

BIDDING DOCUMENTS

FOR

**DESIGN, MANUFACTURE, SUPPLY, ERECTION,
TESTING AND COMMISSIONING INCLUDING
WARRANTY, OPERATION & MAINTENANCE**

FOR

**10 YEARS FOR TOTAL AGGREGATE CAPACITY
OF (100kWp) GRID-CONNECTED
ROOFTOP SPV POWER AT DAV COLLEGE SECTOR
10
IN CHANDIGARH**

DAV COLLEGE SECTOR 10 CHANDIGARH

Tender Notice

Tenders are hereby invited by Principal DAV College Chandigarh from the manufacturers / SPV module/ System Integrators having specific experience of supply, installation, testing &

Commissioning of SPV Power Plants

Design, Manufacture, Supply, Erection, Testing and Commissioning Including Warranty, Operation & Maintenance for 10 Years for Total Aggregate Capacity of 100kWp) Grid-Connected Rooftop SPV Power Plants
Rs.1,000/- plus 18% GST to be submitted along with EMD through Demand Draft Favoring Principal DAV College Chandigarh, payable at Chandigarh)
Rs.1.00 Lac (Favoring Principal DAV College Chandigarh, DD payable at Chandigarh)
4 months from the date of placement of work order.

**Submission
Last Date**

26.03.2020 11.00 am

**Opening
Technical bid**

27.03.2020 upto 12.00 Hrs.

**Opening of
Price-Bid.**

27.03.2020 upto 2.30 Pm

*The decision of the committee will be final.

CHECK LIST FOR BIDDERS FOR SUBMISSION OF TENDER

Sr. No.	<u>Documents Required</u>	<u>Submitted</u>
1.	Tender Document Fee	
2.	Earnest Money Deposit (EMD)	
3.	Notarized affidavit on Indian non judicial stamp paper that bidder/ firm has never been blacklisted.	
4.	Undertaking on its letterhead that all the terms and conditions of the DNIT are acceptable to the Bidder.	
5.	Affidavit/ certificate from CA mentioning financial turnover of last three years.	
6.	Proof of execution of similar nature of work as per minimum SPV Capacity defined with copy of certificates of satisfactory completion and performance from an authority for which the work was executed including agreement amount, actual amount, date of start, date of completion.	
7.	Proof of experience of having successfully completed similar works during last seven years as per tender estimate cost criteria.	
8.	Authorization of the manufacturer of PCUs as per Performa attached.	
9.	Authorization of the manufacturer of SPV Module as per Performa attached.	
10.	<input type="text"/>	
11.	Technical Detail Form as per Performa attached.	
12.	Detail of service centre after sale of service equipment with telephone facility or Undertaking for opening of service centre after the placement of Work Order.	
13.	Submit a signed and stamped copy of the DNIT and all other documents duly signed and stamped as uploaded while submitting e-bid in the Tender.	
14.	The bidder should fill the cost break up form as per Performa attached and load it along with the financial bid.	

Name of the Work:

Design, Manufacture, Supply, Erection, Testing and Commissioning Including Warranty, Operation & Maintenance for 10 Years for Total Aggregate Capacity of 100kWp Grid-Connected Rooftop SPV Power Plants at Roof Top of DAV College Chandigarh

1. Location / SiteRoof Top of DAV College Chandigarh

2. Details for the SPV

ii) Roof Top As per site available

iii) Ambient Temp 45° c (Max)

4°C (Min)

iv) Latitude 30° 42' N

v) Longitude 76° 44' E

vi) Elevation 238 Mtr. Above mean sea level

vii) Tilt Angle As per roof / space available viii)

Feeding point HT side

NOTE:-Sr. no. ii above, BIDDER MUST VISIT THE SITE BEFORE QUOTING THE RATES , OTHERWISE IT WILL BE ASSUMED THAT THE PARTY HAS ALREADY VISITED THE SITE BEFORE QUOTING THE TENDER, AN UNDERTAKING TO BE FURNISHED ACCORDINGLY

1. Solar Photovoltaic Modules

Solar PV plant array capacity should not be less than the capacity of the SPV Plant capacity and total aggregate SPV array capacity should not be less than 100kWp on max. radiation day and should comprise of solar mono / multi crystalline aluminum framed solar modules of minimum

300Watts with five bus bar or more cells for better performance. **The Solar Photovoltaic modules must approved by one of the IEC authorized test centers , Test Certificates can be from any of the NABL / BIS accredited testing / calibration laborites** the module type must be qualified as per IEC 61215(Second Edition). In addition PV modules must qualify to IEC 61730 Part I to II for safety qualification testing. SPV module conversion efficiency should not be less than 16.0% under STC as per MNRE latest guidelines and specification.

