EPC Contract

Execution of PPA with BESCOM, Design, Supply, Installation, Commissioning of 140 kWp Rooftop Solar PV Power Plant and Undertake Comprehensive Maintenance for Five years

VOLUME II
EPC Contract

July 2020

Karnataka State Remote Sensing Applications Centre
DPAR (e-Governance), Government of Karnataka
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EPC Contract

This EPC Contract ("Contract") is made at Bengaluru, the ----------day of ----------in the year Two Thousand Twenty

-------- between ----------(herein after referred to as "The Contractor" which expression shall unless excluded by or repugnant to the contract include its successors or permitted assigns) of the one part and KSRSAC having their Registered Office at Karnataka State Remote Sensing Applications Centre (KSRSAC), Department of Information Technology, Biotechnology and Science & Technology, Government of Karnataka, Doora Samvedi Bhavana, Major Sandeep Unnikrishnan Road, Doddabettahalli, Bengaluru- 560097 only. (hereinafter called "EMPLOYER" which expression shall unless excluded by or repugnant to the context include its successors or assigns) of the other part.

WHEREAS the aforesaid Employer has accepted the tender of the aforesaid Contractor for ----------

---------- as per Employer LOA No.----------

----------hereinafter called "**the Works**" and more particularly described enumerated or referred to in the specification, terms and conditions prescribed in the LOA which for the purpose of identification have been signed by ---------- on behalf of the Contractor and by ----------on behalf of Employer a list whereof is made out in the Schedule hereunder written and all of which said documents are deemed to form part of this contract and included in the expression " **the Works"** wherever herein used, upon the terms and subject to the conditions hereinafter mentioned.

AND WHEREAS Employer has accepted the tender of the Contractor for the said works for the sum of Rs. ---------- (Rupees: ----------) upon the terms and subject to the conditions herein mentioned. {*If required multiple split orders shall be issued to Contractor for addressing the taxation issues. The cumulative value of the split orders shall not exceed the quoted price of the bidder. All the split order shall be regulated by this agreement/contract. Note: However, KSRSAC decision shall be final in regard to issuance of multiple split orders.*}

NOW THIS AGREEMENT WITNESSES AND IT IS HEREBY AGREED AND DECLARED THAT: –

(a) The Contractor shall do and perform all works and things in this Contract mentioned and described or which are implied therein or therefrom respectively or are reasonably necessary for the completion of the works as mentioned and at the times, in the manner and subject to the terms, conditions and stipulations contained in this Contract, and in consideration of the due provision, executions, construction and completion of the works agreed to by the Contractor as aforesaid, the Employer do hereby covenant with the Contractor to pay all the sums of money as and when they become due and payable to the Contractor under the provisions of the contract. Such payments to be made at such times and in such manner as is provided by the contract

(b) The conditions and covenants stipulated herein before in this contract are subject to and without prejudice to the rights of the Employer to enforce penalty for delays and / or any other rights

whatsoever including the right to reject and cancel on default or breach by the Contractor of the conditions and the covenants as stipulated in the general conditions, specifications, forms, or tender schedule, drawing, etc., attached with Employer LOA No.----------.

The Contract Value, extent of supply delivery dates, specifications, and other relevant matters may be altered by mutual agreement and if so altered shall not be deemed or construed to mean or apply to affect or alter other terms and conditions of the Contract and the general conditions and the Contract so altered or revised shall be and shall always be deemed to have been subject to and without prejudice to said stipulation.

SCHEDULE

List of documents forming part of the Contract:

1. General Conditions of Contract (GCC)
2. Special Conditions of Contract (SCC)
3. Schedule 1: Format for Performance Bank Guarantee
4. Schedule 2: Format for Advance Bank Guarantee
5. Schedule 3: Indemnity Bond
6. Schedule 4: List of Banks
7. Schedule 5: Technical Specifications
8. Schedule 6: Typical Interfacing Single Line Diagram

In witness whereof the parties hereto have set their hands and seals this day and month year first above written.

Signed, Sealed and delivered by:

(Signature with Name, Designation & official seal)

Signed, Sealed and delivered by:

(Signature with Name, Designation & official seal)

Witnesses:

1.

2.

General Conditions of Contract (GCC)

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A. CONTRACT AND INTERPRETATION

1. DEFINITIONS AND ABBREVIATIONS

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

"**Acceptance**" means acceptance of Facilities by the KSRSAC after third party certification and Commissioning of the Project and demonstration of functioning of the Project.

"**Affected Party**" means KSRSAC or the Contractor whose performance has been affected by an event of Force Majeure.

"**Applicable Law**" means any statute, law, regulation, ordinance, notification, rule, judgment, order, decree, bye-law, approval, directive, guideline, policy, requirement or other governmental restriction or any similar form of decision of, or determination by, or any interpretation or administration having the force of law in the Republic of India and the State Government, by any Government Authority or instrumentality thereof, whether in effect as of the date of this Contract or thereafter.

"**Bid**" shall mean the proposal submitted by the Contractor along with all documents/credentials/attachments annexure etc., in response to the RFQ document, in accordance with the terms and conditions hereof.

"CMC" means comprehensive maintenance contract of the facilities which includes operations, periodic maintenance, and replacement of the defective equipment and parts during the Contract period. This also shall include administration, maintenance and security of the Plant and facilities.

"**Commissioning**" means the Project shall be considered commissioned if all equipment as per rated capacity has been installed and energy has transmitted into grid.

"**Completion**" means that the Facilities (or a specific part thereof where specific parts are specified in the SCC) have been completed operationally and structurally, and that all work in respect of Pre-Commissioning of the Facilities or such specific part thereof has been completed; and Commissioning has been attained as per Technical Specifications.

"Completion Schedule" means the Commissioning of Project within six months from the date of signing of this Contract and subsequent CMC for 5 (five) years including one year of successful demonstration of the Project.

"**Contract**" means the Contract Agreement entered into between KSRSAC and the Contractor, together with the Contract Documents referred to therein; they shall constitute the Contract, and the term "the Contract" shall in all such documents be construed accordingly.

"**Contract Documents**" means the documents listed in the Form of Contract.
"Contract Period" shall commence from the date of signing of the Contract, which shall include Project execution period and five years CMC period after the Commercial Operation Date of the Plant.

"Contract Value" means the firm sum specified in the Contract, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract i.e. the base value including taxes and duties.

"**Contractor**" means the company whose Bid to perform the Contract has been accepted by KSRSAC and is named as such in the Contract Agreement, and includes the legal successors or permitted assigns of the Contractor.

"Contractor's Equipment" means all plant, facilities, equipment, machinery, tools, apparatus, appliances or things of every kind required in or for installation, Completion and maintenance of Facilities that are to be provided by the Contractor, but does not include Plant and Equipment, or other things intended to form or forming part of the Facilities.

"Contractor's Representative & Construction Manager" means the representative named in the Contract/appointed by the Contractor as per the provision of Clause 17.2.

"**Day**" means calendar day of the Gregorian calendar.

"Defect Liability Period" means the period of validity of the warranties including CMC of the Facilities for 5 years from Commissioning date, during which the Contractor is responsible for defects with respect to the Facilities (or the relevant part thereof).

"**Employer**" means Karnataka State Remote Sensing Applications Centre (KSRSAC), Bengaluru and includes the legal successors or permitted assigns of the KSRSAC.

"**Engineer-in-Charge**" means a graduate electrical engineer to work and over view the implementation of the Project along with Third Party Inspector (graduate electrical engineer) appointed by the Employer to perform the duties delegated by the Employer as per the provision of Clause 17.1.

"Facilities" means the Plant and Equipment to be supplied, installed and commissioned, as well as all the Installation Services including all infrastructures as mentioned in scope of works mentioned at GCC Clause 7 to be carried out by the Contractor under the Contract.

"Functional Guarantee" means during the Guarantee Test, the Facilities and all parts thereof shall attain the guarantees specified under the Technical Specifications.

"**GCC**" means the General Conditions of Contract hereof.

"Guarantee Test(s)" means the test(s) specified in the Technical Specifications to be carried out to ascertain whether the Facilities or a specified part thereof is able to attain the Functional Guarantees specified in the Technical Specifications.

"KSRSAC" shall mean Karnataka State Remote Sensing Applications Centre.

