



NAHEP

**INSTITUTIONAL DEVELOPMENT PLAN**  
**National Agricultural Higher Education Project**  
**Sri Karan Narendra Agriculture University**  
**Jobner - Jaipur 303 329**



Email: pi.nahep@sknau.ac.in, Phone No.: 01425-254022

No: SKNAU/NAHEP/Proc./2021-22/141

Date- 24/01/2022

Reference No.: IN-SKNAU-JOBNER-178680-GO-RFQ (Bid No.: 01/2021)

**LETTER OF ACCEPTANCE**

To,

M/s Future Green Power Solutions Pvt. Ltd.,  
92, Karni Nagar, E-Gandi Path,  
West Vaishali Nagar, Jaipur, Rajasthan 302021

Subject: **Notification of Award (Bid No. 01/2021)**

This is to notify you that your Bid dated 17<sup>th</sup> December, 2021 for execution of the work of Design, Supply, Installation, Testing, Commissioning and Maintenance of Grid Connected Rooftop Solar Power Plants in Different Campuses of SKNAU, Jobner for the Accepted Contract Amount of **Rs. 13757608.50 [Rs. One crore thirty-seven lakhs fifty-seven thousand six hundred eight and fifty paisa]**, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted.

You are requested to furnish the Performance Security within 15 days in accordance with the Conditions of Contract in the form of demand draft issued in the name of the PI, IDP-NAHEP, SKNAU payable at Jobner.

  
PI, IDP-NAHEP

Sri Karan Narendra Agriculture University,  
Jobner, Jaipur - 303 329

**Attachment: Contract Agreement**

## CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT is made on the \_\_\_\_\_ day of January, 2022.

BETWEEN

- (1) **Sri Karan Narendra Agriculture University** a corporation incorporated under the laws of Government of Rajasthan, India and having its principal place of business at **Jobner-Jaipur, Rajasthan, India 303329** (herein after called “the Purchaser”), and
- (2) **M/s Future Green Power Solutions Pvt. Ptd.** a corporation incorporated under the laws of India and having its principal place of business at **92, Karni Nagar, E-Gandi Path, West Vaishali Nagar, Jaipur, Rajasthan 302021** (herein after called “the Supplier”).

WHEREAS the Purchaser invited bids for certain Goods and ancillary services, viz., design, supply, installation, testing, commissioning and maintenance of grid connected roof top solar power plants in different campuses of SKNAU, Jobner and has accepted a Bid by the Supplier for the supply of those Goods and Services in the sum of **Rs. 13757608.50 [Rs. One crore thirty-seven lakhs fifty-seven thousand six hundred eight and fifty paisa]**, (herein after called “the Contract Price”).

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.
2. The following documents shall constitute the Contract between the Purchaser and the Supplier, and each shall be read and construed as an integral part of the Contract Agreement. This Agreement shall prevail over all other contract documents: In the event of any discrepancy or inconsistency within the Contract documents, then the documents shall prevail in the order listed below.
  - (a) The letter of Acceptance
  - (b) this Contract Agreement
  - (c) The Supplier’s letter of Bid and original completed Schedules including Price Schedules
  - (d) Special Conditions of Contract
  - (e) General Conditions of Contract
  - (f) Technical Requirements (including Schedule of Requirements and Technical Specifications)

3. In consideration of the payments to be made by the Purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide the Goods and Services and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Goods and Services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of Government of India on the day, month and year indicated above.

**For and on behalf of the Purchaser:**

**PI, IDP-NAHEP**

Sri Karan Narendra Agriculture University,  
Jobner, Jaipur - 303 329

**in the presence of:**

**Procurement Officer, IDP-NAHEP**

Sri Karan Narendra Agriculture University,  
Jobner, Jaipur - 303 329

**For and on behalf of the Supplier:**

**Mr. Ajit Singh**

Managing Director

M/s Future Green Power Solutions Pvt. Ltd.,  
92, Karni Nagar, E-Gandi Path,  
West Vaishali Nagar, Jaipur, Rajasthan 302021

**in the presence of:**

**Mr. Santosh Kumar Sharma**

Manager

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M/s Future Green Power Solutions Pvt. Ltd.,  
92, Karni Nagar, E-Gandi Path,  
West Vaishali Nagar, Jaipur, Rajasthan 302021

## GENERAL CONDITIONS OF CONTRACT

### 1. Definitions

The following words and expressions shall have the meanings hereby assigned to them:

- (a) "Bank" means the World Bank and refers to the International Bank for Reconstruction and Development (IBRD) or the International Development Association (IDA).
- (b) "Contract" means the Contract Agreement entered into between the Purchaser and the Supplier, together with the Contract Documents referred to therein, including all attachments, appendices, and all documents incorporated by reference therein.
- (c) "Contract Documents" means the documents listed in the Contract Agreement, including any amendments thereto.
- (d) "Contract Price" means the price payable to the Supplier as specified in the Contract Agreement, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract.
- (e) "Day" means calendar day.
- (f) "Completion" means the fulfillment of the Related Services by the Supplier in accordance with the terms and conditions set forth in the Contract.
- (g) "GCC" means the General Conditions of Contract.
- (h) "Goods" means all of the commodities, raw material, machinery and equipment, and/or other materials that the Supplier is required to supply to the Purchaser under the Contract.
- (i) "Purchaser's Country" is India.
- (j) "Purchaser" means the entity purchasing the Goods and Related Services, as specified in the SCC.
- (k) "Related Services" means the services incidental to the supply of the goods, such as insurance, installation, start-up, training and initial maintenance and other such obligations of the Supplier under the Contract.
- (l) "SCC" means the Special Conditions of Contract.



- (m) “Subcontractor” means any natural person, private or government entity, or a combination of the above, to whom any part of the Goods to be supplied or execution of any part of the Related Services is subcontracted by the Supplier.
- (n) “Supplier” means the natural person, private or government entity, or a combination of the above, whose bid to perform the Contract has been accepted by the Purchaser and is named as such in the Contract Agreement.
- (o) “The Project Site,” where applicable, means the place named in the SCC.

**2. Contract Documents**

2.1 Subject to the order of precedence set forth in the Contract Agreement, all documents forming the Contract (and all parts thereof) are intended to be correlative, complementary and mutually explanatory. The Contract Agreement shall be read as a whole.

**3. Corrupt & Fraudulent Practices**

3.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Appendix to the GCC.

3.2 The Purchaser requires the Supplier to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the bidding process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

**4. Interpretation**

4.1 If the context so requires it, singular means plural and vice versa.

4.2 Incoterms.

(a) Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of parties there under shall be as prescribed by Incoterms.

(b) The terms EXW and other similar terms, when used, shall be governed by the rules prescribed in the current edition of Incoterms specified in the SCC and published by the International Chamber of Commerce in Paris, France.

4.3 Entire Agreement

The Contract constitutes the entire agreement between the Purchaser and the Supplier and supersedes all communications, negotiations and agreements (whether written or oral) of the parties with respect thereto made prior to the date of Contract.

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#### 4.4 Amendment

No amendment or other variation of the Contract shall be valid unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party thereto.

#### 4.5 Nonwaiver

- (a) Subject to GCC Sub-Clause 4.5 (b) below, no relaxation, forbearance, delay or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect or restrict the rights of that party under the Contract, neither shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.
- (b) Any waiver of a party's rights, powers or remedies under the Contract must be in writing, dated and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

#### 4.6 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

### 5. Language

- 5.1 The Contract as well as all correspondence and documents relating to the Contract exchanged by the Supplier and the Purchaser, shall be in English. Supporting documents and printed literature that are part of the Contract may be in another language provided they are accompanied by an accurate translation of the relevant passages in English language, in which case, for purposes of interpretation of the Contract, this translation shall govern.
- 5.2 The Supplier shall bear all costs of translation to the governing language and all risks of the accuracy of such translation, for documents provided by the Supplier.

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### 7. Eligibility

- 7.1 The Supplier and its Subcontractors shall be of Indian nationality. A Supplier or Subcontractor shall be deemed to have the nationality of a country if it is a citizen or constituted, incorporated, or registered, and operates in conformity with the provisions of the laws of that country.
- 7.2 All Goods and Related Services to be supplied under the Contract and financed by the Bank shall have their origin in Eligible

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Countries. For the purpose of this Clause, origin means the country where the goods have been grown, mined, cultivated, produced, manufactured, or processed; or through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.

**8. Notices**

- 8.1 Any notice given by one party to the other pursuant to the Contract shall be in writing to the address specified in the SCC. The term "in writing" means communicated in written form with proof of receipt.
- 8.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.

**9. Governing Law**

- 9.1 The Contract shall be governed by and interpreted in accordance with the laws of the Union of India.

**10. Settlement of Disputes**

- 10.1 The Purchaser and the Supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.
- 10.2 If, after twenty-eight (28) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute and no arbitration in respect of this matter may be commenced unless such notice is given. Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the Goods under the Contract. Arbitration proceedings shall be conducted in accordance with the rules of procedure **specified in the SCC.**
- 10.3 Notwithstanding any reference to arbitration herein,
- (a) the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree; and
  - (b) the Purchaser shall pay the Supplier any monies due the Supplier.

**11. Inspections and Audit by the Bank**

- 11.1 The Supplier shall keep and shall make all reasonable efforts to cause its Subcontractors to keep, accurate and systematic accounts and records in respect of the Goods in such form and details as will clearly identify relevant time changes and costs



- 11.2 The Supplier shall permit and shall cause its Subcontractors to permit, the Bank and/or persons appointed by the Bank to inspect the Supplier's offices and all accounts and records relating to the performance of the Contract and the submission of the bid and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Supplier's and its Subcontractors and consultants' attention is drawn to Clause 3 [Fraud and Corruption], which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under this Sub-Clause 11.1 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures)
- 12. Scope of Supply** 12.1 The Goods and Related Services to be supplied shall be as specified in the **Special Conditions of Contract**.
- 13. Delivery and Documents** 13.1 Subject to GCC Sub-Clause 33.1, the Delivery of the Goods and Completion of the Related Services shall be in accordance with the Delivery and Completion Schedule specified in the Schedule of Requirements. The details of shipping and other documents to be furnished by the Supplier are specified in the **SCC**.
- 14. Supplier's Responsibilities** 14.1 The Supplier shall supply all the Goods and Related Services included in the Scope of Supply in accordance with GCC Clause 12, and the Delivery and Completion Schedule, as per GCC Clause 13.
- 15. Contract Price** 15.1 Prices charged by the Supplier for the Goods supplied and the Related Services performed under the Contract shall not vary from the prices quoted by the Supplier in its bid, with the exception of any price adjustments authorized in the **SCC**.
- 16. Terms of Payment** 16.1 The Contract Price, including any Advance Payments, if applicable, shall be paid as specified in the **SCC**.
- 16.2 The Supplier's request for payment shall be made to the Purchaser in writing, accompanied by invoices describing, as appropriate, the Goods delivered and Related Services performed, and by the documents submitted pursuant to GCC Clause 13 and upon fulfillment of all other obligations stipulated in the Contract.
- 16.3 Payments shall be made promptly by the Purchaser, but in no case later than sixty (30) days after submission of an invoice or request for payment by the Supplier, and after the Purchaser has accepted it.
- 16.4 The payments shall be made in Indian Rupees to the Supplier under this Contract.



