

INDIAN INSTITUTE OF TECHNOLOGY DELHI
Centre for Energy Studies

May 29, 2013

Sealed Quotations (Technical and Financial in separate appropriately marked envelopes) are invited for (1) Supply and (2) Installation, Commissioning and Testing of 5 kWp Solar Photovoltaic System. The detail specifications are given below.

The sealed quotations should reach the address mentioned below latest by 5:00 PM on Friday ,June 14, 2013 :

Prof. V.Dutta
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I.I.T., Hauz Khas
New Delhi 110016, INDIA.

TECHNICAL SPECIFICATIONS Of 5 kW_P PV System

Name of work:

(1) Supply and (2) Installation, Commissioning and Testing of 5 kWp Solar Photovoltaic System complete with PV modules, inverters, battery bank with charge controller & other accessories for Photovoltaic Laboratory at Center for Energy Studies, Block V in IIT Delhi.

BRIEF SCOPE OF WORK:

The scope of the contractor shall be, including but not limited to design, supply, installation of the required Solar Photovoltaic power plant with accessories & peripherals like inverters, cables, junction boxes, earthing etc., testing and commissioning of entire SPV system in totality and ensuring the performance, warranty, annual maintenance for 05 years etc.

BRIEF DESCRIPTION OF WORK:

Broad scope of work in the tender includes but not limited to the following & work be treated as turnkey project. Nothing extra shall be paid on account of any extra work required for commissioning & running of the system.

The main objective of the proposed system shall be to harness the ‘maximum energy / kWp per day’ and feed the same to the designated loads during the day-time. The available SPV power is utilized and directly fed into the grid on ‘Solar First’ basis if the main grid supply is ON (or DG is ON). The solar electricity shall be used ‘first’ to power the loads in the designated area (Photovoltaic Lab, CES) and the deficit if any (e.g. due to bad weather conditions) shall be sourced from the main grid or DG as the case maybe. A battery bank is to be used to support the load peaks and create a local grid in the absence of main-grid/DG-power, so that the solar power is directly available to the loads during the sun shine hours in the day. The battery bank’s capacity is to be kept ~20% of the daily solar electrical energy generation.

The PV power shall also be utilized by an electrolyzer for generating hydrogen. The hydrogen will be stored in a metal hydride storage system and will be used by a Fuel cell for creating a PV/FC Hybrid system. Both the PV and Fuel cell will feed into the grid in the Photovoltaic lab.

TECHNICAL REQUIREMENTS:

The SPV System is to be installed on the CES Block V roof-top. The system shall have data logging, remote monitoring and data analysis facilities.

The main components of the system are the following:

1. SPV Generator

Requirements

- i) The power rating of the Solar Photo Voltaic Generator should not be less than 5kWp.
- ii) Solar Photo Voltaic module array shall consist of high efficiency Solar Modules utilizing Mono/Multi Crystalline high efficiency Silicon Solar cells.
- iii) The cell efficiency should be > 16% and module efficiency >15%. The module should comply with IEC 61215 / IS14286, IEC 61730 Part 1 &2.
- iv) Efficiency of solar PV system shall be guaranteed to 90% for up to 12 years & 80% for up to 25 years.

Approved Make

Trina Solar/ Kyocera/ Sharp/CEL/ BHEL/Waaree or equivalent approved.

2. 6kW inverter for PV evacuation

3. 5kW Bidirectional grid connected inverter with battery input

Requirements

- i) The DC output produced by the Solar PV array shall be supplied through the DC bus to the inverter for providing AC power to the loads. Maximum Peak Power Tracking (MPPT) to extract maximum energy from solar array shall be inherent feature of the system.
- ii) The efficiency of inverters shall not be less than 95% (between 10% to 90% load) & shall be designed to meet the Solar PV Array capacity control which will extract maximum energy from solar array and provides 230V AC +/- 10%, 50 Hz, to synchronize (and not export) with local utility grid in Indian ambient conditions.
- iii) Output voltage shall be sine wave with <3% harmonic distortion (THD). Additionally. It will provide protection features such as over current, short circuit, over temperature etc.
- iv) The inverters shall be designed for continuous, reliable power supply as per specifications.