"IEC" means International Electro-Technical Commission.

"Installation Services" means all those services ancillary to the supply of the Plant and Equipment for the Facilities, to be provided by the Contractor under the Contract; e.g., transportation and

provision of marine or other similar insurance, inspection, Site preparation works (including the provision and use of Contractor's Equipment and the supply of all use structural and construction materials required), installation including civil and allied works etc., testing, Pre-Commissioning, Commissioning, operations, maintenance, the provision of operations and maintenance manuals, training of Employer's Personnel etc.

"LoA" means Letter of Award issued to the Selected Bidder in accordance with the provision of RFP document.

"**Month**" means calendar month of the Gregorian calendar.

"Operational Acceptance" means the acceptance by the Employer of the Facilities (or any part of the Facilities where the Contract provides for acceptance of the Facilities in parts), which certifies the Contractor's fulfilment of the Contract in respect of Functional and Plant Performance Guarantees of the Facilities.

"Performance Demonstration Period" means the period during which the Contractor is required to demonstrate the performance of the plant as per the requirements specified in Schedule 5 – Technical Specifications of this Contract.

"Plant and Equipment" means permanent plant, equipment, machinery, apparatus, articles and things of all kinds to be provided and incorporated in to the Facilities by the Contractor under the Contract (including the spare parts), but does not include Contractor's Equipment.

"Plant Performance Guarantee Test" means the Tests conducted by the Contractor after Commissioning of the Facilities.

"**PR**" means Performance Ratio.

"Pre-Commissioning" means the testing, checking and other requirements specified in the Technical Specifications that are to be carried out before Commissioning by the Contractor in co-ordination with Engineer-in-Charge and Third Party Inspector.

"SCC" means the Special Conditions of Contract.

"Site" means the land and other places upon which the Facilities are to be installed, and such other land or places as may be specified in the Contract as forming part of the Site.

"Solar Power Plant" or "Solar PV Plant" means Gird Connected 140 KWp Solar Rooftop Photovoltaic Power Plant engineered, procured, supplied and commissioned by the Contractor in accordance with the provisions of this Agreement and Schedule 5 – Technical Specifications of this Contract.

"**Sub-contractor,**" including vendors, means any person to whom execution of any part of the Facilities, including preparation of any design or supply of any Plant and Equipment, is sub- contracted directly or indirectly by the Contractor, and includes its legal successors or permitted assigns.

"Third Party Inspector/Independent Consultant" means the third party appointed by the Employer for monitoring and supervision of the Project.

"Time for Completion" means the time within which Completion of the Facilities as a whole (or of a part of the Facilities where a separate Time for Completion of such part has been prescribed) is to be attained in accordance with the stipulations in the SCC and the relevant provisions of the Contract.

2. USE OF CONTRACT DOCUMENTS & INFORMATION

2.1 All documents forming part of the Contract (and all parts thereof) are intended to be correlative, complementary and mutually explanatory. The Contract shall be read as a whole.

2.2 The Contract will be signed in three originals and the Contractor shall be provided with one signed original and the rest will be retained by the Employer.

2.3 The Contractor shall provide/ submit, free of cost to the Employer all the engineering data, drawings and descriptive materials with the Bid, in at least three (3) copies to form a part of the Contract immediately after issuance of LoA by Employer.

2.4 The Contractor shall not, without the Employer's prior written consent, disclose the Contract or any provision thereof or any specification, plan, drawing, pattern therewith to any person other than person employed by the Contractor in performance of the Contract. Disclosure to any such employed person shall be made in confidence and shall extend strictly for purpose of performance of the Contract only.

2.5 The Contractor shall not, without Employer's prior written consent, make use of any document or information except for purpose of performing the Contract.

2.6 Any document other than the Contract itself shall remain the property of the Owner/Employer.

3. INTERPRETATION

3.1 Language

All correspondence and documents related to the EPC Contract exchanged between the Contractor and the Employer shall be written in English language, provided that any printed literature furnished by the Contractor may be written in another language, as long as such literature is accompanied by a translation of its pertinent passages in English language in which case, for purposes of interpretation of the EPC Contract, the translation shall govern.

3.2 Singular and Plural

The singular shall include the plural and the plural the singular, except where the context otherwise requires.

3.3 Headings

The headings and marginal notes in the General Conditions of Contract are included for ease of reference, and shall neither constitute a part of the Contract nor affect its interpretation.

3.4 Persons

Words importing persons or parties shall include firms, corporations and government entities.

3.5 Entire Agreement

The Contract constitutes the entire agreement between the Employer and Contractor with respect to the subject matter of Contract and supersedes all communications, negotiations and agreements (whether written or oral) of parties with respect thereto made prior to the date of Contract. The various documents forming the Contract are to be taken as mutually explanatory.

3.6 Amendment

No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly Authorized Representative of each party hereto.

3.7 Independent Contractor

3.7.1 The Contract does not create any agency, partnership, joint venture or other joint relationship between the parties hereto.

3.7.2 Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed. All employees, representatives or Sub-contractors engaged by the Contractor in connection with the Performance of the Contract shall be under the complete control of the Contractor and shall not be deemed to be employees of the Employer. Nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives or Sub-contractors and the Employer.

3.7.3 Under no circumstances the Sub-contractor shall claim or shall put any binding to the Employer and at all times the Sub-contractor must be managed by the Contractor. The Employer shall not be responsible for any claims at any time by the Contractor in relation to the Sub-contractor.

3.8 Non-Waiver

3.8.1 Subject to GCC Clause 3.8.2 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, nor shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

3.8.2 Any waiver of a party's rights, powers or remedies under the Contract must be in writing, must be 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.

3.9 Severability

a. 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.

b. It is stated that each paragraph, clause, sub-clause, schedule or annexure of this Contract shall be deemed severable & in the event of the unenforceability of any paragraph, clause sub-clause, schedule or the remaining part of the paragraph, clause, sub-clause, schedule annexure & rest of the Contract shall continue to be in full force & effect.

3.10 Country of Origin

"Origin" means the place where the materials, equipment and other supplies for the Facilities are mined, grown, produced or manufactured and from which the services are provided.

4. NOTICES

4.1 Unless otherwise stated in the Contract, all notices to be given under the Contract shall be in writing, and shall be sent by personal delivery, registered post, special courier, or e-mail to the address of the relevant party by the Authorized Representative of the party set out in Contract coordination procedure to be finalized and mutually agreed for the execution of the Contract and all the communication pertaining to Project shall be in accordance with the procedure with the following provisions.

4.1.1 Any notice sent shall be confirmed within two (2) working days after receipt.

4.1.2 Either party may change its postal, cable, telex, or e-mail address or addresses for receipt of such notices by ten (10) days of notice to the other party in writing.

4.2 Notices shall be deemed to include any approvals, consents, instructions, orders and certificates to be given under the Contract.

5. GOVERNING LAWS

5.1 The Contract shall be governed by and interpreted in accordance with laws in force in India. The Courts of Bengaluru shall have exclusive jurisdiction in all matters arising under the Contract.

5.2 The Contract must be interpreted and read under the influence of Indian Contracts Act, 1872 and all amendments as on date.

6. SETTLEMENT OF DISPUTES

6.1 Dispute Resolution

6.1.1 Either Party is entitled to raise any claim, dispute or difference of whatever nature arising under, out of or in connection with this Contract ("Dispute") by giving a written notice (Dispute Notice) to the other party, which shall contain:

a) a description of the Dispute;
b) the grounds for such Dispute; and
c)all written material in support of its claim.

6.1.2 The other party shall, within thirty (30) days of issue of Dispute Notice issued under Clause 6.1.1, furnish:
a) counter-claim and defences, if any, regarding the Dispute; and
b) all written material in support of its defences and counter-claim.

6.1.3 Within thirty (30) days of issue of Dispute Notice by any Party pursuant to Clause 6.1.1 if the other party does not furnish any counter claim or defence under Clause 6.1.2 or thirty (30) days from the date of furnishing counter claims or defence by the other Party, both the Parties to the Dispute shall meet to settle such Dispute amicably. If the Parties fail to resolve the Dispute amicably within thirty (30) days from the later of the dates mentioned in this Clause 6.1.3, the Dispute shall be referred for dispute resolution in accordance with Clause 6.2.