16.5 In the event that the Purchaser fails to pay the Supplier any payment by its due date or within the period set forth in the SCC, the Purchaser shall pay to the Supplier interest on the amount of such delayed payment at the rate shown in the SCC, for the period of delay until payment has been made in full, whether before or after judgment or arbitrage award.

**17. Taxes and Duties**

17.1 The Supplier shall be entirely responsible for all taxes, duties, license fees etc., incurred until delivery of the contracted Goods to the Purchaser.

**18. Performance Security**

18.1 If required as specified in the SCC, the Supplier shall, within fifteen (15) days of the notification of contract award, provide a performance security for the performance of the Contract in the amount specified in the SCC. In addition to the performance security, the supplier shall provide a maintenance security for the period of four years from the date of commissioning of the solar plants in the amount specified in the SCC.

18.2 The proceeds of the Performance Security and Maintenance Security shall be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.

18.3 As specified in the SCC, the Performance Security and Maintenance Security shall be denominated in the Indian Rupees, and shall be in the format stipulated by the Purchaser in the SCC.

18.4 The Performance Security shall be discharged by the Purchaser and returned to the Supplier not later than sixty (60) days following the date of Completion of the Supplier's performance obligations under the Contract, including any warranty obligations, unless specified otherwise in the SCC.

**19. Copyright**

19.1 The copyright in all drawings, documents and other materials containing data and information furnished to the Purchaser by the Supplier herein shall remain vested in the Supplier, or, if they are furnished to the Purchaser directly or through the Supplier by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.

**20. Confidential Information**

20.1 The Purchaser and the Supplier shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following completion or termination of the Contract. Notwithstanding the

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above, the Supplier may furnish to its Subcontractor such documents, data, and other information it receives from the Purchaser to the extent required for the Subcontractor to perform its work under the Contract, in which event the Supplier shall obtain from such Subcontractor an undertaking of confidentiality similar to that imposed on the Supplier under GCC Clause 20.

20.2 The Purchaser shall not use such documents, data, and other information received from the Supplier for any purposes unrelated to the contract. Similarly, the Supplier shall not use such documents, data, and other information received from the Purchaser for any purpose other than the performance of the Contract.

20.3 The obligation of a party under GCC Sub-Clauses 20.1 and 20.2 above, however, shall not apply to information that:

- (a) the Purchaser or Supplier need to share with the Bank or other institutions participating in the financing of the Contract;
- (b) now or hereafter enters the public domain through no fault of that party;
- (c) can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party; or
- (d) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

20.4 The above provisions of GCC Clause 20 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Supply or any part thereof.

20.5 The provisions of GCC Clause 20 shall survive completion or termination, for whatever reason, of the Contract.

## **21. Subcontracting**

21.1 The Supplier shall notify the Purchaser in writing of all subcontracts awarded under the Contract if not already specified in the bid. Such notification, in the original bid or later shall not relieve the Supplier from any of its obligations, duties, responsibilities, or liability under the Contract.

21.2 Subcontracts shall comply with the provisions of GCC Clauses 3 and 7.

## **22. Specifications and Standards**

22.1 Technical Specifications and Drawings

- (a) The Goods and Related Services supplied under this Contract shall conform to the technical specifications and standards

mentioned in Schedule of Requirements and, when no applicable standard is mentioned, the standard shall be equivalent or superior to the official standards whose application is appropriate to the goods' country of origin.

- (b) The Supplier shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designed by or on behalf of the Purchaser, by giving a notice of such disclaimer to the Purchaser.
- (c) Wherever references are made in the Contract to codes and standards in accordance with which it shall be executed, the edition or the revised version of such codes and standards shall be those specified in the Schedule of Requirements. During Contract execution, any changes in any such codes and standards shall be applied only after approval by the Purchaser and shall be treated in accordance with GCC Clause 33.

### **23. Packing and Documents**

- 23.1 The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract. During transit, the packing shall be sufficient to withstand, without limitation, rough handling and exposure to extreme temperatures, salt and precipitation, and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.
- 23.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified in the SCC, and in any other instructions ordered by the Purchaser.

### **24. Insurance**

- 24.1 Unless otherwise specified in the SCC, the Goods supplied under the Contract shall be fully insured against loss or damage incidental to manufacture or acquisition, transportation, storage, and delivery, in accordance with the applicable Incoterms or in the manner specified in the SCC.

### **25. Transportation & Incidental Services**

- 25.1 Unless otherwise specified in the SCC, responsibility for arranging transportation of the Goods shall be in accordance with the specified Incoterms.
- 25.2 The Supplier may be required to provide any or all of the following services, including additional services, if any, **specified in Schedule of Requirements and SCC:**

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- (a) performance or supervision of on-site assembly and/or start-up of the supplied Goods;
- (b) furnishing of tools required for assembly and/or maintenance of the supplied Goods;
- (c) furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods;
- (d) performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract; and
- (e) training of the Purchaser's personnel, at the Supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Goods

25.3 Prices charged by the Supplier for incidental services, if not included in the Contract Price for the Goods, shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services.

**26. Inspections and Tests**

26.1 The Supplier shall at its own expense and at no cost to the Purchaser carry out all such tests and/or inspections of the Goods and Related Services as are specified in the SCC.

26.2 The inspections and tests may be conducted on the premises of the Supplier or its Subcontractor, at point of delivery, and/or at the Goods' final destination, or in another place in the Purchaser's Country as specified in the SCC. Subject to GCC Sub-Clause 26.3, if conducted on the premises of the Supplier or its Subcontractor, all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Purchaser.

26.3 The Purchaser or its designated representative shall be entitled to attend the tests and/or inspections referred to in GCC Sub-Clause 26.2, provided that the Purchaser bear all of its own costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

26.4 Whenever the Supplier is ready to carry out any such test and inspection, it shall give a reasonable advance notice, including the place and time, to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.

*de* 26.5 The Purchaser may require the Supplier to carry out any test and/or inspection not required by the Contract but deemed



necessary to verify that the characteristics and performance of the Goods comply with the technical specification's codes and standards under the Contract, provided that the Supplier's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impedes the progress of manufacturing and/or the Supplier's performance of its other obligations under the Contract, due allowance will be made in respect of the Delivery Dates and Completion Dates and the other obligations so affected.

- 26.6 The Supplier shall provide the Purchaser with a report of the results of any such test and/or inspection.
- 26.7 The Purchaser may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Supplier shall either rectify or replace such rejected Goods or parts thereof or make alterations necessary to meet the specifications at no cost to the Purchaser, and shall repeat the test and/or inspection, at no cost to the Purchaser, upon giving a notice pursuant to GCC Sub-Clause 26.4.
- 26.8 The Supplier agrees that neither the execution of a test and/or inspection of the Goods or any part thereof, nor the attendance by the Purchaser or its representative, nor the issue of any report pursuant to GCC Sub-Clause 26.6, shall release the Supplier from any warranties or other obligations under the Contract.

**27. Liquidated Damages**

- 27.1 Except as provided under GCC Clause 32, if the Supplier fails to execute the work by the Date(s) of delivery or perform the Related Services within the period specified in the Contract, the Purchaser may without prejudice to all its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in the SCC of the delivered price of the delayed Goods or unperformed Services for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the percentage specified in those SCC. Once the maximum is reached, the Purchaser may terminate the Contract pursuant to GCC Clause 35.

**28. Warranty**

- 28.1 The Supplier warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract.
- 28.2 Subject to GCC Sub-Clause 22.1(b), the Supplier further warrants that the Goods shall be free from defects arising from any act or omission of the Supplier or arising from design,

materials, and workmanship, under normal use in the conditions prevailing in the country of final destination.

- 28.3 The warranty period and conditions shall be as specified in the SCC.
- 28.4 The Purchaser shall give notice to the Supplier stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Purchaser shall afford all reasonable opportunity for the Supplier to inspect such defects.
- 28.5 Upon receipt of such notice, the Supplier shall, within the period specified in the SCC, expeditiously repair or replace the defective Goods or parts thereof, at no cost to the Purchaser.
- 28.6 If having been notified, the Supplier fails to remedy the defect within the period specified in the SCC, the Purchaser may proceed to take within a reasonable period such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.

## **29. Patent Indemnity**

- 29.1 The Supplier shall, subject to the Purchaser's compliance with GCC Sub-Clause 29.2, indemnify and hold harmless the Purchaser and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Purchaser may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract by reason of:
- (a) the installation of the Goods by the Supplier or the use of the Goods in the country where the Site is located; and
  - (b) the sale in any country of the products produced by the Goods.

Such indemnity shall not cover any use of the Goods or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract, neither any infringement resulting from the use of the Goods or any part thereof, or any products produced thereby in association or combination with any other equipment, plant, or materials not supplied by the Supplier, pursuant to the Contract.

- 29.2 If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in GCC Sub-Clause 29.1, the Purchaser shall promptly give the Supplier a notice thereof, and the Supplier may at its own expense and in

the Purchaser's, name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

- 29.3 If the Supplier fails to notify the Purchaser within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Purchaser shall be free to conduct the same on its own behalf.
- 29.4 The Purchaser shall, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim, and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.
- 29.5 The Purchaser shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Supplier may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Purchaser.