- v) The inverters shall be built-in with data logging OR communication capabilities with external datalogger (also to be provided) to remotely monitor and control plant performance through external PC.
- vi) The inverters shall have internal protection arrangement against any sustained fault. The dimension, weight, foundation details etc. of the PCU shall be clearly indicated in the detailed technical specification.
- vii) It has user friendly LED / LCD display for programming and view on line parameters.
- viii) Unit shall be IP-4X .

Approved Inverter Make:

SMA/KACO/XENTRAX/OPS/PPS/DB POWER/Equivalent approved

Data Monitoring of Power Plant:

The inverters should have the capability to be connected to the internet, so that the data can be brought to a PC in the Photovoltaic Lab. Suitable interfacing equipment (hardware and software) should be provided.

4. 48V/150Ah battery bank

The battery bank will store the solar electricity and provide the virtual grid through Bi-directional grid connected Inverter having in built charge controller. The batteries shall be tubular positive plate, flooded electrolyte, low maintenance batteries of Exide-make (for solar applications) or equivalent. It shall carry a 5 years replacement warranty.

- i) The batteries shall have the minimum nominal capacity not less than 7.2 kWhr (48 V, 150 Ahr) at C/10 rate to ECV of 1.75V
- ii) The self discharge of the batteries shall be less than 2% per month.
- iii) The Charge efficiency shall be more than 90% up to 70% stage of charge.
- iv) The topping up frequency shall be >12 months.
- v) A suitable metal/wooden battery rack with interconnections & end connectors shall be provided to suitably houses the batteries in the bank. The battery rack shall be painted with acid resistant paint.
- vi) The Bi-directional inverter will charge the battery bank using high efficiency charge controller.

5. Other BOS including mounting structures, cables, distribution boxes etc.

Module Mounting structure:

- i) Structure shall support SPV modules at given orientation, absorb and transfer the composite (static/dynamic) loads to the roof uniformly. The structure should not cause any damage to the roof or any other part of the building. There shall be no requirement of welding or complex machinery

at site. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from SPV panels & shall withstand heavy winds. The supplier / manufacturer shall specify installation details of the PV load and distribution on roof top.

- ii) Module mounting structure shall be made up of hot dipped MS galvanized material. Structures to be coated with hot dip (Galvanized) minimum 70 microns galvanizing. Super structure shall be designed & fabricated according to site condition. The array structure shall be grounded properly with earthing system. Support structure design and foundation or fixation mounting arrangements should withstand horizontal wind speed of 200kms / hr arrangements should be greater than 200 kms / hr.). All fasteners shall be of Stainless steel (minimum 304).
- iii) While making structure and foundation design, due consideration shall be given to weight of module assembly, maximum wind speed seismic factors of the site and overall height of the location (on the roof of the Block V Building), as all structural / civil works are under the scope of this tender.

Cable and Accessories:

- i) Cables should be FRLS PVC insulated copper conductor armoured MV Cables up to 1100 Volts grade as per IS: 1554/armoured PVC sheathed cables.
- ii) Cable should be bright annealed 99% pure copper conductor, conductor shall be of electrolytic copper conforming to IS: 8130.
- iii) Minimum size of the cable as following :
- iv) Array to junction box / PCU: 1 core x 4/6 sq mm stranded copper cables.
- v) PCU to LT AC DB and metering panel: 2 core x 16 sq mm stranded copper XLPE armoured cables.
- vi) LTACDB and metering panel to main Grid DB: 3.5/4 core XLPE 35 sqmm stranded armoured cable.
- vii) Cable shall be laid on prefabricated GI cable trays and through suitable HD PE pipes.

Earthing and protection:

- i) The PV array structure shall be grounded properly using adequate number of connecting system. All metal casing / shielding of the plant shall be thoroughly grounded to ensure safety of the power plant. Earthing resistance shall be less than 2.0 ohms for individual anode and less than 1.0 Ohms for Grid in line with IE rules and as per IS:3043 code of practice for earthing.
- ii) Chemical earthing with suitable copper conductors.
- iii) Proper earthing pit shall be made at locations approved by IIT Delhi.