6.2 Arbitration

6.2.1 It is agreed by the Parties that, any disputes or claims arising out of this Contract shall be settled by the sole or several arbitrators appointed in accordance with The Arbitration Centre-Karnataka (Domestic and International), Rules 2012.

6.2.2 The place of arbitration shall ordinarily be Bengaluru but by agreement of the Parties, the arbitration hearings, if required, may be held elsewhere.

6.2.3 The request for arbitration, the answer to the request, the terms of reference, any written submissions, any orders and awards shall be in English and, if oral hearings take place, English shall be the language to be used in the hearings.

6.2.4 The provisions of this Clause shall survive the termination of this Agreement for any reason whatsoever.

6.2.5 The award shall be of majority decision. If there is no majority, the award will be given by the presiding Arbitrator.

6.2.6 The Parties agree that the decision or award resulting from arbitration shall be final and binding upon the Parties and shall be enforceable in accordance with the provisions of the Arbitration Centre – Karnataka (Domestic and International), Rules 2012 subject to the rights of the aggrieved parties to secure relief from any higher forum.

6.3 Reference to Arbitration

Notwithstanding any reference to the Arbitration herein,

The parties shall continue to perform their respective obligations under the Contract unless they otherwise agree.

The Employer shall pay the Contractor any payment due to the Contractor.

B. Subject Matter of Contract:

7. SCOPE OF FACILITY

7.1 The scope of Facility includes, but not limited to, the following:

7.1.1 Execution of PPA with BESCOM, design, engineering, manufacturing, procurement & supply, packing and forwarding, transportation, unloading, storage, erection & installation, testing, Commissioning of 140KW rooftop Solar PV Power Plant which includes construction of parking lot for the 50 KW Solar PV Module installation and comprehensive CMC the entire 140KW for a period of 5 (Five) years from the date of Commercial Operation Date. The Contractor shall register the Project for Clean Development Mechanism (CDM) and Renewable Energy Certificate (REC) benefit, as applicable.

7.1.2 Contractor shall be responsible for all the paper works, follow-up with BESCOM and to pay all the official fee required for the execution of PPA between the KSRSAC and BESCOM for a capacity of minimum of 140kW. Any upgradation in the sanction load, modification in the existing Electrical setup, and all other liasoning work pertaining to the successful implementation of this project shall be in the scope of the contractor. And all the cost associated to the scope defined shall be borne by the contractor. Any additional deposit pertaining to the increase in sanction load, if any shall be paid by KSRSAC

7.1.3 All associated civil engineering works including design for:

a) Construction of foundation & mounting structures for SPV panels

b) Dismantling of old parking structures

c) Construction of parking lot for ~50 KW Solar module installation

d) Installation of fire safety equipment.

e) Arrangement of permanent water supply for module washing and daily usage.

7.1.4 All power conditioning system including junction boxes, Inverters/Power Conditioning Unit (PCU), DC and AC circuit breaker(s).

7.1.5 Integrated microprocessor based SCADA with required software and hardware for monitoring of SPV plant.

7.1.6 All associated electrical works required for interfacing at grid network voltage prescribed (i.e. lightning arrestor(s), panels, protection system, cables, metering, etc.) as per Technical Specifications.

7.1.7 Design, supply, erection, testing & commissioning of cables, Inverters, Panels and metering equipment for connecting to Grid as per Technical Specification and State Regulations.

7.1.8 Design and implementation of plant monitoring scheme with compatible software and hardware for accessing the SCADA data remotely.

7.1.9 Comprehensive CMC of the SPV plant as detailed in Technical Specification including supply and storage of all spare parts, consumables, repairs/ replacement of any defective equipment etc.

7.1.10 Obtaining all associated Statutory and Regulatory compliances and approvals for successful construction and operation of Plant.

7.1.11 Provision and inventory management of all mandatory and recommended spares as per the OEM recommendation and plant requirement.

7.1.12 Scrap disposal and waste management including removal of debris and other non-usable material.

7.1.13 The Contractor is free to use materials or equipment's having standards exceeding, the specification mentioned under the Technical Specification.

7.2 Unless otherwise expressly limited in the Technical Specifications, the Contractor's obligations cover the provision of all Plant and Equipment including spares and the Performance of all services required for the design, the manufacture (including procurement, quality assurance, construction, installation, associated civil, structural and other construction works, Pre-Commissioning and delivery) of the Plant and Equipment and the installation, Commissioning, Completion of Facilities and carrying out Guarantee Tests for the Facilities in accordance with the plans, procedures, specifications, drawings, codes and any other documents as specified in the Technical Specifications. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labour, materials, equipment, spare parts and accessories; Contractor's Equipment; construction utilities and supplies; temporary materials, structures and facilities; transportation (including, without limitation, loading, unloading and hauling to, from and at the Site); insurance and storage, except for those supplies, works and services that will be provided or performed by the Employer.

7.3 The Contractor shall, unless specifically excluded in the Contract, perform all such work and/or supply all such items and materials not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Completion of the Facilities as if such work and/or items and materials were expressly mentioned in the Contract.

7.4 In addition to the supply of mandatory spare parts included in the Contract, the Contractor agrees to supply spare parts, recommended or otherwise required for the CMC of the Facilities. Tools and tackles, spares necessary to ensure the continuous operation of the Plant shall be considered as mandatory spares. However, the identity, and quantities of such spare parts and the terms and conditions relating to the supply thereof are to be agreed between the Employer and the Contractor based on the recommendation of OEM, and the price of such spare parts shall be that given as part of approved billing schedule, which shall be part of the Contract Value. The price of such spare parts shall include the purchase price therefore and other costs and expenses (including the Contractor's fees) relating to the supply of spare parts. The prices of spares covered under billing schedule shall be kept valid for a period as specified in SCC. Contractor shall maintain the minimum required spares mandatory or recommended or otherwise at any time during the CMC period.

8. CONTRACTOR'S RESPONSIBILITY

8.1.1 Contractor shall support and handhold the customer in the execution of the PPA with BESCOM for a capacity minimum of 140KW. Contractor shall be responsible for all the paper works, follow-up with BESCOM and to pay all the official fee. Any upgradation in the sanction load, modification in the existing Electrical setup, and all other liasoning work pertaining to the successful implementation of this project shall be in the scope of the contractor.

8.2 The Contractor shall design, procure, manufacture (including associated purchases and/or subcontracting), install, commission and complete the Facilities, carry out the Guarantee Tests with due care and diligence in accordance with the Contract including the CMC for the prescribed period.

8.3 The Contractor confirms that it has entered into this Contract on the basis of a proper examination of the data relating to the Project provided by the Employer and assessed by himself at the Site location, and on the basis of information that the Contractor could have obtained from a visual inspection of the Site (if access thereto was available) and of other data readily available to it only after proper due diligence relating to the requirement for executing the Project and facilities available prior to Bid submission. The Contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Scope of Work.

8.4 The Contractor shall acquire at its own cost, on behalf of the Employer, in the Employer's name, all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located that are necessary for the setting up of the Solar Power Plant mentioned under the Contract. The Contractor shall be responsible for, but not limited to, entry permits for all imported Employer's Equipment (if any). In this regard, any document required from Employer shall be intimated at least 10 days prior to submission. Contractor has to ensure safe keeping of the documents and diligent use. It is the responsibility of the Contractor to safe keep and return all the approvals, permits, licenses, certificates and other relevant document generated as a result of the setting up of Project and CMC process to the Employer.

8.5 The Contractor shall also seek for any exemption applicable for the Project as per the orders released from GOI time to time. In this regard, the Contractor shall be responsible to take all necessary certificates as a proof of exemptions on behalf of Employer. The Contractor shall register the Project for Clean Development Mechanism (CDM) and Renewable Energy Certificate (REC) benefit, as applicable. However, all the documents required from Employer, as needed for the process, will be provided by Employer. The demand of such documents shall be made to the Employer in at least 10 days of advance.

8.6 The Contractor shall comply with all laws in force at the place, where the Facilities are installed and where the Installation Services are carried out. The laws will include all national, provincial, municipal or other laws that affect the Performance of the Contract and binding upon the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Sub-contractors and their personnel, but without prejudice to GCC Sub-Clause 9.1 hereof.