**30. Limitation of Liability**

- 30.1 Except in cases of criminal negligence or willful misconduct,
- (a) the Supplier shall not be liable to the Purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Supplier to pay liquidated damages to the Purchaser, and
  - (b) the aggregate liability of the Supplier to the Purchaser, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the supplier to indemnify the purchaser with respect to patent infringement.

**31. Change in Laws and Regulations**

- 31.1 Unless otherwise specified in the Contract, if after the date of 28 days prior to date of Bid submission, any law, regulation, ordinance, order or bylaw having the force of law is enacted, promulgated, abrogated, or changed in India, where the Site is located (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the Delivery Date and/or the Contract





Price, then such Delivery Date and/or Contract Price shall be correspondingly increased or decreased, to the extent that the Supplier has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced cost shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with GCC Clause 15.

- 32. Force Majeure**
- 32.1 The Supplier shall not be liable for forfeiture of its Performance Security, liquidated damages, or termination for default if and to the extent that its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.
- 32.2 For purposes of this Clause, "Force Majeure" means an event or situation beyond the control of the Supplier that is not foreseeable, is unavoidable, and its origin is not due to negligence or lack of care on the part of the Supplier. Such events may include, but not be limited to, acts of the Purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes.
- 32.3 If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.
- 33. Change Orders and Contract Amendments**
- 33.1 The Purchaser may at any time order the Supplier through notice in accordance GCC Clause 8, to make changes within the general scope of the Contract in any one or more of the following:
- (a) drawings, designs, or specifications, where Goods to be furnished under the Contract are to be specifically manufactured for the Purchaser;
  - (b) the method of shipment or packing;
  - (c) the place of delivery; and
  - (d) the Related Services to be provided by the Supplier.
- 33.2 If any such change causes an increase or decrease in the cost of, or the time required for, the Supplier's performance of any provisions under the Contract, an equitable adjustment shall be made in the Contract Price or in the Delivery/Completion
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Schedule, or both, and the Contract shall accordingly be amended. Any claims by the Supplier for adjustment under this Clause must be asserted within twenty-eight (28) days from the date of the Supplier's receipt of the Purchaser's change order.

33.3 Prices to be charged by the Supplier for any Related Services that might be needed but which were not included in the Contract shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services.

33.4 Subject to the above, no variation in or modification of the terms of the Contract shall be made except by written amendment signed by the parties.

#### **34. Extensions of Time**

34.1 If at any time during performance of the Contract, the Supplier or its subcontractors should encounter conditions impeding timely delivery of the Goods or completion of Related Services pursuant to GCC Clause 13, the Supplier shall promptly notify the Purchaser in writing of the delay, its likely duration, and its cause. As soon as practicable after receipt of the Supplier's notice, the Purchaser shall evaluate the situation and may at its discretion extend the Supplier's time for performance, in which case the extension shall be ratified by the parties by amendment of the Contract.

34.2 Except in case of Force Majeure, as provided under GCC Clause 32, a delay by the Supplier in the performance of its Delivery and Completion obligations shall render the Supplier liable to the imposition of liquidated damages pursuant to GCC Clause 26, unless an extension of time is agreed upon, pursuant to GCC Sub-Clause 34.1.

#### **35. Termination**

35.1 Termination for Default

(a) The Purchaser, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate the Contract in whole or in part:

(i) if the Supplier fails to deliver any or all of the Goods within the period specified in the Contract, or within any extension thereof granted by the Purchaser pursuant to GCC Clause 34;

(ii) if the Supplier fails to perform any other obligation under the Contract; or

(iii) if the Supplier, in the judgment of the Purchaser has engaged in fraud and corruption, as defined in GCC Clause 3, in competing for or in executing the Contract.

- (b) In the event the Purchaser terminates the Contract in whole or in part, pursuant to GCC Clause 35.1(a), the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Related Services similar to those undelivered or not performed, and the Supplier shall be liable to the Purchaser for any additional costs for such similar Goods or Related Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.

#### 35.2 Termination for Insolvency.

- (a) The Purchaser may at any time terminate the Contract by giving notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In such event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy that has accrued or will accrue thereafter to the Purchaser.

#### 35.3 Termination for Convenience.

- (a) The Purchaser, by notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Purchaser's convenience, the extent to which performance of the Supplier under the Contract is terminated, and the date upon which such termination becomes effective.
- (b) The Goods that are complete and ready for shipment within twenty-eight (28) days after the Supplier's receipt of notice of termination shall be accepted by the Purchaser at the Contract terms and prices. For the remaining Goods, the Purchaser may elect:
  - (i) to have any portion completed and delivered at the Contract terms and prices; and/or
  - (ii) to cancel the remainder and pay to the Supplier an agreed amount for partially completed Goods and Related Services and for materials and parts previously procured by the Supplier.

### 36. Assignment

- 36.1 Neither the Purchaser nor the Supplier shall assign, in whole or in part, their obligations under this Contract, except with prior written consent of the other party.

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## APPENDIX TO GENERAL CONDITIONS

### Bank's Policy- Corrupt and Fraudulent Practices

**Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011:**

**“Fraud and Corruption:**

1.16 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.<sup>1</sup> In pursuance of this policy, the Bank:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

- (i) “corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;<sup>2</sup>
- (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;<sup>3</sup>
- (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;<sup>4</sup>
- (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;<sup>5</sup>
- (v) “obstructive practice” is:

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<sup>1</sup> In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

<sup>2</sup> For the purpose of this sub-paragraph, “another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

<sup>3</sup> For the purpose of this sub-paragraph, “party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

<sup>4</sup> For the purpose of this sub-paragraph, “parties” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other's bid prices or other conditions.

<sup>5</sup> For the purpose of this sub-paragraph, “party” refers to a participant in the procurement process or contract execution.



- (aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
  - (bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
  - (c) will declare mis procurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
  - (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,<sup>6</sup> including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated<sup>7</sup>;
  - (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank."

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<sup>6</sup> A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

<sup>7</sup> A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.



## SPECIAL CONDITIONS OF CONTRACT

The following Special Conditions of Contract (SCC) shall supplement and/or amend the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

<b>GCC 1.1 (j)</b>	The Purchaser is: <b>The Principal Investigator, IDP-NAHEP, Sri Karan Narendra Agriculture University, Jobner-Jaipur, Rajasthan, 303 328</b>
<b>GCC 1.1 (o)</b>	<b>“Project Site(s)”:</b> <b>1. Campus of SKN College of Agriculture, Jobner (Dist. Jaipur)</b> <b>2. Campus of College of Agriculture, Lalsot (Dist. Dausa)</b>
<b>GCC 4.2 (a)</b>	The meaning of the trade terms shall be as prescribed by Incoterms.
<b>GCC 4.2 (b)</b>	The version edition of Incoterms shall be 2010.
<b>GCC 8.1</b>	For notices, the Purchaser’s address shall be: <b>The Principal Investigator, IDP-NAHEP, Sri Karan Narendra Agriculture University, Jobner, Jaipur - 303 329</b> <b>Country – India</b> <b>Telephone No.: 01425-254022</b> <b>Email ID: pi.nahep@sknau.ac.in</b>
<b>GCC 10.2</b>	<b>Settlement of Disputes</b> The dispute settlement mechanism to be applied for ad-hoc arbitration shall be as follows: (a) In case of Dispute or difference arising between the Purchaser and a domestic supplier relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Arbitration and Conciliation Act, 1996. The arbitral tribunal shall consist of 3 arbitrators one each to be appointed by the Purchaser and the Supplier. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties and shall act as Presiding arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the *Indian Council of Arbitration/President of the Institution of Engineers (India)/The International center for Alternative Dispute Resolution (India). (b) If one of the parties fails to appoint its arbitrator in pursuance of sub-clause (a) above, within 30 days after receipt of the notice of the appointment of its arbitrator by the other party, then the *Indian Council of Arbitration/President of the Institution of Engineers (India)/The International Centre for Alternative Dispute Resolution (India), shall appoint the arbitrator. A certified copy of the order of the *Indian Council of Arbitration/President of the Institution of Engineers (India)/The

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- International Centre for Alternative Disputes Resolution (India), making such an appointment shall be furnished to each of the parties.
- (c) Arbitration proceedings shall be held at office of the PI, IDP-NAHEP, SKNAU, Jobner-Jaipur, Rajasthan, India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English.
  - (d) The decision of the majority of arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration proceedings will be paid as determined by the arbitral tribunal. However, the expenses incurred by each party in connection with the preparation, presentation etc. of its proceedings as also the fees and expenses paid to the arbitrator appointed by such party or on its behalf shall be borne by each party itself.
  - (e) Where the value of the contract is Rs. 10 million and below, the disputes or differences arising shall be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by agreement between the parties; failing such agreement, by the appointing authority namely the \*Indian Council of Arbitration/President of the Institution of Engineers (India)/The International Centre for Alternative Dispute Resolution (India).
  - (f) Except otherwise agreed to by the Parties, Arbitrators should give a decision in writing within 120 days of receipt of notification of dispute.

**GCC 12.1 and 25.2**

The Supplier has to carry out the assignment as per the Terms, Conditions and Specifications as mentioned in the Schedule of Requirements. The detailed scope of work with other conditions is given here under:

**Work of installation of grid connected rooftop SPV power plants shall involve:**

- i. Design, supply, storage, civil work, erection (installation), testing and commissioning of grid connected SPV rooftop power plants of total capacity of 375 kWp at different locations under the jurisdiction of SKN Agriculture University, Jobner-Jaipur.
- ii. The details of different grid connected SPV rooftop power plants to be installed under this project are as given below:

Sr. No.	Grid Connected Rooftop SPV Power Plants (Name of Building with location)	Capacity of the Plant (kWp)
<b>Project Site A: Campus of SKN College of Agriculture, Jobner-Jaipur, Rajasthan 303328</b>		
1	Girls Hostel	55
2	New Girls Hostel	55
3	Bhabha Hostel	55
4	Pal-PG-Raman Hostel	130
<b>Project Site B: Campus of College of Agriculture, Lalsot-Dausa, Rajasthan</b>		
1	Administrative Building	80
<b>Total Capacity (kWp)</b>		<b>375</b>

- iii. Entering into supply and comprehensive maintenance contract (CMC) agreements with the Purchaser. CMC shall be for five (5) years with free replacement warranty on spare parts against manufacturing defect.