2. The module shall have warranty of 25years with degradation of power generated not exceeding 20% of the minimum rated power over the 25 years period and not more than 10% after 10 years period. The Bidder will have to furnish a CORPORATE GURANTEE on a required stamp paper for the same.

a) IDENTIFICATION AND TRACEBILITY

Each PV module used in any solar power project 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 PV Installer

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 , 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

2. SPV PANEL ARRAY STRUCTURES

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

- 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 details 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 SPV 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 Aluminium Alloy of superior quality. 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 Officer In Charge 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 PV panel structures shall be provided. Structures shall be of flat-plate design and can be with combination of square pipe, I, C and L sections as per structure design requirement.

ii. Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts..

iii. Structures with adequate strength and in accordance with relevant BIS standards shall be used with proof that the design of the structure can withstand a wind speed upto 170KM per Hour. The certificate about structure capable to withstand 170KM per Hour wind speed should be provided from Chartered Structural Engineer on his letter pad with his registration no.

iv. Structures shall be supplied complete with all members to be compatible for allowing easy installation at the rooftop site. Each structure should have angle of inclination as per the site conditions to take maximum insulation.

vi. Each panel frame structure be so fabricated as to be fixed on the rooftop column/wall structures. The structures shall be designed for 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 specifications in the bid.

VII. The entire structure should be connected to each other in a grid form so as to sustain the wind speed upto 170KM/Hr.

VIII. 4 Ft. offset from boundary of rooftop from all sides should be kept while installing structure for modules.

IX. The vertical section and base plate of module mounting structure should be of minimum 5mm thickness.

X. No damage in any way should be caused to the building rooftops while installation of SPV Power Plant. If any damage done it will wholly be the responsibility of the bidder and cost shall be recovered from the bidder.

3. POWER CONDITIONING UNIT (STRING INVERTORS):

The power conditioning unit totaling should not be less than 80 kVA should be provided to convert DC power with an overload capacity of atleast 25% produced by SPV modules, in to AC power. The Individual Inverter should not be less than 50kVA and not be greater than 100kVA. A multi function power conditioningsystem 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 : 3 phase, 400V AC (+12.5 %, - 20 % V AC)

Frequency : 50 Hz \pm 1 Hz

DC input Operating range : 200 V to 1000V nominal

Total Harmonic Distortion : less than 3 %

Operating temperature Range : 0 to 55 deg C

Housing cabinet : PCU to be housed in suitable cabinet with minimum IP65 standard WITH POWDER COATED MS CABINET to also house ACDB AND DCDB)

Inverter efficiency : >95 % at full load.

Power Control : MPPT (minimum 4 in built dc switch and GPRS)

The bidder shall use the original parts in case of any fault in the PCU/Inverter during the O&M period of 10 years. In case the original part/parts are not available with the manufacturer of the PCU/Inverter (Based on certificate from the manufacturer), the bidder shall use the new parts of other standard brands available in the market or will use the repaired parts but only with the prior permission of Chief Executive Officer, Other important Features/Protections required in the PCU

- Authentic tracking of the solar arrays maximum power operation voltage (MPPT).
- Array ground fault detection.
- LCD and piezoelectric keypad operator interface Menu driven
- Automatic fault conditions reset for all parameters like voltage, frequency and/or black out.
- MOV type surge arresters on AC and DC terminals for over voltage surge protection

from any source.

- PCU should be rated to operate at 0 to 55 deg. Centigrade above ambient temp
- All parameters should be accessible through an industry standard communication link.
- The PCU should go in sleep mode when there is no grid supply.

3.1 Since the PCU is to be used in solar photo voltaic energy system, it should have high operational efficiency. The idling current at no load must not exceed 2 percent of the fullload current.

3.2 A suitable Surge Protection Device separately at output (A.C. side) shall be provided for the SPV Power Plant.

3.3 The PCU output shall be 400V, AC, 50 Hz 3 phase.

3.4 The PCU shall include appropriate self protective and self diagnostic features to protect itself and the PV array from damage in the event of PCU component failure or from parameters beyond the PCU's safe operating range due to internal or external causes.