8.7 Any plant, material, spares & spares inventory and services that will be incorporated in or be required for the Facilities and other supplies shall have their origin as defined under GCC Clause 3.10 (Country of Origin).

8.8 Unless otherwise specified in the Contract or agreed upon by the Employer and the Contractor, the Contractor shall provide/ deploy sufficient, properly qualified operating and maintenance personnel; shall supply and make available all raw materials, spares, other materials and facilities; and shall perform all work and services of whatsoever nature, to properly carry out Pre-Commissioning,

Commissioning and Guarantee Tests, all in accordance with the provisions of "Technical Specifications" to the Contract at or before the time specified in the program furnished by the Contractor under GCC Clause 18 hereof and in the manner thereupon specified or as otherwise agreed upon by the Employer and the Contractor.

9. EMPLOYER'S RESPONSIBILITY

9.1 The Employer shall ensure the accuracy of all information and/or data to be supplied by the Employer as described in Scope of Works and Supply by the Employer to the Contract, except when otherwise expressly stated in the Contract.

9.2 Employer shall be responsible for providing all the necessary documents required for the execution of the PPA with BESCOM.

9.3 The Employer shall be responsible for acquiring and providing legal and physical possession of the Site thereto required for the proper execution of the Contract. The Employer shall give full possession of Site and accord all rights of access thereto on or before the date(s) specified in SCC.

9.4 If requested by the Contractor and up on Employer's sole discretion, the Employer shall use its best endeavours to assist the Contractor in obtaining in a timely and expeditious manner all permits, approvals and/or licenses necessary for the execution of the Contract from all local, state or national government authorities or public service undertakings that such authorities or undertakings required for the Contractor or Sub-contractors or the personnel of the Contractor or Sub-contractors, as the case may be, to obtain.

9.5 The Employer shall be responsible for the CMC of the Facilities after Completion and proper hand over of the Site by Contractor, in accordance with GCC Clause 26 and 27. However, the Contractor, undertake CMC and, shall be responsible for the care and custody of the facility as per GCC Clause 26.9.

C. Payments

10. CONTRACT VALUE

10.1 The Contract Value mentioned Total Fixed Price under Appendix III: Financial Bid shall be firm and shall not change after the Award of Contract.

10.2 Subject to GCC Sub-Clauses 8.2 and 9.1 hereof, the Contractor shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Value, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract.

10.3 Contract Value shall be adjusted in accordance with the provisions of GCC Clause 29.

10.4 The successful bidder shall submit the price breakup along with quantity (with in 15days of LoA issuance) and the same shall be part of the agreement/contract). However, KSRSAC / PMC / Independent Engineer reserves the right for accepting/commenting the price breakup

11. TERMS OF PAYMENT

11.1 The terms of Payment shall be as specified in SCC. The procedures to be followed in making application for and processing payments shall be those outlined in the same SCC Clause.

11.2 No payment made by the Employer herein shall be deemed to constitute acceptance by the Employer of the Facilities, CMC of the Facility or any part(s) thereof.

12. BANK GUARANTEES

12.1 Issuance of Bank Guarantees

The Contractor shall provide the Bank Guarantees specified below in favour of the Employer at the times, and in the amount, manner and form specified below.

12.2 Advance Bank Guarantee

12.2.1 The Contractor shall, if advance mobilization payment is required, provide a Bank Guarantee equal to advance mobilization payment plus the applicable interest, with an initial validity period of 180 days from the date of signing of this Contract. The advance mobilization payment shall be 10% of the Contract Value. However, in case of delay in Completion of Facilities under the Project, the validity of the security shall be extended by the period of such delay.

12.2.2 The security shall be in the form of an unconditional and irrevocable bank guarantee as per the Proforma provided in "Schedule 2: Advance Bank Guarantee for Mobilization". The Mobilization Advance shall be interest free for the period of contract period. The total amount of mobilization advance, shall be adjusted proportionately against the payment to be released for supplies as per SCC Clause no 12.1.1. It should be clearly understood that adjustment in the value of Bank Guarantee for Mobilization Advance shall not in any way dilute the Contractor's responsibility and liabilities under the Contract including in respect of the facilities for which the adjustment in the value of Bank Guarantee is allowed. Bank Guarantee in lieu of mobilization advance shall be returned to the Contractor on Commissioning of the Project.

12.3 Performance Bank Guarantee

12.3.1 The contractor on issuance of the LoA within 15 days shall furnish Performance Bank Guarantee @ 10% of the total work order valid throughout the warranty/CMC period (plus 1 month). On receipt of which, the supply of materials / services shall be deemed started. The format for Performance Bond shall be as in the Form set out in Schedule 1. Performance Bank Guarantee shall be released after the end of 5 year CMC period.

However, in case of delay in demonstration of the Performance Test (PR test) and Acceptance, the validity of all the Contract Performance Bank Guarantees shall be extended by the period of such delay.

12.3.2 The Performance Bank Guarantee shall be denominated in the Indian Rupees and shall be in the form of unconditional and irrevocable bank guarantee in the prescribed Proforma provided in Schedule 1.

12.3.3 The Bank Guarantee submitted against Mobilization Advance and the Performance Bank Guarantee shall be essentially from any of the Banks listed at Schedule – 4: List of banks of the Bidding Documents.

13. TAXES AND DUTIES

13.1 Except as otherwise specifically provided in the Contract, the Contractor shall bear and pay all taxes, duties, royalties, levies and charges in connection with the Project.

13.2 In order to claim the concessions and exemptions under the State and Central Government including Customs duty, excise duty etc., the Contractor shall make the necessary submissions / applications on behalf of the Employer in accordance with the applicable rules. Failure to get the exemption shall not be grounds for claiming duties or taxes which the Employer would have otherwise been exempted from

paying to the concerned authorities.

D. Intellectual Property

14. COPYRIGHT & PATENT

14.1 The copyright in all drawings, documents and other materials containing data and information furnished to the Employer by the Contractor herein shall remain vested in the Employer. The Employer shall be free to reproduce all drawings, documents, specification and other material furnished to the Employer for the purpose of the Contract including, if required, for CMC of the Facilities.

14.2 The Contractor shall indemnify the Employer against third party claims of infringement of patent, trademark or industrial design rights arising from use of goods or any part thereof in India.

15. CONFIDENTIAL INFORMATION

15.1 The Employer and the Contractor 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 termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Sub-contractor(s) such documents, data and other information it receives from the Employer to the extent required for the Sub-contractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Sub-contractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this GCC Clause 15.

15.2 The obligation of a party under GCC Sub-Clauses 15.1 above, however, shall not apply to that information which:

15.2.1 Now or hereafter enters the public domain through no fault of that party.

15.2.2 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 hereto.

15.2.3 Otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

15.3 The above provisions of this GCC Clause 15 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 Facilities or any part thereof.

15.4 The provisions of this GCC Clause 15 shall survive termination, for whatever reason, of the Contract.

16. DELETED

17. REPRESENTATIVES

17.1 Engineer-In-Charge:

If the Engineer-In-Charge is not named in the Contract, then within five (05) days of the Effective Date, the Employer shall appoint and notify the Contractor in writing of the name of the Engineer-In-Charge. The Employer may from time to time appoint some other person as the Engineer-In-Charge in place of the person previously so appointed, and shall give a notice of the name of such other person to the Contractor without delay. The Employer shall take reasonable care, unless unavoidable to see that no such appointment is made at such a time or in such a manner as to impede the progress of work on the Facilities. The Engineer-In-Charge shall represent and act for the Employer at all times during the currency of the Contract. All notices, instructions, orders, certificates, approvals and all other communications under the Contract shall be given by the Engineer-In-Charge, except as herein otherwise provided.

All notices, instructions, information and other communications given by the Contractor to the Employer under the Contract shall be given to the Engineer-In-Charge, except as herein otherwise provided.

17.2 Contractor's Representative & Construction Manager

17.2.1 If the Contractor's Representative is not named in the Contract, then within five (05) days of the Effective Date, the Contractor shall appoint the Contractor's Representative and shall request the Employer in writing to approve the person so appointed. If the Employer makes no objection to the appointment within seven (07) days of submission, the Contractor's Representative shall be deemed to have been approved. If the Employer objects to the appointment within five (05) days giving the reason therefor, then the Contractor shall appoint a replacement within five (05) days of such objection, and the foregoing provisions of this GCC Sub- Clause 17.2.1 shall apply thereto.