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- iv. The Bidder shall visit all the sites of work before initiation of the work. He has to carry out detailed survey of the proposed site before starting the work and then procure the required materials as per the Bid document. The tentative detailed item wise technical specifications are mentioned in the Bid documents. However, as the work is to be carried out as a Turnkey Job, all required material to complete the project in all respect shall be Bidder's responsibility. The required civil work for installation of panels along with the mounting structures shall have to be done by the Bidder. The decision of Purchaser in accepting the material in the project will be final & bounded on the Bidder. The testing of various items as required in the Bid document while executing the work shall be arranged by the Bidder & all the expenses shall be the responsibility of the Bidder.
- v. The bidder should visit the site & perform technical survey along with concern persons at sites and submit the survey report for each project as per the contract agreement.
- vi. It is the responsibility of the Bidder of Obtaining No Objection Certificate from concerned DISCOM for grid connectivity.
- vii. The Bidder shall take all required approvals for this project from concerned Authorities before starting the work & after completion of work. The required follow up for getting various approvals shall have to be done by the Bidder.
- viii. The Bidder shall also arrange inspections of concerned Authorities after the completion of the works. He shall collect the Inspection Certificate & submit it to the Purchaser before commissioning. The fees for various approvals & expenses for inspection of all material & project will be the Bidder's responsibility. The Bidder has to attend the fault if any occurred in the plant during the CMC period of 5 years. The Bidder shall arrange required staff for maintaining the system till handing over. After completion of the total work & CMC period, the project is to be handed over to the Purchaser in working condition.
- ix. The entire work under the contract shall be guaranteed for a period of five years (Defect liability period) from the date of commissioning & handing over the project to the Purchaser. Any defect occurred during the above period shall be rectified/repared by the Bidder at his cost immediately on notification.
- x. It shall be presumed that, the Bidder has satisfied himself with the site conditions & the nature of the works, general and local conditions, particularly on those bearings on transport handling, storage of materials, availability of labour, weather conditions and has estimated the cost and quoted his rates accordingly. The Purchaser will bear no responsibility for lack of such acquaintance with site conditions and consequences thereof.
- xi. The Bidder shall have to solve all ROW & disputes occurred if any & other obstructions during execution of project. The expenses required for this will be Bidder's responsibility.

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	<p>xii. All statutory clearances/permissions/NOC from respective authorities shall be arranged by the Bidder prior to start the work. The required charges for this shall be paid by the Bidder &amp; it will be the Bidder's responsibility.</p> <p>xiii. The Bidder will be required to complete the work within the stipulated time as specified in the contract agreement. The bidder shall ensure that SPV power plant should be commissioned within the given time period from the date of issue of work order.</p> <p>xiv. During the installation of plants, while erecting the mounting structures, due care has to be taken so that it should not damage the roof surface and also there should not be problem of water leakage during rainy season.</p> <p>xv. Bidder shall provide training to the Purchaser's personnel, at the Supplier's plant and/or on-site, in assembly, start-up, operation, maintenance and/or repair of the supplied Goods.</p> <p>xvi. Bidder should furnish tools required for assembly and/or maintenance of the supplied Goods;</p> <p>xvii. Bidder should furnish a detailed operations and maintenance manual for each appropriate unit of the supplied Goods.</p>
<b>GCC 13.1</b>	<p>Details of Shipping and other Documents to be furnished by the Supplier are given below:</p> <p>Upon delivery of the goods to the transporter/consignee, the supplier shall notify the purchaser and mail the following documents to the Purchaser:</p> <ol style="list-style-type: none"> <li>i. Three copies of the Supplier invoice showing contract number, goods description, quantity, unit price, total amount;</li> <li>ii. Delivery note, Railway receipt, or Road consignment note or equivalent transport document or acknowledgement of receipt of goods from the Consignee;</li> <li>iii. Three copies of packing list identifying contents of each package;</li> <li>iv. Insurance certificate;</li> <li>v. Manufacturer's/Supplier's warranty certificate;</li> <li>vi. Inspection certificate issued by the nominated inspection agency, and the Supplier's factory inspection report; and</li> <li>vii. Certificate of origin.</li> </ol> <p>The above documents shall be received by the Purchaser before arrival of the Goods (except where it is handed over to the Consignee with all documents) and if not received, the supplier will be responsible for any consequent expenses.</p>
<b>GCC 15.1</b>	The prices charged for the Goods supplied and the related Services performed shall not be adjustable.
<b>GCC 16.1</b>	<p>Payment shall be made in Indian Rupees in the following manner:</p> <p><b><i>On Delivery of Items at Destination:</i></b> Seventy per cent (70%) of the contract price shall be paid on the successful delivery and verification from the concerned authority for all the material required for all the project sites. The Bidder has to</p>

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	<p>submit delivery report along with all requisite documents and upon successful verification from the Purchaser, the payment will be released.</p> <p><b>On handover of work:</b> The remaining thirty per cent (30%) of the Contract Price shall be paid within thirty (30) days after the date of the handing over the work and subsequent Performance Certificate issued by the Purchaser's representative in the proforma given in in contract documents.</p>
<b>GCC 16.5</b>	<p>The payment-delay period after which the Purchaser shall pay interest to the supplier shall be 30 days.</p> <p>The interest rate that shall be applied is <b>6.70%</b>. (<i>Prime Bank lending rate of State Bank of India</i>)</p>
<b>GCC 17</b>	<p>In the case of tax/duty waiver, the purchaser, if applicable will issue only the certificates in terms of the Government of India's notification as per information given by supplier. Supplier is solely responsible for obtaining such benefits and in case of failure to receive such benefits, the purchaser will not compensate the supplier separately.</p>
<b>GCC 18.1</b>	<p><b>Performance Security</b> to the Purchaser shall be for an amount of <b>2.5 % of the contract value</b>, valid up to 60 days after the date of completion of performance obligations including warranty obligations.</p> <p>In the event of any correction of defects or replacement of defective material during the warranty period, the warranty for the corrected/ replaced material shall be extended to a further period of 12 months and the Performance Bank guarantee for proportionate value shall be extended 60 days over and above the extended warranty period.</p> <p><b>Maintenance Security</b> to the Purchaser shall be for an amount of <b>8.0 % of the contract value</b> valid for the period of four years from the date of commissioning of the solar plants.</p>
<b>GCC 18.3</b>	<p>The <b>Performance Security</b> shall be in the form of a "<b>Demand Draft</b>" drawn in favour of the PI, IDP-NAHEP, SKNAU payable at Jobner.</p> <p>The <b>Maintenance Security</b> shall be submitted in the form of "<b>Bank Guarantee</b>".</p>
<b>GCC 18.4</b>	<p>Discharge of the performance Security shall take place not later than 60 days following the date of completion of the Supplier's performance obligations, including the warranty obligation, under the contract.</p>
<b>GCC 18.5</b>	<p>Add as Clause 18.5 to the GCC the following:</p> <p>In the event of any contractual amendment, the Supplier shall, within 21 days of receipt of such amendment, furnish the amendment to the Performance Security, rendering the same valid for the duration of the Contract, as amended for 60 days after the completion of performance obligations including warranty obligations.</p>
<b>GCC 23.2</b>	<p><u>Packing Instructions:</u> The Supplier will be required to make separate packages for each Consignee. Each package will be marked on three sides with proper paint/indelible ink with the following:</p> <p>(i) Project; (ii) Contract No.; (iii) Country of Origin of Goods; (iv) Supplier's Name; (v) Packing List Reference Number.</p> <p>Suppliers should use recycled materials as much as possible for packing.</p>

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GCC 24.1	The insurance shall be paid in an amount equal to 110 percent of the EXW value of the Goods from “Warehouse to warehouse (final destination)” on “All Risks” basis including War Risks and Strikes.
GCC 25.1	The Supplier is required under the Contract to transport the Goods duly insured to the specified final destination, and all related costs shall be included in the Contract Price.
GCC 26.1	<p>The inspections and tests shall be:</p> <p>The Supplier should carry out the following tests at the time of installation:</p> <p><b>Ground Continuity:</b> Continuity testing is commonly used to verify grounding and bonding connections in electrical systems. Proper grounding of PV systems reduces the risk of electrical shock to personnel and the effects of lightning and surges on equipment.</p> <p><b>Open Circuit Voltage:</b> These tests simply verify correct installation, and are not intended to verify performance. The PV array should be tested and compared with expectations.</p> <p><b>Short Circuit Current:</b> Short circuit current tests are conducted on PV string source circuits to verify proper readings, and that the circuits are clear from major faults. Similar to the Open Circuit Voltage, these tests are only intended to verify proper system operation, not performance. Measuring of Short circuit current is very difficult without an effective external shorting device.</p> <p><b>Polarity of DC Wiring:</b> As for any DC circuits, the polarity of array wiring and dc equipment is a critical concern for PV Installations. The polarity of every source circuit and the entire PV power source must be verified prior to connecting to any dc utilization equipment, such as inverters, batteries or electrical loads.</p> <p><b>Insulation Resistance (Megger) Test:</b> Insulation resistance tests are used to verify and demonstrate the integrity of electrical wiring systems and equipment, as required by the NEC (110.7). These tests can be used to assess degradation or damage to wiring insulation to locate faults within PV arrays.</p> <p><b>All components, sub-assemblies and system test parameters shall be verified on site to ensure they meet the specifications.</b></p> <p><b>Plant Performance Evaluation:</b> The successful bidder shall be requiring to meet minimum guaranteed generation with Performance Ratio (PR) at the time of commissioning and related Capacity Utilization Factor (CUF) as per the DNI level for the location during the O&amp;M period. PR should be shown minimum of 75% at the time of inspection for initial commissioning. Minimum CUF of 15% should be maintained for a period of 5 years for release of performance related security deposit. For CUF less than 15%, the penalty can be imposed for the loss of energy generation @ APP of DISCOM for that year subject to force majeure</p>