The self-protective features shall not allow signals from the PCU front panel to cause the PCU to be operated in a manner which may be unsafe or damaging. Faults 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.

a) Insufficient Solar Power Input.

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 as per standard code IEC 61683 and IEC 60068 2(6,21,27,30,75,78). The charge controller/ MPPT units should qualify IEC 62093 and IEC 60068 2 (6,21,27,30,75,78). The junction boxes/ enclosures should be minimum IP 65.

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. Party must supply and upload the test report of PCU /inverter along with the tender document.

b) Utility-Grid Over or Under Frequency

3.5 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.

3.6 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 50 Hz are considered.

3.7 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.

3.8 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.

3.9 The PCU shall withstand a high voltage test of 2000 V rms, between either the input or the output terminals and the cabinet (chassis).

3.10 Full protection against accidental open circuit and reverse polarity at the input shall be provided.

3.11 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.

3.12 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 messages or indicator lights on the front cover of the PCU enclosure.

3.13 Electrical safety, earthing and protection:

A) Internal Faults: In built protection for internal faults including excess temperature, commutation failure, overload and cooling fan failure (if fitted) is obligatory.

B) 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.

C) Earth fault supervision: An integrated earth fault device shall have to be provided to detect eventual earth fault on DC side and shall send message to the supervisory system.

D) Cabling practice: Cable connections 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 run in GL trays with covers for protection.

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

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.

3.16 All exposed surfaces of ferrous parts shall be thoroughly cleaned, primed, and painted

or otherwise suitably protected to survive a nominal 30 years design life of the unit.

3.17 The PCU enclosure shall be weatherproof and capable of surviving *climatic changes and should keep the PCU* intact under all conditions in the room where it will be housed. *The PCU located indoor should be floor mounted.* In case of String Invertors, it will be installed as per the manufacturer design Moisture condensation and entry of rodents and insects shall be prevented in the PCU enclosure.

3.18 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.

3.19 All doors, covers, panels and cable exists shall be gasketed 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.

3.20 The design and fabrication of the PCU the site temperature, 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.

3.21 Factory Testing:

A) 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. B) Operation of start up, 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. C) Factory testing shall include measurement of phase currents, efficiencies, harmonic content and power factor.

D) 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.

3.22 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 sleep 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, pf and fault Indication (if any).

3.23. METERING

1. Solar Irradiance: An integrating Pyranometer (Class II or better) should be provided, with the sensor mounted in the plane of the array. Readout should be integrated with data logging system for the SPV Power Plant.

2. Temperature: Temperature probes for recording the Solar panel temperature and ambient temperature of the SPV Power Plant.

3. A data logging system for plant control and monitoring shall be provided for the SPV Power Plant

An independent internet connection for remote monitoring will be at the part of the bidder for entire period of contract/O&M of 10 years, any documentation/permission if required for service provider will be arranged by us but all the expenditure will be made by the bidder. The data logging system should be able to display the total cumulative generation data of and also to display SPV and should be integrated with a window based PC (provided By The Buyer)

5. 1 Nos. Class (0.5s), 3 phase, 4 wire, Uni-directional Energy Meters along with necessary CTs to be provided to measure the Energy produced by **each SPV Power Plants on LT side** which will be installed in the ACDB and 2 nos. HT, TPT Meter DLMS Compliant and AMR compatible class (0.5s) or better 3 phase 4wire, HT (11kV)

Bi-directional Energy Meter along with necessary CTs & PTs approved by UT Electricity Department will be provided to measure the Energy Exported by each SPV Power Plant on HT side. The expenditure on testing and calibrating of Energy Meter shall be borne by the bidder. In case, the bi-directional meter is not needed, then cost of Rs.20,000/- per meter shall be deducted.

All major parameters should be available on the digital bus and logging facility for energy auditing through the internal microprocessor and can be read on the digital front panel at any time the current values, previous values for up to a month and the average values. The parameters should be accessible via the operating interface display. Protective function limits (Viz-AC Over voltage, AC Under voltage, Over frequency, Under frequency ground fault, PV starting voltage, PV stopping voltage, Over voltage delay, Under voltage delay over frequency, Ground fault delay, PV starting delay, PV stopping delay).

The Solar power generated at different rooftops of SPV Power Plant will be collected at one central point in the same complex from where it will be evacuated on LT side.