17.2.2 The Contractor's Representative shall represent and act for the Contractor at all times during the tenure of the Contract and shall give to the Engineer-In-Charge all the Contractor's notices, instructions, information and all other communications under the Contract.

17.2.3 All notices, instructions, information and all other communications given by the Employer or the Engineer-In-Charge to the Contractor under the Contract shall be given to the Contractor's Representative or, in its absence, its deputy, except as herein otherwise provided.

17.2.4 The Contractor shall not revoke the appointment of the Contractor's Representative without the Employer's prior written consent, which shall not be unreasonably withheld. If the Employer consents thereto, the Contractor shall appoint some other person as the Contractor's Representative, pursuant to the procedure set out in GCC Sub-Clause 17.2.1.

17.2.5 The Contractor's Representative may, subject to the approval of the Employer (which shall not be unreasonably withheld), at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Contractor's Representative, and shall specify the powers, functions and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Employer and the Engineer-In-Charge.

17.2.6 Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with GCC Sub-Clause 17.2.5 shall be deemed to be an act or exercise by the Contractor's Representative.

17.2.7 Notwithstanding anything stated in GCC Sub-clause 17.1 and 17.2.1 above, for the purpose of

execution of Contract, the Employer and the Contractor shall finalize and agree to a Contract Co-ordination Procedure and all the communication under the Contract shall be in accordance with such Contract Co-ordination Procedure.

17.2.8 From the commencement of installation of the Facilities at the Site until Operational Acceptance, the Contractor's Representative shall appoint a suitable person as the construction manager (hereinafter referred to as "the Construction Manager"). The Construction Manager shall supervise all work done at the Site by the Contractor and shall be present at the Site throughout normal working hours except when on leave, sick or absent for reasons connected with the proper Performance of the Contract. Whenever the Construction Manager is absent from the Site, a suitable person shall be appointed to act as his or her deputy.

17.2.9 The Employer may by notice to the Contractor object to any representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Employer, may behave inappropriately, may be in-competent or negligent, or may commit a serious breach of the Site regulations and safety. The Employer shall provide evidence of the same, whereupon the Contractor shall remove such person from the works.

17.2.10 If any representative or person employed by the Contractor is removed in accordance with GCC Sub-Clause 17.2.4, the Contractor shall, where required, promptly appoint a replacement.

18. PROJECT IMPLEMENTATION

18.1 Work Schedule

Within fourteen (14) days after the date of Issue of LOA, the Contractor shall prepare and submit to the Engineer-In-Charge a detailed program of Performance of the Contract, made in the form of PERT Chart and showing the sequence in which it proposes to preparation of Site, transport, procurement of materials, storing arrangements, dispatch of personnel, fabrication, design, assemble, install, establishment of new parking lot for 50 KW Solar PV Module installation by dismantling old parking structures, Net Metering Facilities and Pre-Commission the Facilities. The program so submitted by the Contractor shall agree with the Time Schedule indicated in SCC and any other dates and periods specified in the Contract. The Contractor shall update and revise the program as and when appropriate or when required by the Engineer-In-Charge, but without modification in the Time for Completion given in the SCC and any extension granted in accordance with clause for extension of time, and shall submit all such revisions to the Engineer-In-Charge.

18.2 Progress Report

18.2.1 The Contractor shall monitor progress of all the activities specified in the work schedule referred in GCC Sub-Clause 18.1 above, and submit the progress report to the Engineer-In-Charge as per the Contract Co-ordination procedure.

18.2.2 The progress report shall be in a form acceptable to the Engineer-In-Charge and shall also indicate: (a) percentage completion achieved compared with the planned percentage completion for each activity; and (b) where any activity is behind the program, giving comments and likely consequences and stating the corrective action being taken.

18.3 Maintenance of Records of Weekly Progress Review Meeting at Site

The Contractor shall be required to attend all weekly Site progress review meetings organized by the 'Engineer-In-Charge' or his Authorized Representative. The deliberations in the meetings shall inter-alia include the weekly program, progress of work (including details of manpower, tools and plants deployed by the Contractor vis-à-vis agreed schedule), inputs to be provided by Employer, delays, if

any and recovery program, specific hindrances to work and work instructions by Employer. The minutes of the weekly meetings shall be recorded in triplicate in a numbered register available with the 'Engineer-In-Charge' or his Authorized Representative. These recordings shall be jointly signed by the 'Engineer-In-Charge' or his Authorized Representative and the Contractor and one copy of the signed records shall be handed over to the Contractor.

19. SUBCONTRACTING

19.1 The Contractor shall not, without the prior consent in writing of the Employer, assign or sublet or transfer its Contract in whole or in part, its obligations to perform under the Contract or a substantial part thereof, other than raw materials, or for any part of the work of which makers are named in the Contract, provided that any such consent shall not relieve the Contractor from any obligation, duty or responsibility under the Contract.

19.2 The Contractor shall notify the Employer in writing of all sub contracts awarded under the Contract if not already specified in its Bid. Such notification in its Bid or later shall not relieve the Contractor from any liability or obligation under the Contract.

19.3 In case, the Contractor engages any Sub-Contractor to carry out a part of the work, the Sub-Contractor should have requisite Government License for carrying out such part of the work.

20. DESIGN AND ENGINEERING

20.1 Specifications and Drawings

20.1.1 The Contractor shall execute the basic and detailed design and engineering work in compliance with the provisions of the Contract, or where not so specified, in accordance with good and sound engineering practice not lesser than established current standard industry practice.

20.1.2 The Contractor shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other technical documents that it has prepared, whether such specifications, drawings and other documents have been approved by the Engineer-In-Charge or not, provided that such discrepancies, errors or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the Employer.

20.2 Codes and Standards

Technical Specifications set out in the RFP document shall form part of this Contract. The Contract shall be executed in compliance of the codes and standards set out in Technical Specifications, the new edition or the revised version of such codes and standards current at the date of Bid submission shall apply unless otherwise specified. However, the Contractor may use equipment's/materials exceeding the standard mentioned.

20.3 Approval / Review of Technical Documents by Engineer-In-Charge

The Contractor shall prepare list of documents as per Technical Specifications and furnish to the Engineer-In-Charge for approval of the same and Review of work schedule.

Any part of the Facilities covered by or related to the documents to be approved by the Engineer-In-Charge shall be executed only after the Engineer-In-Charge's approval thereof.

20.3.1 Within seven (07) days after receipt of any document requiring the Engineer-In-Charge's approval,

the Engineer-In-Charge shall either return one copy thereof to the Contractor with its approval endorsed thereon or shall notify the Contractor in writing of its disapproval thereof and the reasons therefor and the modifications that the Engineer-In-Charge proposes.

20.3.2 The Engineer-In-Charge shall not disapprove any document, except on the grounds that the document does not comply with some specified provision of the Contract or that it is contrary to good engineering practice.

20.3.3 If the Engineer-In-Charge disapproves the document, the Contractor shall modify the document and resubmit it for the Engineer-In-Charge's approval. If the Engineer-In-Charge approves the document subject to modification(s), the Contractor shall make the required modification(s), and upon resubmission with the required modifications the document shall be deemed to have been approved.

20.3.4 The procedure for submission of the documents by the Contractor and their approval by the Engineer-In-Charge shall be as per the Contract Co-ordination procedure.

20.3.5 If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the Engineer-In-Charge of any document and/or any modification(s) thereto that cannot be settled between the parties within a reasonable period, then such dispute or difference may be settled in accordance with GCC Clause 6.0 (Settlement of Dispute) hereof. If such dispute or difference is referred as per GCC Clause 6.0, the Engineer-In-Charge shall give instructions as to whether and if so, how, Performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the Engineer-In-Charge's instructions, provided that if the Arbitration upholds the Contractor's view on the dispute, then the Contractor shall be reimbursed by the Employer for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Arbitration shall decide, and the Time for Completion shall be extended accordingly.

20.3.6 The Engineer-In-Charge's approval, with or without modification of the document furnished by the Contractor, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Engineer-In-Charge.