Lightening Arrester:

To protect the system including use of Metal Oxide Varistors from heavy surge of lightening a suitable arrester to be provided with separate earthing system, so that induced transient find an alternate route to earth. Protection shall meet the safety rules.

Installation and Commissioning:

- i) Detailed project execution programme shall be submitted along with the offer. The bidder shall be responsible for arranging all tools / tackles and manpower for installation and commissioning the complete system.
- ii) The bidder shall quote the charges of installation, testing & commissioning of the system by the technical experts and manpower involved should be inclusive of to and for air/ rail fares, boarding / lodging & daily expenses amongst other. The bidder will also submit the erection & commissioning procedure for approval by IIT Delhi.

Annual Generation Guarantee:

Bidder shall give minimum energy generation guarantee at the rate of 4.0 kWhr per kWp per day (on a clear sunny day) at least for the first five years.

SPV Panels Cleaning Facilities:

Bidder shall provide daily dusting & Water washing facilities, all necessary accessories for dusting shall be provided. Bidder shall also extend water line with suitable pressure pump for the roof top of single storied building and shall provide necessary rubber hose etc for washing the panels.

LT Panel & AC Distribution Board:

The AC power output of both the inverters shall be fed to the AC Distribution Board (metering panel & isolation panel) which also houses energy meter. The 230V AC +10% output of the isolation panel is fed to the Photovoltaic lab load. AC energy is then synchronized with the grid / DG and power is fed into the utility grid on a continuous basis.

Warranty

All the electronic components including the inverters should be accompanied by a warranty of min.5 years. Battery should be accompanied by a warranty of min.5 years. SPV generator should be accompanied by a performance warranty of min.5 years.

Certificated and test reports

All the supporting test reports and quality/performance certificates of IEC/BIS (as applicable) should be submitted related to all the components of the system.

Terms and Conditions

1. IIT Delhi is exempted from paying custom duty under notification No.51/96 (partially or fully) and necessary “Custom Duty Exemption Certificate” can be issued after providing following information.
a. Shipping details i.e. Master Airway Bill No. and House Airway No. (if exists) b. Forwarder details i.e. Name, Contact No., etc.

Custom Duty Exemption Certificate will be issued to the shipment in the name of the Institute and Bills of Entry should be submitted to IIT Delhi later on.

2. Either the Indian agent on behalf of the Principal/OEM or Principal/OEM itself can bid but both cannot bid simultaneously for the same item/product in the same tender. If an agent submits bid on behalf of the Principal/OEM, the same agent shall not submit a bid on behalf of another Principal/OEM in the same tender for the same item/product.

3. If the bidder is an authorized dealer of any manufacturer, the authorized Indian dealership certificate from the principles should be enclosed. Similarly, proprietary certificate for proprietary items should be provided.

4. IIT Delhi is exempted from paying Excise Duty and necessary Excise Duty .

Exemption Certificate will be provided for which following information are required. a. Quotation with details of Basic Price, Rate & Amount on which ED is applicable.

5. Please quote prices of imported items at FOB (Freight on Board) IIT Delhi inclusive of all taxes, freight, delivery, installation and onsite training charges. The quotation should provide the total price of the system including all taxes and transportation charges.

6. In case IIT Delhi is imposed with demurrage charge due to import on CIF, the entire demurrage charge has to be borne by the Indian Agent of foreign supplier.

7. Three years comprehensive warranty be provided and AMC price beyond 3 years should be mentioned separately.

Payment Options:

Letter of Credit: 90% payment against shipping documents & balance 10% after satisfactory installation.

OR Sight Draft: Payment against documents through bank.

8. Delivery period: within 1 month from the issue of supply order.

9. Warranty: at least 3 years onsite warranty should be provided.

10. The quotations must have validity of at least three months.

11. The products will be used for educational purposes. Any applicable academic institution discounts should be offered and stated clearly.

12. Authority of IIT Delhi reserves the right to reject any or all quotations without assigning any reasons.