4. Array Junction Box with Surge Protection Device (SPD) & Fuses:

There should be a separate Array Junction Box with Metal Oxide Varistors (MOV) type Surge Protection Device with fuses to be provided for each string inverter on D.C. Side.(IEC61643-1:International Standards for low voltage).

Further, on A.C. Side, the Surge Protection Device should be provided in ACDB, besides the existing SPD device in PCU.

In case, the inverter has provision of inbuilt array junction box, then the separate array junction box is not required but the surge protection device should be provided separately on D.C. and A.C. both side in addition to Inverter's protections.

5. COMMON AC DISTRIBUTION PANEL BOARD (ACDPB)

5.1. Common AC Distribution Panel Board (DPB) shall control the AC power from inverter. AC Distribution panel (ACDP) should consist of appropriate size of MCCB/MCB with appropriate breaking capacity as incomer and suitable numbers of MCCB with appropriate size breaking capacity out going switches. The panel should be provided 3 Phase copper bus bar of suitable capacity.

5.2 Common AC DPB shall have the arrangement for measuring all electrical quantities such as Voltage, Current, Frequency, of different feeder line & energy supplied to the main or different feeder. DPB shall have the provision of visual indication of existence of power input & output through MIMIC diagram. Common ACDPB shall have sheet iron enclosure of dust & vermin proof & shall have adequate cooling arrangement. The bus-bars are to be made of copper of desired size. Design & Drawing is to be submitted before manufacturer assembly on installation for obtaining necessary approval from CEO, CREST.

5.3 The 3- Phase unidirectional Energy Meter is to be installed in ACDPB as Solar meter.

6. CABLES:-

a) 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 inverter and inverter to ACDB.

b) Cabling in the yard and control room: Cabling in the yard shall be carried out as per IE Rules. Cabling inside control room and array area should be in cable pipes with proper water/moisture protection sealing. All other cabling above ground should be suitably mounted on cable trays with proper covers.

c) Wires: Only solar copper wires of appropriate size **based on load requirements** of reputed make as specified in DNIT shall have to be used on the DC side.

However on A.C side of after ACDB, aluminum cables of appropriate size can 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)

Cables Ends: All connections are to be made through suitable cable/lug/terminals;

crimped properly & with use of Cable Glands.

e) 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 and specifications mentioned can be used. All cable schedules/ layout drawings have to be got approved from the purchaser prior to installation.

The make of cables will be accepted only as specified in the DNIT. If there is any deviation required that may be brought to the notice during the pre-bid meeting after which no query would be entertained.

7. LIGHTNING PROTECTION

There shall be the 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. **Only ESE type Lightning Arrestors will be installed for each SPV Power Plants.**

8. EARTHING PROTECTION

Each array structure of the PV yard should be grounded/ Earthing properly as per IS:3043-1987. In addition the lightning 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 metal casing/shielding of the plant should be thoroughly grounded in accordance with Indian electricity Act./IE Rules. Earth Resistance should be tested in presence of the representative of Department after earthing by calibrated earth tester. PCU, ACDB and Module Structure should also be earthed properly.

9. COMPREHENSIVE MAINTENANCE

All the equipments (but in case of SPV Modules the guarantee period is 25years) shall be provided with comprehensive Maintenance for 10 years 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 Engineer-in-charge.

11. MODULE CLEANING SYSTEM:

As per site requirement, minimum 1No. pump per structure, BIS approved high pressure surface pump shall be installed for SPV Power Plant structure. Suitable Nos. of water outlets with water spray brass nozels shall be provided through C-Class ISI/BIS Marked GI Piping for automatic water spray cleaning of the SPV modules.

FIRE EXTINGUISHER

As per requirement, Fire Extinguishers shall be provided in Control Room and other fire prevents materials like sand basket at the PV array field for the SPV Power Plant.

13. STAIRS:

If there is no provision to access the rooftop of building, there should be provided a suitable steel stairs for each SPV Power Plants.