20.3.7 The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Engineer-In-Charge an amended document and obtained the Engineer-In-Charge's approval thereof, pursuant to the provisions of this GCC Sub-Clause 20.3.

20.3.8 If the Engineer-In-Charge requests any change in any already approved document and/or in any document based thereon, generally shall be taken care by the Contractor if the change is not causing any major financial impact.

21. PROCUREMENT

21.1 Plant and Equipment

The Contractor shall procure and transport all the Plant and Equipment in an expeditious and orderly manner to the Site.

21.2 Transportation

The Contractor shall at its own risk and expense transport all the Plant and Equipment and the Contractor's Equipment to the Site by the mode of transport that the Contractor judges most suitable under all the circumstances.

21.3 Packing and Marking

21.3.1 The Contractor shall be responsible for securely protecting and packing the Plant & Equipment as per prescribed standards in force to withstand the journey and ensuring safety of materials and also arrival of materials at destination in original condition and good for contemplated use. Packing case size & weight shall take into consideration the remoteness of the goods final destination and absence of heavy material handling facilities at all points in transit.

21.3.2 Packing lists of materials shall be provided in each package to facilitate checking up of the contents at the destination.

21.3.3 In order to import any items, associated with the Solar PV Power Project, from abroad or from any other state in India, Contractor shall have to arrange any clearance, permission, if required at his own risk, from any Government (Government of State & Government of India) or any Government (Government of State & Government of India) controlled organization for transportation of materials from manufacturing shop to delivery at Site. Necessary certificates if so required shall be issued by the Employer within reasonable time after getting written request from the Contractor along with the necessary documents substantiating necessity of such approvals. All packing material is the property of the Employer and shall be immediately deposited by the Contractor to the Employer's Store at Project Site.

22. MATERIALS AND WORKMANSHIP

22.1 All materials shall be of the best quality and workmanship capable of satisfactory operation under the operating and climatic conditions as may be specified. Unless otherwise specified, they shall conform in all respect to the latest edition of the relevant IS codes specification wherever Indian specifications apply or IEC codes or equivalent internationally accepted standard.

22.2 The Contractor shall supply & deliver all equipment and materials for installation at Site. The Contractor shall arrange for transportation, loading & unloading and safe storage of materials at Project Site at his own cost & risk.

22.3 If the Contractor offers equipment manufactured in accordance with other international well recognized standards (mentioned above), he shall, in that case, supply a copy in English of the Standard Specification adopted and shall clearly mention in what respect such standard specification differs from Indian Standard Specifications. The Plant, equipment, and materials offered by the Contractor should comply with one consistent set of Standards only to make the system compatible and work in harmony as far as possible.

23. INSTALLATION

23.1 Tools & Tackles

The Contractor shall provide technically suitable tools and tackles for installation & erection of Plant & Machineries conforming to relevant BIS safety and technical standards for proper execution of work. The Employer, in no way, shall be responsible for supply of any tools and tackles for implementation of the work and also to carry out CMC activities.

23.2 Setting up/Supervision/Labour

23.2.1 Bench Mark

The Contractor shall be responsible for the true and proper setting-up of the Facilities in relation to bench marks, reference marks which are mutually agreed upon by the Contractor and Employer.

If, at any time during the progress of installation of the Facilities, any error shall appear in the position, level or alignment of the Facilities, the Contractor shall forthwith notify the Engineer-In-Charge of such error and, at its own expense, immediately rectify such error to the satisfaction of the Engineer-In-Charge.

23.2.2 Contractor's Supervision:

The Contractor shall give or provide all necessary superintendence during the installation of the Facilities, and the Construction Manager or its deputy shall be constantly on the Site to provide full-time superintendence of the installation. The Contractor shall provide and employ only technical personnel who are skilled and experienced in their respective disciplines and supervisory staff who are competent to adequately supervise the work at hand.

23.2.3 Workmen:

The Contractor shall provide and employ on the Site in the installation of the Facilities such skilled, semi- skilled and unskilled workmen as is necessary for proper and timely execution of the Contract. The Contractor is encouraged to use local workmen that has the necessary skills.

Unless otherwise provided in the Contract, the Contractor shall be responsible for the recruitment, transportation, accommodation and catering of all workmen, local or expatriate, required for the execution of the Contract and for all payments in connection therewith.

The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the entry of all workmen and personnel to be employed by Contractor on the Site.

The Contractor shall at all times during the progress of the Contract use its best endeavours to prevent any unlawful, riotous or disorderly conduct or behaviour by or amongst its employees and the workmen of its Sub-contractors.

The Contractor shall, in all dealings with its workmen and the workmen of its Sub-contractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official

holidays, religious or other customs and all local laws and regulations pertaining to the employment of workmen.

23.3 Contractor's Equipment

23.3.1 All equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the Engineer-In-Charge's consent that such Contractor's Equipment is no longer required for the execution of the Contract. Upon successful commissioning and approval from the KSRSAC Representatives and Independent Consultant, Contractor can remove excess materials

23.3.2 Unless otherwise specified in the Contract, upon Completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor to the Site.

23.4 Site Regulations and Safety

The Contractor shall have to provide necessary and adequate safety measures including personal protective equipment and precautions to avoid any accident, which may cause damage to any equipment / material or injury to workmen. The Employer shall not be responsible for any accidents at the Project Site. Also, Contractor shall engage sufficient security guards to protect Facility from any theft and unauthorized access to Site.

23.5 Site Clearance

23.5.1 Site Clearance in Course of Performance

In the course of carrying out the Contract, the Contractor shall keep the Site reasonably free from all unnecessary obstruction, store or remove any surplus materials, clear away any wreckage, rubbish or temporary works from the Site, and remove any Contractor's Equipment no longer required for execution of the Contract.

23.5.2 Site Clearance after Completion

After Completion of all parts of the Facilities, the Contractor shall clear away and remove all wreckage, rubbish and debris of any kind from the Site, and shall leave the Site and Facilities clean and safe.

23.5.3 Disposal of Scrap

The Contractor shall with the agreement of the Employer promptly remove from the Site any 'Scrap' generated during Performance of any activities at Site in pursuance of the Contract. The term 'Scrap' shall refer to scrap/waste/remnants arising out of the unpacking of equipment, construction debris, fabrication of structural steel work and piping work at the Project Site in the course of execution of the Contract and shall also include any wastage of cables during the termination process while installing the cables.

The ownership of such Scrap shall vest with the Contractor except in cases where the items have been issued by the Employer from its stores for their installation only without any adjustment to the Contract Value or any excess quantity lying at the Site after completion of the Project for which payment has been made by the Employer and is the property of the Employer. The removal of scrap shall be subject to the Contractor producing the necessary clearance from the relevant authorities (Custom, Excise etc.),

if required by the law, in respect of disposal of the scrap. The liability for the payment of the applicable taxes/duties shall be that of the Contractor.

The Contractor shall also indemnify to keep the Employer harmless from any act of omission or negligence on the part of the Contractor in following the statutory requirements with regard to removal/disposal of scrap. The Indemnity Bond shall be furnished by the Contractor as per Proforma enclosed as Schedule 3. Further, in case the laws require the Employer to take prior permission of the relevant Authorities before handing over the scrap to the Contractor, the same shall be obtained by the Contractor on behalf of the Employer.

24. INSPECTION & TESTING

24.1 The Employer or its Authorized Representative shall have, at all time, access to the Project Site/Contractor's premises and also shall have the power, at all times, to inspect and examine the materials and workmanship of project work during its manufacture, shop assembly and testing. If part of the plant is required to be manufactured in the premises other than the Contractor's, the necessary permission for inspection shall be obtained by the Contractor for the Employer or his duly Authorized Representative.

24.2 The Employer shall have the right to serve notice in writing to the Contractor on any grounds of objections, which he may have in respect of the work. The Contractor has to satisfy the objection, otherwise, the Employer at its liberty may reject all or any component of Plant or workmanship connected with such work.

24.3 The Contractor shall issue request letter to the Employer or its Authorized Representative for testing of any component of the Plant, which is ready for testing at least 05 days in advance from the date of actual date of testing at the premises of the Contractor or elsewhere. However, the Employer at its own discretion may waive the inspection and testing in writing under very special circumstances. In such case, the Contractor may proceed with the tests which shall be deemed to have been made in the Employer presence, and it shall forthwith forward two sets of duly certified copies of test results and certificates to the Employer for approval. The Contractor, on receipt of written acceptance from the Employer, may dispatch the equipment for erection & installation.