	<p>conditions. The Bidder should send the periodic plant output details to the Purchaser for ensuring the CUF. The PR will be measured at Inverter output level during peak radiation conditions. The PR and CUF will be evaluated considering 100% grid availability.</p> <p><b>Plant Energy Performance Ratio Testing:</b> The overall energy performance ratio of the system shall exceed 75 % (Sum total of the system energy losses shall not exceed 25%). For global solar insolation in the Plane of Array (PoA) of 5 kWh/m<sup>2</sup> (5 Peak Sun Hours) for the day. For example: 10kW PV power plant AC energy output shall be minimum of 37.5 kWh (10 kW x 0.75 x 5 hrs.) for the day.</p>
<b>GCC 26.2</b>	<p>The Inspections and tests shall be conducted at:</p> <p>The tests and inspections which are needed to be carried out after the commissioning of the plant will be conducted at the installation site for each project.</p>
<b>GCC 27.1</b>	<p>a. The liquidated damages shall be: 0.5% of contract price per week or part thereof.</p> <p>b. The maximum number of liquidated damages shall be: 10% of the contract price.</p>
<b>GCC 28.3</b>	<p>Warranty Clause (also see Schedule of Requirements):</p> <p>i. The systems offered shall be warranted (including consumables) by the Supplier for use and services for a period of five years from the date of commissioning and solar modules shall have warranty for minimum 10 years. Free replacement warranty on spare parts against manufacturing defects for five years.</p> <p>ii. Comprehensive Maintenance Services for 5 years from the date of commissioning should be provided by the Supplier. Quarterly Report for maintenance and Servicing should be prepared and submitted to the Purchaser after providing necessary services.</p> <p>For purposes of the Warranty, the place(s) of final destination(s) shall be:</p> <ol style="list-style-type: none"> <li>1. SKN College of Agriculture, Jobner, Jaipur</li> <li>2. College of Agriculture, Lalsot, Dausa</li> </ol>
<b>GCC 28.5</b>	<p>The period for repair or replacement shall be: 10 days.</p>
<b>GCC 31.1</b>	<p>This clause will apply only to variations in GST and other taxes payable in India on the final product which is being supplied and not for variations in tax on the individual components / raw materials which go into the product.</p>

## SCHEDULE OF REQUIREMENTS

### SCOPE OF WORK

The detailed scope of work with other conditions is given here under:

**1. Work of installation of grid connected rooftop SPV power plants shall involve:**

- (i) Design, supply, storage, civil work, erection (installation), testing and commissioning of grid connected SPV rooftop power plants of total capacity of 375 kWp at different locations under the jurisdiction of SKN Agriculture University, Jobner-Jaipur.
- (ii) The details of different grid connected SPV rooftop power plants to be installed under this project are as given below:

Sr. No.	Grid Connected Rooftop SPV Power Plants (Name of Building with location)	Capacity of the Plant (kWp)
<b>Project Site A: Campus of SKN College of Agriculture, Jobner-Jaipur, Rajasthan 303328</b>		
1	Girls Hostel	55
2	New Girls Hostel	55
3	Bhabha Hostel	55
4	Pal-PG-Raman Hostel	130
<b>Project Site B: Campus of College of Agriculture, Lalsot-Dausa, Rajasthan</b>		
1	Administrative Building	80
<b>Total Capacity (kWp)</b>		<b>375</b>

- (iii) Entering into supply and comprehensive maintenance contract (CMC) agreements with the Purchaser. CMC shall be for five (5) years with free replacement warranty on spare parts against manufacturing defect.
- (iv) The Bidder shall visit all the sites of work before initiation of the work. He has to carry out detailed survey of the proposed site before starting the work and then procure the required materials as per the Bid document. The tentative detailed item wise technical specifications are mentioned in the Bid documents. However, as the work is to be carried out as a Turnkey Job, all required material to complete the project in all respect shall be Bidder's responsibility. The required civil work for installation of panels along with the mounting structures shall have to be done by the Bidder. The decision of Purchaser in accepting the material in the project will be final & bounded on the Bidder. The testing of various items as required in the Bid document while executing the work shall be arranged by the Bidder & all the expenses shall be the responsibility of the Bidder.
- (v) The bidder should visit the site & perform technical survey along with concern persons at sites and submit the survey report for each project as per the contract agreement.



- (vi) It is the responsibility of the Bidder of Obtaining No Objection Certificate from concerned DISCOM for grid connectivity.
- (vii) The Bidder shall take all required approvals for this project from concerned Authorities before starting the work & after completion of work. The required follow up for getting various approvals shall have to be done by the Bidder.
- (viii) The Bidder shall also arrange inspections of concerned Authorities after the completion of the works. He shall collect the Inspection Certificate & submit it to the Purchaser before commissioning. The fees for various approvals & expenses for inspection of all material & project will be the Bidder's responsibility. The Bidder has to attend the fault if any occurred in the plant during the CMC period of 5 years. The Bidder shall arrange required staff for maintaining the system till handing over. After completion of the total work & CMC period, the project is to be handed over to the Purchaser in working condition.
- (ix) The entire work under the contract shall be guaranteed for a period of five years (Defect liability period) from the date of commissioning & handing over the project to the Purchaser. Any defect occurred during the above period shall be rectified/repared by the Bidder at his cost immediately on notification.
- (x) It shall be presumed that, the Bidder has satisfied himself with the site conditions & the nature of the works, general and local conditions, particularly on those bearings on transport handling, storage of materials, availability of labour, weather conditions and has estimated the cost and quoted his rates accordingly. The Purchaser will bear no responsibility for lack of such acquaintance with site conditions and consequences thereof.
- (xi) The Bidder shall have to solve all ROW & disputes occurred if any & other obstructions during execution of project. The expenses required for this will be Bidder's responsibility.
- (xii) All statutory clearances/permissions/NOC from respective authorities shall be arranged by the Bidder prior to start the work. The required charges for this shall be paid by the Bidder & it will be the Bidder's responsibility.
- (xiii) The Bidder will be required to complete the work within the stipulated time as specified in the contract agreement. The bidder shall ensure that SPV power plant should be commissioned within the given time period from the date of issue of work order.
- (xiv) During the installation of plants, while erecting the mounting structures, due care has to be taken so that it should not damage the roof surface and also there should not be problem of water leakage during rainy season.
- (xv) Bidder shall provide training to the Purchaser's personnel, at the Supplier's plant and/or on-site, in assembly, start-up, operation, maintenance and/or repair of the supplied Goods.
- (xvi) Bidder should furnish tools required for assembly and/or maintenance of the supplied Goods;
- AL* (xvii) Bidder should furnish a detailed operations and maintenance manual for each appropriate unit of the supplied Goods.



## 2. Testing, Certification and Approval Schedule:

All components, sub-assemblies and system test parameters shall be verified on site to ensure they meet the specifications.

### 2.1 Plant Performance Evaluation:

The bidder shall be required to meet minimum guaranteed generation with **Performance Ratio (PR)** at the time of commissioning and related **Capacity Utilization Factor (CUF)** as per the DNI level for the location during the O&M period. PR should be shown minimum of 75% at the time of inspection for initial commissioning. Minimum CUF of 15% should be maintained for a period of 5 years for release of performance related security deposit. For CUF less than 15%, the penalty can be imposed for the loss of energy generation @ APP of DISCOM for that year subject to force majeure conditions. The Bidder should send the periodic plant output details to the Purchaser for ensuring the CUF. The PR will be measured at Inverter output level during peak radiation conditions. The PR and CUF will be evaluated considering 100% grid availability.

### 2.2 Plant Energy Performance Ratio Testing

The overall energy performance ratio of the system shall exceed 75 % (Sum total of the system energy losses shall not exceed 25%). For global solar insolation in the Plane of Array (PoA) of 5 kWh/m<sup>2</sup> (5 Peak Sun Hours) for the day. For example: 10kW PV power plant AC energy output shall be minimum of 37.5 kWh (10 kW x 0.75 x 5 hrs.) for the day.

## 3. Operation & Maintenance (O&M):

- i. Cleaning of solar PV modules with water, wet and dry mops: Monthly
- ii. DC String/Array and AC Inverter monitoring: Continuous and computerized.
- iii. AC Energy monitoring: Continuous and computerized.
- iv. Visual Inspection of the plant: Monthly
- v. Functional Checks of Protection Components and Switchgear: Quarterly
- vi. Spring Clean PV Array and Installation Area: Quarterly
- vii. Inverter, data acquisition, energy meters and power evacuation checks: Half Yearly
- viii. Support structure and terrace water-proofing checks: Yearly.
- ix. O&M log sheet shall be provided and maintained.
- x. The repair/replacement work shall be completed within 10 days from the time of reporting the fault.
- xi. A half yearly performance report of the plant inclusive of energy generation data shall be provided as per approved format.
- xii. All recorded data for the first 5 years shall be preserved in both manual and computer format and submitted at hand over.

## 4. Comprehensive Maintenance Contract (CMC)

- i. Comprehensive Maintenance Services for 5 years from the date of commissioning should be provided by the Bidder. Quarterly Report for maintenance and Servicing should be prepared and submitted to the Purchaser after providing necessary services.

- ii. The complete Solar PV Power Plant (including consumables) must be guaranteed against any manufacturing/design/installation defects for a minimum period of 5 years from the date of commissioning.
- iii. PV modules used in Solar PV Power Plant must be guaranteed for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.
- iv. During the CMC period, authorized representative of MNRE or the Purchaser will have all the rights to cross check the performance of the Solar PV Power Plant. The Purchaser may carry out the frequent inspections of the Solar PV Power Plant installed and randomly pick up its components to get them tested at Govt./MNRE approved any test center. If during such tests any part is not found as per the specified technical parameters, the Purchaser will take the necessary action. The decision of the Purchaser in this regard will be final and binding on the bidder.

**5. Warranties and Guarantees:**

- i. Solar Modules: Workmanship/product replacement for 10 years
  - ii. Solar Modules: >90% power output for 10 years & >80% power output for 25 years
  - iii. Inverter: Workmanship/product replacement for 5 years, service for 25 years
  - iv. Power Evacuation and Metering Equipment: Workmanship/product replacement for 10 years, service for 25 years
  - v. BoS: Parts and Workmanship for 10 years, service for 25 years
  - vi. Power Plant Installation: Workmanship for 10 years, service for 25 years
  - vii. PV Array Installation: Structural for 25 years
  - viii. Power plant power performance ratio: min. 75%
  - ix. Power plant energy performance ratio: min. 75%
6. The bidders are required to study carefully the conditions of the tender document, the enclosed specifications and the relevant provision of the relevant BIS/ISS/MNRE specifications wherever necessary before submitting the proposal. Technical particulars of the material offered must comply with the specifications and the relevant provisions of the BIS/ISS/MNRE as far as possible. In case tenders are called for 'ISI' marked stores; the material 'ISI' marked only shall be accepted.