Sr. No.	Description	Make
1	SPV Modules	To be quoted by the firm. Option of minimum three brands to be quoted by bidder (Buyer shall be free to choose any one out of quoted brands) . The Solar Photovoltaic modules must be domestic manufactured and must be tested & approved by one of the IEC authorized test centers , Test Certificates can be from any of the NABL / BIS accredited testing / calibration laborites the module type must be qualified as per IEC 61215(Second Edition). In addition PV modules must qualify to IEC 61730 Part I to II for safety qualification testing. The Photovoltaic modules must be made in India and tested & approved by one of the IEC authorized test centers, Test Certificates can be from any of the NABL / BIS accredited testing /calibration lab. The SPV modules to be supplied should be approved from MNRE.
2	Inverters	SMA/KSOLARE/ABB /TATA POWER
3	Distribution Panel	Switchgear for AC ABB/ SIEMENS / Schneider Electric/ L&T/C&S/ HENSEL as per ISI /International standards
4	Cables	KEI/ Finolex / Havells / CCI/ Polycab/ Siechem/ Trisolar/ Bizlink/ Tyco/ Banshali and should be ISI/TUV Approved. Of minimum 10sqmm
5	Housing cabinets	The field array junction boxes will comply with IP65 standard.The electronics including inverters, CPU, charge controllers,MPPTs, AC & DC distribution boxes should comply IP21 for indoor and IP 65 for outdoor applications.
6	Energy Meters	The field array junction boxes will comply with IP65 standard.The electronics including inverters, CPU, charge controllers, MPPTs, AC & DC distribution boxes should comply IP21 for indoor and IP 65 for outdoor applications.

1. SCOPE OF OPERATION & MAINTENANCE OF SPV POWER PLANTS FOR A PERIOD OF 10 YEAR FROM DATE OF COMMISSIONING.

a) Regular operation & maintenance of the SPV Power Plant for a period of ten years after commissioning along with supply of consumable items as and when necessary, under the operation & maintenance contract.

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 for a period of 120 months from date of commissioning of power plant. The operation and maintenance schedule of the SPV power plant during the 10 years contract period shall be as detailed below :

b) 10 years operation and maintenance period shall begin on the date actual commissioning for the power plant. The requisite number of qualified and trained persons are required to be deputed from 8 A.M. to 6 P.M. daily to take care of all the systems. If person found absent from duty the recovery shall be made @ Rs. 500/-

per day.

c) The security of the power plant will rest with the tenderer till such time operation and maintenance of the power plant is not handed over to the purchaser/department.

d) The deputed persons shall be qualified having Diploma or B.Tech and well trained so that they can handle any type of operation hazard quickly and timely.

e) 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 Engineer-in-Charge immediately for appropriate action.

f) The deputed personnel shall keep clean the power plant at all the time to achieve the generation required.

g) Normal and preventive maintenance of the SPV power plant such as cleaning of module surface, tightening of all electrical connections etc.

h) During operation & maintenance period of ten years of 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 be responsible for immediate replacement/rectification. The damaged component may be repaired, if it is understood after examination that 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.

2. Operation & Maintenance Instructions:

2.1 The successful bidder shall furnish prior to completion of the works, 2 copies of operation and maintenance instructions in English for approval and supply 2 sets of the approved manuals of instructions at the time of final inspection. These manuals shall properly bound in book form and contain all information, description of equipment, diagram etc., necessary to enable the customer to operate and maintain the SPV Power Plant.

2.2 Proper Operation & maintenance of the plant shall be carried out by the contractor during O&M period of 10 years with 6 monthly review checkups of plant and equipment.

2.3 Properly qualified and trained personnel well versed in O&M of SPV plant and knowledge of computers with approval from purchaser shall be deployed for operation & maintenance who will also be responsible for round the clock maintenance (routine, preventive, breakdown and capital maintenance) of complete plant and equipment in emergency in odd hours.

2.4 Proper repainting, re- coating of exposed surfaces to prevent rusting & replacement of worn out parts shall be carried out along with the maintenance of the PCU.

● Supplier shall depute on engineer of their company minimum Diploma in Engineering for the operation and maintenance of the plant who shall be fully responsible for the complete O&M and optimum operation of the plant. The name and contact nos. of

this engineer shall be notified to the purchaser, for the purpose of contact, responsibility and correspondence with regard to all trouble shooting.