24.4 For all tests to be carried out, whether in the premises of the Contractor or any Sub-Contractor, the Contractor, shall provide labour, materials, electricity, fuel, water, stores, apparatus and instruments etc. free of charge as may reasonably be demanded to carry out such tests of the plant in accordance with the Contract. The Contractor shall provide all facilities to the Employer or its Authorized Representative to accomplish such testing.

24.5 The Employer or his Authorized Representative shall have the right to carry out inward inspection of the items on delivery at Site and if the items have been found to be not in line with the approved Specifications, shall have the liberty to reject the same.

24.6 If Employer desires, testing of any component(s) of the plant be carried out by an independent agency. The inspection fee, if any, shall be paid by the Employer. However, the Contractor shall render all necessary help to Employer whenever required free of charge.

24.7 The Contractor has to provide the necessary testing reports to the Employer as and when required.

24.8 Neither the waiving of inspection nor acceptance after inspection by the Employer shall, in anyway, absolve the Contractor of the responsibility of supplying the plant and equipment strictly in accordance with specification and drawings etc.

25. AUTHORIZED TEST CENTERS FOR TEST CERTIFICATES

The PV modules/ Inverters/ cables and other Balance of system equipment deployed in the solar PV power plant shall have valid test certificates for their qualification as per specified BIS & IEC/ IS Standards by one of the NABL Accredited Test Centres in India. Random sample modules shall be tested in NABL Accredited Test Centres, if required.

26. COMMISSIONING AND COMPLETION OF THE FACILITIES

26.1 As soon as installation of the Facilities has, in the opinion of the Contractor, been completed as specified in the Technical Specifications, excluding minor items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify the Employer (Engineer-In-Charge) in writing for conducting Pre- Commissioning Test of the Facility in co-ordination with Employer representative.

26.2 As soon as all works in respect of Pre-Commissioning are completed and, in the opinion of the Contractor, the Facilities are ready for Commissioning, the Contractor shall so notify the Engineer-In-Charge in writing. The Contractor shall commence Commissioning of the Facilities as per the GCC Clause 26.3.

26.3 Commissioning of the Facilities shall be completed by the Contractor as per procedures detailed in the Technical Specifications and in the presence of the Engineer-In-Charge or the representatives of the Employer.

26.4 If the Engineer-In-Charge notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies, and shall repeat the procedure described in GCC Sub-Clause 26.2.

26.5 If the Engineer-In-Charge is satisfied that the Facilities have reached Completion, the Engineer-In-Charge shall, within five (05) days after receipt of the Contractor's notice, issue a Completion Certificate stating that the Facilities have reached Completion as at the date of the Contractor's notice.

26.6 If the Engineer-In-Charge is not so satisfied, then it shall notify the Contractor in writing of any defects and/or deficiencies within five (05) days after receipt of the Contractor's repeated notice, and the above procedure shall be repeated.

26.7 If the Engineer-In-Charge fails to issue the Completion Certificate and fails to inform the Contractor of any defects and/or deficiencies within fourteen (14) days after receipt of the Contractor's notice under GCC Sub-Clause 26.2, or if the Employer makes use of the Facilities, then the Facilities shall be deemed to have reached Completion as of the date of the Contractor's notice or repeated notice, or as of the Employer's use of the Facilities, as the case may be.

26.8 As soon as possible after Completion, the Contractor shall complete all outstanding minor items so that the Facilities are fully in accordance with the requirements of the Contract, failing which the Employer will undertake such completion and deduct the costs thereof from any monies owing to the Contractor.

26.9 Upon Completion and successful demonstration of the PR test, the Contractor shall be responsible for the care and custody of the Facilities, together with the risk of loss or damage thereto, and shall thereafter take over the Facilities or the relevant part thereof for the agreed duration of CMC as stipulated and mutually agreed terms and conditions.

27. GUARANTEE TEST AND OPERATIONAL ACCEPTANCE

27.1 Functional Guarantees

27.1.1 The Contractor guarantees that during the Guarantee Test, the Facilities and all parts thereof shall

attain the Functional Guarantees specified under Technical Specifications, subject to and upon the conditions therein specified.

27.1.2 If, for reasons attributable to the Contractor, the guaranteed level of the Functional Guarantees specified under Technical Specifications are not met either in whole or in part, the Contractor shall, within a mutually agreed time, at its cost and expense make such changes, modifications and/ or additions to the Plant or any part thereof as may be necessary to meet such Guarantees. The Contractor shall notify the Employer upon completion of the necessary changes, modifications and/or additions, and shall seek the Employer's consent to repeat the Guarantee Test. If the level of the specified Functional Guarantee parameters, as demonstrated even during repeat of the Guarantee Test(s), are outside the acceptable shortfall limit, the Employer may at its option, either

a) Reject the Equipment and Advise immediate replacement with equipment to suit the provisions of Technical Specification without any additional cost

b) Reject the Equipment and recover the payments already made, or

c) Terminate the Contract and recover the payments already made, or

d) Accept the equipment after levy of liquidated damages in accordance with the provisions specified.

27.2 Plant Performance Guarantee Test

The Plant Performance Guarantee (as mentioned in SCC) Test shall be conducted by the Contractor after Commissioning of the Facilities to ascertain whether the Facilities or the relevant part(s) can attain the Functional Guarantees specified in the Contract Documents. The Contractor's and Engineer-In-Charge's advisory personnel shall attend the Guarantee Test. The Contractor shall promptly provide the Employer with such information as the Employer may reasonably require in relation to ascertain the performance guarantee based on the test results. The detailed procedure for Plant Performance Guarantee Test shall be carried out as per procedure laid down in Schedule 5 – Technical Specifications of this Contract.

27.3 Operational Acceptance and Acceptance

27.3.1 Operational Acceptance shall occur in respect of the Facilities when the Plant Performance Guarantee Test in accordance with the procedure specified in Schedule 5 – Technical Specifications of this Contract has been successfully completed and the Functional Guarantees are met

27.3.2 At any time after any of the events set out in GCC Sub- Clause 27.3.1 have occurred, the Contractor may give a notice to the Engineer-In-Charge requesting the issue of an Operational Acceptance Certificate in the form provided in the Bidding Documents or in another form acceptable to the Employer in respect of the Facilities or the part thereof specified in such notice as at the date of such notice.

27.3.3 The Engineer-In-Charge shall, after consultation with the Employer, and within thirty (30) days after receipt of the Contractor's notice, issue an Operational Acceptance Certificate.

27.3.4 If within thirty (30) days after receipt of the Contractor's notice, the Engineer-In-Charge fails to issue the Operational Acceptance Certificate or fails to inform the Contractor in writing of the justifiable reasons why the Engineer-In-Charge has not issued the Operational Acceptance Certificate, the Facilities shall be deemed to have been accepted as at the date of the Contractor's said notice.

28. INTER-CHANGEABILITY

All the parts shall be made accurately to applicable Standards and specification so as to facilitate replacement and repairs. All corresponding parts of similar apparatus shall be inter-changeable.

29. POWER TO VARY OR OMIT WORK

29.1 No alterations, amendments, omissions, additions, subtractions, or variations of the work or materials as specified in the data-sheets (1 to 6) (hereinafter referred to as "variation") under the Contract shall be made by the Contractor except as directed by the Employer.

29.2 If any suggested variations would, in the opinion of the Contractor, if carried out prevent it from fulfilling any of its obligations or guarantees under the Contract, it shall notify the Employer thereof in writing and the Employer shall decide forthwith whether or not the same shall be carried out and if Employer confirms its instruction, the Contractor shall carryout the work as per the instructions.

29.3 The differences in cost, if any, occasioned by such variations, shall be added to or deducted from the Contract Value, as the case may be.

29.4 In the event of the Employer requiring any variations, reasonable and proper notice shall be given to the Contractor as well, to enable it to make arrangements accordingly, and in cases where goods or materials are already prepared/procured, or any designs, drawings or patterns made or work done that require to be altered, a reasonable sum in respect thereof shall be allowed by the Employer.