## 1. WORK COMPLETION SCHEDULE

Sr. No.	Name of Building where SVP Plant to be Installed	Capacity of Plant (kWp)	Final Site as specified in BDS	Work Completion Date		
				Date of Start of the Work <i>[the number of days following the date of effectiveness the Contract]</i>	Earliest Work Completion Date <i>[the number of days following the date of effectiveness the Contract]</i>	Latest Work Completion Date <i>[the number of days following the date of effectiveness the Contract]</i>
1	Girls Hostel	55	SKN College of Agriculture, Jobner	15 Days	60 Days	70 Days
2	New Girls Hostel	55				
3	Bhabha Hostel	55				
4	Pal-PG-Raman Hostel	130	College of Agriculture, Lalsot			
5	Administrative Building	80				



## 2. TECHNICAL SPECIFICATIONS FOR GRID CONNECTED SPV SYSTEMS

**The proposed projects shall be commissioned as per the technical specifications given below. Any shortcomings will lead to cancelation of the Bid.**

### 1. DEFINITION

A Grid Tied Solar Rooftop Photo Voltaic (SPV) power plant consists of SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter and Controls & Protections, interconnect cables, junction boxes, distribution boxes and switches. PV Array is mounted on a suitable structure. Grid tied SPV system is without battery and should be designed with necessary features to supplement the grid power during daytime. Components and parts used in the SPV power plants including the PV modules, metallic structures, cables, junction box, switches, PCUs etc., should conform to the BIS or IEC or international specifications, wherever such specifications are available and applicable.

Solar PV system shall consist of following equipment's/components:

- Solar PV modules consisting of required number of Crystalline PV modules;
- Grid interactive Power Conditioning Unit with Remote Monitoring System;
- Mounting structures;
- Junction Boxes;
- Earthing and lightning protections;
- IR/UV protected PVC Cables, pipes and accessories;
- Solar Meter and Bi-directional Energy Meter.

### 1.1.SOLAR PHOTOVOLTAIC MODULES:

- 1.1.1 **The PV modules used should be made in India using only domestic manufactured Polycrystalline Solar cells as per MNRE requirement. The empaneled Vendor shall require to submit the self-declaration regarding SPV Modules and Solar Cells used are "Made in India" from the manufacturer of SPV Modules, supplied before commissioning of the System.**
- 1.1.2 As per Office Memorandum No. F. No. 283/54/2018 - Grid Solar – Part (1) dated 10th March, 2021 of MNRE only the models and manufacturers of SPV modules included in the list of Manufacturers and Models of Solar PV modules enlisted under ALMM Order are eligible for use in Government/ Government Assisted Projects/ Projects under Government Schemes & Programs. Therefore, the module manufacturer and model of module should be in the updated list as per List – 1 (Manufacturers and Models of Solar PV Modules) ALMM Order, 2019 as on 29.09.2021 i.e., Revision – 2 released via office memorandum no. F. No. 283/54/2018 – Grid Solar – Part (1) dated 29th September, 2021. The PV modules used must qualify to the latest edition of IEC PV module qualification test or equivalent BIS standards Crystalline Silicon Solar Cell Modules IEC 61215/IS14286. In addition, the modules must conform to IEC 61730 Part 1 - requirements for construction & Part 2 – requirements for testing, for safety qualification or equivalent IS.
- a) For the PV modules to be used in a highly corrosive atmosphere throughout their

lifetime, they must qualify to IEC 61701.

- b) The total solar PV array capacity should not be less than allocated capacity (kWp) and should comprise of solar crystalline modules of minimum 300 Wp and above wattage. Module capacity less than minimum 300 watts peak should not be accepted.
- c) Adequate protective devices against surges at the PV module shall be provided. Low voltage drop bypass diodes shall be provided.
- d) PV modules must be tested and approved by one of the IEC authorized test centers.
- e) The module frame shall be made of corrosion resistant materials, preferably having anodized aluminum.
- f) The bidder shall carefully design and accommodate requisite numbers of the modules to achieve the rated power in his bid.
- g) Other general requirement for the PV modules and subsystems shall be the following:
  - I. The rated output power of any supplied module shall have tolerance of +/- 5 W.
  - II. The peak-power point voltage and the peak-power point current of any supplied module and/or any module string (series connected modules) shall not vary by more than 2 (two) per cent from the respective arithmetic means for all modules and/or for all module strings, as the case may be.
  - III. The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of bypass diode. The box shall have hinged, weather proof lid with captive screws and cable gland entry points or may be of sealed type and IP-65 rated.
  - IV. I-V curves at STC should be provided by the Bidder.
- h) Plants installed must have the solar modules tested with relevant dust standards (Applicable standard would be IEC 60068-2-68).

1.1.3 Modules deployed must use a RF identification tag. The following information must be mentioned in the RFID used on each module (This should be inside the laminate only and must be able to withstand harsh environmental conditions).

- a) Name of the manufacturer of the PV module;
- b) Name of the manufacturer of Solar Cells;
- c) Month & year of the manufacture (separate for solar cells and modules);
- d) Country of origin (separately for solar cells and module);
- e) I-V curve for the module Wattage,  $I_m$ ,  $V_m$  and FF for the module;
- f) Unique Serial No and Model No of the module;
- g) Date and year of obtaining IEC PV module qualification certificate;
- h) Name of the test lab issuing IEC certificate;
- i) Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO 14001.

#### 1.1.4 Warranties:

##### a) Material Warranty:

- i. Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period



not less than five (05) years from the date of sale to the original customer ("Customer").

- ii. Defects and/or failures due to manufacturing.
- iii. Defects and/or failures due to quality of materials.
- iv. Non-conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at the Owners sole option.

**b) Performance Warranty:**

- i. The predicted electrical degradation of power generated not exceeding 20% of the minimum rated power over the 25-year period and not more than 10% after ten years period of the full rated original output.

**2. ARRAY STRUCTURE**

- a) Hot dip galvanized MS mounting structures may be used for mounting the modules/ panels/arrays. Each structure should have angle of inclination as per the site conditions to take maximum insolation. However, to accommodate more capacity the angle inclination may be reduced until the plant meets the specified performance ratio requirements.
- b) The Mounting structure shall be so designed to withstand the speed for the wind zone of the location where a PV system is proposed to be installed in Rajasthan. It may be ensured that the design has been certified by a recognized Lab/ Institution in this regard and submit wind loading calculation sheet to the purchaser. Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed.
- c) The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be complying of latest IS4759.
- d) Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts. Aluminium structures also can be used which can withstand the wind speed of respective wind zone. Necessary protection towards rusting need to be provided either by coating or anodization.
- e) The fasteners used should be made up of stainless steel. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels.
- f) Regarding civil structures the bidder need to take care of the load bearing capacity of the roof and need arrange suitable structures based on the quality of roof.
- g) The total load of the structure (when installed with PV modules) on the terrace should be less than **60 kg/m<sup>2</sup>**.
- h) The minimum clearance of the structure from the roof level should be **300 mm**.

**3. JUNCTION BOXES (JBs)**

- a) The junction boxes are to be provided in the PV array for termination of connecting cables. The Junction Boxes (JBs) shall be made of GRP/FRP/Powder Coated Aluminium /cast aluminium alloy with full dust, water & vermin proof arrangement.



All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands.

- b) Copper bus bars/terminal blocks housed in the junction box with suitable termination threads conforming to IP 65 standard and IEC 62208 Hinged door with EPDM rubber gasket to prevent water entry. Single/double compression cable glands. Provision of earthing. It should be placed at 5 feet height or above for ease of accessibility.
- c) Each Junction Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs)/SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups.
- d) Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification.
- e) All fuses shall have DIN rail mountable fuse holders and shall be housed in thermoplastic IP 65 enclosures with transparent covers.

#### **4. DC DISTRIBUTION BOARD:**

- a) DC Distribution panel to receive the DC output from the array field.
- b) DC DPBs shall have sheet from enclosure of dust & vermin proof conform to IP 65 protection. The bus bars are made of copper of desired size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors.

#### **5. AC DISTRIBUTION PANEL BOARD:**

- a) AC Distribution Panel Board (DPB) shall control the AC power from PCU/inverter and should have necessary surge arrestors. Inter connection from ACDB to mains at LT Bus bar while in grid tied mode.
- b) All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS 60947 part I, II and III.
- c) The changeover switches, cabling work should be undertaken by the bidder as part of the project.
- d) All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air-insulated, cubical type suitable for operation on three phase/single phase, 415 or 230 volts, 50 Hz.
- e) The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.
- f) All indoor panels will have protection of IP 54 or better. All outdoor panels will have protection of IP 65 or better.
- g) Should conform to Indian Electricity Act and Rules (till last amendment).
- h) All the 415 AC or 230 volts devices/equipment like bus support insulators, circuit breakers, SPDs, VTs etc., mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions.

Variation in supply voltage = +/- 10 %

Variation in supply frequency = +/- 5 Hz

## 6. PCU/ARRAY SIZE RATIO:

- a) The combined wattage of all inverters should not be less than rated capacity of power plant under STC.
- b) Maximum power point tracker shall be integrated in the PCU/inverter to maximize energy drawn from the array.