- Plant operation reports in a format prescribed by the purchaser shall be furnished by the supplier on monthly basis.
- Plant shall be operated as per the standard IER practices to ensure proper safety measures.
- The supplier shall ensure replacement of worn out parts and components during the operation & maintenance period for which purpose the supplier shall carry and maintain minimum inventory levels of spares at the plant and at its works.
- In case of delay in repair & maintenance and non observance of purchasers O&M schedules, the purchaser shall have the right to impose any penalties including forfeiture of performance security.
- In case of any fault, the fault must be removed within 120 hours failing which a penalty of Rs. 1,000/- per day shall be charged. However, under Force Majeure circumstances penalty can be waived off

2.5 Routine, Preventive, Breakdown & Capital Maintenance:

● Routine and preventive maintenance shall include such checks and maintenance activities round the clock on hourly, shift wise, daily, weekly, fortnightly, monthly, quarterly, half yearly, and yearly basis which are required to be carried out on all the components of **the power plant to minimize breakdowns and to ensure smooth and trouble free running of** the power plants. The supplier shall be responsible to carry out routine and preventive maintenance and replacement of each and every component / equipment of the power plant and he shall provide all labour, material, consumables etc. for routine and preventive maintenance at his own cost.

Breakdown maintenance shall mean the maintenance activity including repairs and replacement of any component or equipment of the power plant which is not covered by routine and preventive maintenance and which is required to be carried out as a result of sudden failure/breakdown of that particular component or equipment while the plant is running. The supplier shall be responsible to carry out breakdown maintenance of each and every component of the power plant and he shall provide the required manpower, materials, consumables, components or equipment etc. for breakdown maintenance at his own cost irrespective of the reasons of the breakdown/failure.

Capital maintenance shall mean the major overhaul of any component or equipment of the power plant which is not covered by routine, preventive and breakdown maintenance which may become necessary on account of excessive wear & tear, aging, which needs repair/replacement. The capital maintenance of power plant and all civil structures shall normally be planned to be carried out on an annual basis. For this purpose a joint inspection by the supplier and purchaser shall be carried out of all the major components of the power plant, about two months in advance of the annual maintenance period, in order to ascertain as to which components of the power plant require capital maintenance. In this regard the decision of the purchaser will be final and binding.

However, if the condition of any plant and component warrants its capital maintenance at any other time, a joint inspection of the purchaser and supplier shall be carried out immediately on occurrence of such situation and capital maintenance shall be carried out by arranging the shutdown of the plant/part of the plant, if required, in consultation with concerned authorities. The decision of the purchaser shall be final and binding.

PRICE BID

Sr. No.	ITEM	PARTICULARS
	SOLAR PHOTOVOLTAIC MODULES	
1.1	<u>Option-1</u> Make: Model No.: Wattage: Module Efficiency % (If bidder is not the manufacturer, Authorization letter from Manufacturer to be enclosed)	
1.2	<u>Option-2</u> Make: Model No.: Wattage: Module Efficiency % (If bidder is not the manufacturer, Authorization letter from Manufacturer to be enclosed)	
1.3	<u>Option-3</u> Make: Model No.: Wattage: Module Efficiency % (If bidder is not the manufacturer, Authorization letter from Manufacturer to be enclosed)	
2	POWER CONDITIONING UNITS	
2.1	<u>Option-1</u> Make: Model No.: Rated Capacity: Maximum Efficiency: (If bidder is not the manufacturer, Authorization letter from Manufacturer to be enclosed)	
2.2	<u>Option-2</u> Make: Model No.: Rated Capacity: Maximum Efficiency: (If bidder is not the manufacturer, Authorization letter from Manufacturer to be enclosed)	
2.3	<u>Option-3</u> Make: Model No.: Rated Capacity: Maximum Efficiency: (If bidder is not the manufacturer, Authorization letter from Manufacturer to be enclosed)	

Signature of the Bidder _____

Business Address _____

- Note: CREST is free to select any one of SPV module from the above three or more brands quoted by the bidders.

COST BREAK-UP OF POWER PLANTS OF 100kWp

Sl. No.	Brief Description	Units	Qty	Rate (Rs.)	Amount (Rs.)
1	SPV modules for a total capacity 100kWp as per specifications.				
2	SPV module mounting structure suitable for accommodating 100kWp capacity SPV modules as per specifications.				
3	Power Conditioning Units / String Inverters as per specifications				
4	Data Logging system along with sensors as per specifications				
5	ACDB, SPD Box, Breaker etc.				
6	Uni- Directional and Bi-directional Energy Meters				
7	Jet Pump with Pipe and Fire Extinguisher				
8	Balance of Systems				
9	Operation & maintenance of the 100kWp SPV Power Plant including cost of replacement of all the parts for a period of 10 years from the date of commissioning the power plant as per scope mentioned in the DNIT.				
10	Installation & Commissioning of the SPV Power Plant				
11	Any other item				
	TOTAL				