latest **by 3:00 PM on 30 November 2015.**
- 11.** Technical bid clarification date has been fixed **on 26 November 2015** at 3:00 PM in Dept. of Electrical Engineering meeting room, IIT Kanpur.
- 12.** We look forward to receiving your quotations/tender and thank you for your interest in this project.



**Table 1**  
**FORMAT OF QUOTATION/TENDER**

Sl. No.	Description Goods	Specifications	Qty.	Unit	Quoted Unit Rate in Rs.	Total Amount (in Rs.)	
						In Figures	In Words
1.	Solar PV Systems.	As Mentioned in the tender.	20	No.			
<b>TOTAL (in Rs.)</b>							

**Gross Total Cost: Rs.....**

We agree to supply the above goods in accordance with the technical specifications for a total contract price of Rs. .... (amount in figures) (Rs. .... amount in words) within the period specified in the Invitation for Quotations.

We also confirm that the normal commercial warranty/guarantee of 60 months shall apply to the offered goods.

**Signature of Supplier**

Certified that all the information / parameters indicated above exist in the Solar PV Systems offered by us and shall stand all the tests specified above within the variation of current / voltage frequency and climatic conditions specified therein.

SIGNATURE

BIDDER NAME

DESIGNATION



**SPECIAL CONDITION**

**1) Authorization from Manufacturer**

In the case of a Bidder offering to supply goods under the contract which the Bidder did not manufacture or otherwise produce, the Bidder has been duly authorized by the goods' Manufacturer or producer to supply the goods in India.

**2) Proof of Manufacturing and past performance.**

Details of experience and past performance of the bidder on equipment offered and on those of similar nature within the past one years and details of current contracts in hand and other commitments.

**3) Details of last 3 years turnover of the bidder.**

Saikat Chakrabarti

Associate Professor  
Department of Electrical Engineering  
Indian Institute of Technology  
Kanpur 208016  
India  
Office: 105D ACES  
Email: saikatc@iitk.ac.in  
saikat.chakrabarti@gmail.com  
Phone: +91-512-2596598  
Fax: +91-512-2590063 / 2590260  
Homepage: <http://home.iitk.ac.in/~saikatc/>