## 7. PCU/ Inverter:

As SPV array produce direct current electricity, it is necessary to convert this direct current into alternating current and adjust the voltage levels to match the grid voltage. Conversion shall be achieved using an electronic Inverter and the associated control and protection devices. All these components of the system are termed the "Power Conditioning Unit (PCU)". In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array & the Inverter, to the power conditioning unit/inverter should also be DG set interactive. If necessary, the inverter output should be compatible with the grid frequency. Typical technical features of the inverter shall be as follows:

- Switching devices: IGBT/MOSFET
  - Control: Microprocessor/DSP
  - Nominal AC output voltage and frequency: 415V, 3 Phase, 50 Hz (In case single phase inverters are offered, suitable arrangement for balancing the phases must be made.)
  - Output frequency: 50 Hz
  - Grid Frequency Synchronization range: +/-5 Hz
  - Ambient temperature considered: -20°C to 50°C
  - Humidity: 95 % Non-condensing
  - Protection of Enclosure: IP-20 (Minimum) for indoor. IP-65 (Minimum) for outdoor.
  - Grid Frequency Tolerance range: +/-5 Hz
  - Grid Voltage tolerance: - 20 % & +15 %
  - No-load losses: Less than 1% of rated power
  - Inverter efficiency (Min.): > 93% (In case of 10 kW or above with in-built galvanic isolation) > 98% (In case of 10 kW or above without inbuilt galvanic isolation).
  - THD: < 3%
  - PF: > 0.9
- a) Three phase PCU/ inverter shall be used with each power plant system (10 kW and/or above).
  - b) PCU/inverter shall be capable of complete automatic operation including wake-up, synchronization & shutdown.
  - c) The output of power factor of PCU inverter is suitable for all voltage ranges or sink of reactive power, inverter should have internal protection arrangement against any sustainable fault in feeder line and against the lightning on feeder.
  - d) Built-in meter and data logger to monitor plant performance through external computer shall be provided.
  - e) Anti-islanding (Protection against Islanding of grid): The PCU shall have anti islanding



protection in conformity to IEEE 1547/UL 1741/ IEC 62116 or equivalent BIS standard.

- f) The Bidder shall be responsible for limiting dc injection into the grid and load as per the CEA/state regulations.
- g) The PCU/ inverter generated harmonics, flicker, DC injection limits, Voltage Range, Frequency Range and Anti-Islanding measures at the point of connection to the utility services should follow the latest CEA (Technical Standards for Connectivity Distribution/Generation Resources) Guidelines.
- h) The power conditioning units/inverters should comply with applicable IEC/equivalent BIS standard for efficiency measurements and environmental tests as per standard codes IEC 61683/IS 61683 and IEC 60068-2 (1,2,14,30)/Equivalent BIS Std.
- i) The charge controller (if any)/MPPT units environmental testing should qualify IEC 60068-2 (1, 2, 14, 30)/Equivalent BIS std. The junction boxes/enclosures should be IP 65 (for outdoor)/ IP 54 (indoor) and as per IEC 529 specifications.
- j) The PCU/inverters should be tested from the MNRE approved test centers/NABL/BIS/IEC accredited testing- calibration laboratories. In case of imported power conditioning units, these should be approved by international test houses.

#### **8. INTEGRATION OF PV POWER WITH GRID:**

The output power from SPV would be fed to the inverters which converts DC produced by SPV array to AC and feeds it into the main electricity grid after synchronization. In case of grid failure or low or high voltage, solar PV system shall be out of synchronization and shall be disconnected from the grid. Once the DG set comes into service PV system shall again be synchronized with DG supply and load requirement would be met to the extent of availability of power. 4 pole isolation of inverter output with respect to the grid/ DG power connection need to be provided.

#### **9. DATA ACQUISITION SYSTEM/PLANT MONITORING**

- i. Data Acquisition System shall be provided for each of the solar PV plant.
- ii. Data Logging Provision for plant control and monitoring, time and date stamped system data logs for analysis with the high quality, suitable PC. Metering and Instrumentation for display of systems parameters and status indication to be provided.
- iii. Solar Irradiance: An integrating Pyranometer/Solar cell-based irradiation sensor (along with calibration certificate) provided, with the sensor mounted in the plane of the array. Readout integrated with data logging system for all plants.
- iv. Temperature: Temperature probes for recording the Solar panel temperature and/or ambient temperature to be provided complete with read out integrated with the data logging system.
- v. The following parameters are accessible via the operating interface display in real time separately for solar power plant:
  - a. AC Voltage
  - b. AC Output current
  - c. Output Power
  - d. Power factor



- e. DC Input Voltage
  - f. DC Input Current
  - g. Time Active
  - h. Time disabled
  - i. Time Idle
  - j. Power produced
  - k. Performance ratio
  - l. Specific yield
  - m. Historical data
  - n. Inverter data
  - o. Sensor data
  - p. Protective function limits (Viz-AC Over voltage, AC Under voltage, over frequency, under frequency ground fault, PV starting voltage, PV stopping voltage).
- vi. All major parameters available on the digital bus and logging facility for energy auditing through the internal microprocessor and read on the digital front panel at any time) and logging facility (the current values, previous values for up to a month and the average values) should be made available for energy auditing through the internal microprocessor and should be read on the digital front panel.
  - vii. Solar Meter: Digital Energy Meters to log the actual value of Energy generated by the PV system be provided. Energy meter if required with CT/PT should be of 0.5 accuracy class/as per DISCOM guidelines.
  - viii. Computerized DC Array monitoring and AC output monitoring shall be provided as part of the inverter and/or string/array combiner box or separately.
  - ix. Array DC Voltage, Current and Power, Inverter AC Output Voltage and Current (all three phases and lines), AC Power (Active, Reactive and Apparent), Power Factor and AC Energy (All three Phases and Cumulative) and Frequency shall be monitored.
  - x. Computerized AC energy monitoring shall be in addition to the digital AC Energy Meter.
  - xi. The data shall be recorded in a common work sheet chronologically date wise. The data file shall be MS Excel compatible. The data shall be represented in both tabular and graphical form.
  - xii. All instantaneous data shall be shown on the computer screen.
  - xiii. Software shall be provided for USB download and analysis of DC and AC parametric data for individual plant.
  - xiv. Provision for instantaneous Internet monitoring and download of data shall be also incorporated.
  - xv. Remote Server and Software for centralized Internet monitoring system shall be also provided for download and analysis of cumulative data of all the plants. The data of the solar radiation and temperature monitoring system should also be available on Remote Monitoring server.
  - xvi. Ambient/Solar PV module back surface temperature shall be also monitored on

continuous basis.

- xvii. Simultaneous monitoring of DC and AC electrical voltage, current, power, energy and other data of the plant for correlation with solar and environment data shall be provided.
- xviii. Remote Monitoring and data acquisition through Remote Monitoring System software at the owner/the Purchaser's location with latest software/hardware configuration and service connectivity for online/real time data monitoring/control complete to be supplied and operation and maintenance/control to be ensured by the Supplier. Provision for interfacing these data on the Purchaser's server and portal in future shall be kept.

#### **10. TRANSFORMER "IF REQUIRED" & METERING:**

- a) Dry/oil type relevant kVA, 11kV/415V, 50 Hz Step up along with all protections, switchgears, Vacuum circuit breakers, cables etc. along with required civil work. **(If the transformer is required, the cost of the same will be borne by beneficiary and will not be the part of project cost).**
- b) The bi-directional electronic energy meter (0.5 S class) shall be installed for the measurement of import/Export of energy.
- c) The bidder must take approval/NOC from the Concerned DISCOM for the connectivity, technical feasibility, and synchronization of SPV plant with distribution network and submit the same to the Purchaser before commissioning of SPV plant.
- d) Reverse power relay shall be provided by bidder (if necessary), as per the local DISCOM requirement.

#### **11. POWER CONSUMPTION:**

- a) Regarding the generated power consumption, priority need to give for internal consumption first and thereafter any excess power can be exported to grid.

#### **12. PROTECTIONS**

The system should be provided with all necessary protections like earthing, Lightning, and grid islanding as follows:

##### **12.1. LIGHTNING PROTECTION**

The SPV power plants shall be provided with lightning & over voltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. the entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors. Lightning protection should be provided as per NFC17-102:2011 standard. The protection against induced high-voltages shall be provided by the use of metal oxide varistors (MOVs) and suitable earthing such that induced transients find an alternate route to earth.

##### **12.2. SURGE PROTECTION**

Internal surge protection shall consist of three SPD type-II surge-arrestors connected from +ve and -ve terminals to earth (via Y arrangement).

##### **12.3. EARTHING PROTECTION**

- i. Each array structure of the PV yard should be grounded/earthed properly as per

IS:3043-1987. In addition, the lighting arrester/masts should also be earthed inside the array field. Earth Resistance shall be tested in presence of the representative of the Purchaser as and when required after earthing by calibrated earth tester. PCU, ACDB and DCDB should also be earthed properly.

- ii. Earth resistance shall not be more than 5 ohms. It shall be ensured that all the earthing points are bonded together to make them at the same potential.

#### 12.4. GRID ISLANDING:

- i. In the event of a power failure on the electric grid, it is required that any independent power-producing inverters attached to the grid turn off in a short period of time. This prevents the DC-to-AC inverters from continuing to feed power into small sections of the grid, known as "islands." Powered islands present a risk to workers who may expect the area to be unpowered, and they may also damage grid-tied equipment. The Rooftop PV system shall be equipped with islanding protection. In addition to disconnection from the grid (due to islanding protection) disconnection due to under and over voltage conditions shall also be provided.
- ii. A manual disconnect 4-pole isolation switch beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility personnel to carry out any maintenance. This switch shall be locked by the utility personnel.

#### 13. CABLES

Cables of appropriate size to be used in the system shall have the following characteristics:

- i. Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards
- ii. Temp. Range:  $-10^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$ .
- iii. Voltage rating 660/1000V
- iv. Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- v. Flexible
- vi. Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop (power loss) of the entire solar system to the minimum (2 %).
- vii. For the DC cabling, XLPE or, XLPO insulated and sheathed, UV-stabilized single core multi-stranded flexible copper cables shall be used; multi-core cables shall not be used.
- viii. For the AC cabling, PVC or, XLPE insulated and PVC sheathed single or, multi-core multi-stranded flexible copper cables shall be used; Outdoor AC cables shall have a UV-stabilized outer sheath.
- ix. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use. Outer sheath of cables shall be electron beam cross-linked XLPO type and black in colour.
- x. The DC cables from the SPV module array shall run through a UV-stabilized PVC conduit pipe of adequate diameter with a minimum wall thickness of 1.5mm.
- xi. Cables and wires used for the interconnection of solar PV modules shall be provided



with solar PV connectors (MC4) and couplers.

- xii. All cables and conduit pipes shall be clamped to the rooftop, walls and ceilings with thermo-plastic clamps at intervals not exceeding 50 cm; the minimum DC cable size shall be 4.0 mm<sup>2</sup> copper; the minimum AC cable size shall be 4.0 mm<sup>2</sup> copper. In three phase systems, the size of the neutral wire size shall be equal or half to the size of the phase wires.
- xiii. Cable Routing/ Marking: All cable/wires are to be routed in a GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable easily identified. In addition, cable drum no./Batch no. to be embossed/printed at every one meter.
- xiv. Cable Jacket should also be electron beam cross-linked XLPO, flame retardant, UV resistant and black in colour.
- xv. All cables and connectors for use for installation of solar field must be of solar grade which can withstand harsh environment conditions including High temperatures, UV radiation, rain, humidity, dirt, salt, burial and attack by moss and microbes for 25 years and voltages as per latest IEC standards. DC cables used from solar modules to array junction box shall be solar grade copper (Cu) with XLPO insulation and rated for 1.1 kV as per relevant standards only.
- xvi. The ratings given are approximate. Bidder to indicate size and length as per system design requirement. All the cables required for the plant shall be provided by the bidder. Any change in cabling sizes if desired by the bidder shall be approved after citing appropriate reasons. All cable schedules/layout drawings shall be approved prior to installation.
- xvii. Multi Strand, annealed high conductivity copper conductor PVC type A pressure extruded insulation or XLPE insulation. Overall PVC/XLPE insulation for UV protection Armoured cable for underground laying. All cable trays including covers to be provided. All cables conform to latest edition of IEC/ equivalent BIS Standards as specified below: BoS item / component Standard Description Standard Number Cables General Test and Measuring Methods, PVC/XLPE insulated cables for working Voltage up to and including 1100 V, UV resistant for outdoor installation IS/IEC 69947.
- xviii. The total voltage drop on the cable segments from the solar PV modules to the solar grid inverter shall not exceed 2.0%.
- xix. The total voltage drop on the cable segments from the solar grid inverter to the building distribution board shall not exceed 2.0%.

#### 14. CONNECTIVITY

The maximum capacity for interconnection with the grid at a specific voltage level shall be as specified in the distribution code/supply code of the state regulation for Grid connectivity and norms of DISCOM and amended from time to time.

- i. The maximum permissible capacity for rooftop shall be 1 MW for a single net metering point.
- ii. Utilities may have voltage levels other than above, DISCOMS may be consulted before finalization of the voltage level and specification be made accordingly.

- iii. For large PV system (Above 100 kW) for commercial installation having large load, the solar power can be generated at low voltage levels and stepped up to 11 kV level through the step-up transformer. If the transformer is required, the cost of the same will be borne by beneficiary separately and will not be the part of project cost.

#### **15. TOOLS & TACKLES AND SPARES:**

- i. After completion of installation & commissioning of the power plant, necessary tools & tackles are to be provided free of cost by the bidder for maintenance purpose. List of tools and tackles to be supplied by the bidder for approval of specifications and make from RREC.
- ii. list of requisite spares in case of PCU/inverter comprising of a set of control logic cards, IGBT driver cards etc. Junction Boxes. Fuses, MOVs /arrestors, MCCBs etc. along with spare set of PV modules be indicated, which shall be supplied along with the equipment or can be maintained at Supplier's end. A minimum set of spares shall be maintained in the plant itself or can be maintained at Bidder's end for the entire period of warranty and Operation & Maintenance which upon its use shall be replenished

#### **16. DANGER BOARDS AND SIGNAGES:**

Danger boards should be provided as and where necessary as per IE Act/IE rules as amended up to date. Three signage shall be provided one each at battery cum control room, solar array area and main entry from administrative block. Text of the signage maybe finalized in consultation with the Purchaser.

#### **17. FIRE EXTINGUISHERS:**

The firefighting system for the proposed power plant for fire protection shall be consisting of:

- a) Portable fire extinguishers in the control room for fire caused by electrical short circuits;
- b) Sand buckets in the control room;
- c) The installation of Fire Extinguishers should confirm to TAC regulations and BIS standards. The fire extinguishers shall be provided in the control room housing PCUs as well as on the Roof or site where the PV arrays have been installed.

#### **18. DRAWINGS & MANUALS:**

- i. Two sets of Engineering, electrical drawings and Installation and O&M manuals are to be supplied to beneficiaries. Bidders shall provide complete technical datasheets for each equipment giving details of the specifications along with make/makes in their bid along with basic design of the power plant and power evacuation, synchronization along with protection equipment.
- ii. Approved ISI and reputed makes for equipment be used.

#### **19. PLANNING AND DESIGNING:**

- i. The bidder should carry out Shadow Analysis at the site and accordingly design strings & arrays layout considering optimal usage of space, material and labor. The bidder should submit the array layout drawings along with Shadow Analysis Report to the Purchaser for approval.
- ii. The Purchaser reserves the right to modify the landscaping design, Layout and

specification of sub-systems and components at any stage as per local site conditions/requirements.

- iii. The bidder shall submit preliminary drawing for approval & based on any modification or recommendation, if any. The bidder submits three sets and soft copy of final drawing for formal approval to proceed with construction work.

## **20. SOLAR PV SYSTEM ON THE ROOFTOP FOR MEETING THE ANNUAL ENERGY REQUIREMENT**

The Solar PV system on the rooftop of the selected buildings will be installed for PV capacity permissible by DISCOM as per regulation issued by RERC.

## **21. SAFETY MEASURES:**

The bidder shall take entire responsibility for electrical safety of the installation(s) including connectivity with the grid and follow all the safety rules & regulations applicable as per Electricity Act, 2003 and CEA guidelines etc.

**Note:** The Technical Standards for Grid Connected SPV Rooftop Plants are revised/updated time to time by Ministry of New and Renewable Energy, New Delhi, the same will also be applicable on issuance of revised/updated standards by MNRE.



### 3. QUALITY CERTIFICATION, STANDARDS AND TESTING FOR GRID CONNECTED ROOFTOP SOLAR PV SYSTEMS/ POWER PLANTS

Quality certification and standards for Grid-Connected Rooftop Solar PV Systems are essential for the successful mass-scale implementation of this technology. It is also imperative to put in place an efficient and rigorous monitoring mechanism, adherence to these standards. Hence, all components of Grid-Connected Rooftop Solar PV System/ Plant must conform to the relevant standards and certifications given below:

<b>Solar PV Modules/ Panels</b>	
IEC 61215/ IS 14286	Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
IEC 61701	Salt Mist Corrosion Testing of Photovoltaic (PV) Modules
IEC 61853-Part 1/ IS16170: Part 1	Photovoltaic (PV) module performance testing and energy rating: Irradiance and temperature performance measurements and power rating
IEC 62716	Photovoltaic (PV) Modules – Ammonia (NH <sub>3</sub> ) Corrosion Testing (As per the site condition like dairies, toilets)
IEC 61730-1,2	Photovoltaic (PV) Module Safety Qualification – Part 1: Requirements for Construction, Part 2: Requirements for Testing
<b>Solar PV Inverters</b>	
IEC 62109-1, IEC 62109-2	Safety of power converters for use in photovoltaic power systems –  Part 1: General requirements, and Safety of power converters for use in photovoltaic power systems  Part 2: Particular requirements for inverters. Safety compliance (Protection degree IP 65 for outdoor mounting, IP 54 for indoor mounting)
IEC/IS 61683 (as applicable)	Photovoltaic Systems – Power conditioners: Procedure for Measuring Efficiency (10%, 25%, 50%, 75% & 90-100% Loading Conditions)
IEC 62116/ UL 1741/IEEE 1547 (as applicable)	Utility-interconnected Photovoltaic Inverters - Test Procedure of Islanding Prevention Measures
IEC 60255-27	Measuring relays and protection equipment – Part 27: Product safety requirements
IEC 60068-2 / IEC 62093 (as applicable)	Environmental Testing of PV System – Power Conditioners and Inverters
<b>Fuses</b>	
IS/IEC 60947 (Part 1, & 3), EN 50521	General safety requirements for connectors, switches, circuit breakers (AC/DC): a) Low-voltage Switchgear and Control-gear, Part 1: General rules b) Low-Voltage Switchgear and Control-gear, Part 2: Circuit Breakers c) Low-voltage switchgear and Control-gear, Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units d) EN 50521: Connectors for photovoltaic systems – Safety requirements and tests

IEC 60269-6	Low-voltage fuses - Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energysystems
<b>Surge Arrestors</b>	
BFC 17-102:2011	Lightening Protection Standard
IEC 60364-5-53/ IS15086-5 (SPD)	Electrical installations of buildings - Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control
IEC 61643-11:2011	Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods
<b>Cables</b>	
IEC 60227/IS 694, IEC 60502/IS 1554 (Part 1 & 2)/IEC69947 (as applicable)	General test and measuring method for PVC (Polyvinyl chloride) insulated cables (for working voltages up to and including 1100 V, and UV resistant for outdoor installation)
BS EN 50618	Electric cables for photovoltaic systems (BT(DE/NOT)258), mainly for DC Cables
<b>Earthing/ Lightning</b>	
IEC 62561 Series (Chemical earthing) (as applicable)	IEC 62561-1 Lightning protection system components (LPSC) - Part 1: Requirements for connection components IEC 62561-2 Lightning protection system components (LPSC) - Part 2: Requirements for conductors and earth electrodes IEC 62561-7 Lightning protection system components (LPSC) - Part 7: Requirements for earthing enhancing compounds
<b>Junction Boxes</b>	
IEC 60529	Junction boxes and solar panel terminal boxes shall be of the thermoplastic type with IP 65 protection for outdoor use, and IP54 protection for indoor use
<b>Energy Meter</b>	
IS 16444 or as specified by the DISCOMs	A.C. Static direct connected watt-hour Smart Meter Class 1 and 2 Specification (with Import & Export/Net energy measurements)
<b>Solar PV Roof Mounting Structure</b>	
IS 2062/IS 4759	Material for the structure mounting

Note- Equivalent standards may be used for different system components of the plants.

#### 4. DRAWINGS/DOCUMENTS

The Bidder shall furnish the following drawings/documents for each power plant after award of contract:

- i. O&M Manual/User Manual for different components of the SPV plant;
- ii. General arrangement and dimensional layout;
- iii. Schematic drawing showing the requirements of SPV panel, power conditioning units/inverter, junction boxes, Ac and DC distribution boards, meters etc.;
- iv. Structural drawing along with foundation details for the structure;
- v. Itemized bill of material for complete SV plant covering all the components and associate accessories;
- vi. Layout of solar power array;
- AR* vii. Shadow analysis of the roof.