29.5 In every case in which the Contractor shall receive instructions from the Employer for carrying out any work, which either then or later, will in the opinion of the Contractor involve a claim for additional payment, the Contractor shall as soon as reasonably possible after the receipt of such instructions, inform in writing the Employer of such claim for additional payment.

29.6 In any case, if the Contractor deviates from the design or specification as defined in the Bid Document, the Contractor has to submit the deviation sheet to the Engineer-in-Charge and seek approval from the Employer.

30. NEGLIGENCE

30.1 If the Contractor neglects to supply Equipment or construct the Plant with necessary infrastructure, with due diligence and expeditiousness or refuses or neglects to comply with any reasonable order given to it in writing by the Employer or contravenes any provisions of the Contract, the Employer may give (7) seven days' notice in writing to the Contractor, to make good the failure, neglect or contravention complained of. If the Contractor fails to comply with the notice within reasonable time depending on the nature of affected work, which is evaluated by the Engineer-In-Charge from the date of serving thereof, in the event of failure, neglect or contravention capable of being made good within that time, then in such case, if the Employer thinks fit, it shall be lawful for it to take the Plant and Equipment wholly or in part, out of the Contractor's hand and give it to another person on Contract at current market price and the Employer shall be entitled to retain any balance which may be otherwise due on the Contract by it to the Contractor or such part thereof as may be necessary, to the payment of the cost with respect to such acquisition as aforesaid.

30.2 If the cost of executing the work as aforesaid shall exceed the balance due to the Contractor and the Contractor fails to make good such deficiency, the Employer shall have the right to appropriate the Performance Security in addition to take action in the manner it may consider deem fit in terms of the Contract including black-listing the Contractor.

31. STATUTORY RESPONSIBILITY

The Contractor shall comply with all Applicable Laws or ordinances, codes, approved standards, rules, and regulations and shall procure and maintain their validity all necessary Municipal, Panchayat and Government permits & licenses etc. at its own cost.

32. INSOLVENCY AND BREACH OF CONTRACT

The Employer may at any time, by notice in writing, summarily terminate the Contract without compensation to the Contractor in any of the following events:

If the Contractor shall at any time, be adjudged insolvent or shall have a receiving order or order from administration of its state made against it or shall take any proceeding for compensation under any Insolvency Act for the time being in force or make any conveyance or assignment with its creditors or suspend payment or a Receiver, Liquidator or manager on behalf of the Debenture holder is appointed or circumstances have arisen which entitle the Court or debenture holder to appoint a Receiver, Liquidator or Manager.

33. DELAY IN EXECUTION OR FAILURE TO SUPPLY

33.1 Any delay in Completion of the work, shall attract liquidated damage, for late Completion as per Liquidated Damage Clause 34 (GCC).

33.2 If the Contractor fails to deliver the plant or fails to start the work within specified time frame after signing of Contract Agreement or handover of site whichever is later or leave the work Site after partial execution of the work, Employer shall have the right to get the work done through any other agency at the risk and cost of the Contractor. Further to this, Employer may, without prejudice to the right of the Employer to recover damages for breach of trust of the Contract, may impose liquidity damages on the contractor as per GCC Clause 34.

34. LIQUIDATED DAMAGES

34.1 The Project is scheduled to be commissioned & shall start the Commercial Operation within 120 days from

the date of singing of this Contract or handover of site whichever is later.

34.2 In case the Contractor fails to achieve successful Commissioning (Commercial Operation) of Plant by the due date indicated in Timeline, the Employer shall levy liquidated damages ("**Liquidated Damages**") on the Contractor at the following rate: (partial/ part Commissioning shall not be accepted)

34.2.1 Any delay beyond the contractual commercial operation date the liquidated damages shall be applicable as below

S No	**Days** (both the days inclusive) **from Effective contract date**	**Penalty**	
		Rate	**Cumulative**
1	121-127	0.5%	0.5%
2	128-134	1.0%	1.5%
3	135-141	1.0%	2.5%
4	142-148	1.0%	3.5%
5	149-155	0.0%	3.5%
6	≥156	5.0%	8.5%

34.2.2 During the Operational Acceptance any shortfall in the Performance Guarantee Test (PG Test) as determined through the Procedure specified in Section E – Technical Specifications of this Contract will attract imposition of Penalty damages. For every 0.01 shortfall in PR below 0.75 by the Contractor, a penalty of 1% of the Contract Value shall be levied, however maximum PR penalty shall be capped at maximum of 5% of the contract value.

34.2.3 The Penalty for delay in Commissioning and PR shortfall are separate, however the maximum penalty for the project on account of delay in commissioning and PR shortfall is capped maximum at 10% of the contract value (Split -1).

35. DEFECT LIABILITY

35.1 The Contractor must warrant that the Facilities shall be free from defects in the design, engineering, materials and workmanship of the Plant and Equipment supplied and of the work executed. The overall aggregate liability of the contractor shall be limited to 100% of the Contract value.

35.2 If it shall appear to the Employer that any supplies have been executed with unsound, imperfect or unskilled workmanship, or with materials of any inferior description, or that any materials or articles provided by the Contractor for the execution of Contractor are unsound or otherwise not in accordance with the Contract, the Employer/Engineer-In-Charge shall on demand in writing inform the Contractor's Representative specifying the item, materials or articles complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for. The Contractor shall forthwith rectify or remove and replace that item so specified and provide other proper and suitable materials or articles at its own charge and cost, and in the event of failure to do so within a period to be specified by the Engineer-in-Charge in its demand aforesaid, the Engineer-in-Charge may on expiry of notice period rectify or remove and replace with others or re-execute the materials or articles complained of as the case may be at the risk and expense in all respects of the Contractor. The decisions of the Employer in this regard shall be final and binding.

35.3 The Contractor shall also be undertaking the CMC of the Facility and consequently shall be required to rectify any defects that emerge during the CMC of the Facilities for the entire term of this Contract.

35.4 The Defect Liability Period shall be 60 (sixty) months from the date of Successful Commissioning of the Project ("Defects Liability Period").

35.5 If during the Defect Liability Period any defect should be found in the design, engineering, materials and workmanship of the Plant and Equipment supplied or of the work executed by the Contractor, the Contractor shall promptly, in consultation and agreement with the Employer regarding appropriate remedying of the defects, and at its cost, repair, replace or otherwise make good (as the Contractor shall, at its discretion, determine) such defect as well as any damage to the Facilities caused by such defect.

35.6 Furthermore, without prejudice to the generality of the foregoing, it is clarified that the Contractor shall also be responsible for the repair, replacement or making good of any defect, or of any damage to the Facilities arising out of or resulting from any of the following causes:

a) Improper CMC of the Facilities by the Contractor; and
b) Operation of the Facilities outside specifications of the Facilities.

35.7 The Employer shall give the Contractor a notice stating the nature of any such defect together with all available evidence thereof, promptly following the discovery thereof. The Employer shall afford all reasonable opportunity for the Contractor to inspect any such defect.

35.8 The Employer shall provide the Contractor all necessary access to the Facilities and the Site to enable the Contractor to perform its obligations under this Clause 35 (Defect Liability). The Contractor may, with the consent of the Employer remove any Plant and Equipment or any part of the Facilities that are defective from the Site, if the nature of the defect and/or any damage to the Facilities caused by the defect is such that repairs cannot be expeditiously carried out at the Site.

35.9 If the repair, replacement or making good is of such a nature that it may affect the efficiency of the Facilities or any part thereof, the Employer may give to the Contractor a notice requiring that tests of the defective part of the Facilities shall be made by the Contractor immediately upon completion of such remedial work, whereupon the Contractor shall carry out such tests.

35.10 If such part fails the tests, the Contractor shall carry out further repair, replacement or making good (as the case may be) until that part of the Facilities passes such tests. The tests, in character, shall in any case be not inferior to what has already been agreed upon by the Employer and the Contractor for the original Equipment/part of the Facilities.

35.11 If the Contractor fails to commence the work necessary to remedy such defect or any damage to the Facilities caused by such defect within a reasonable time (which shall in no event be considered to be less than seven (7) days), the Employer may, following notice to the Contractor, proceed to do such work, and the costs incurred by the Employer in connection therewith shall be paid to the Employer by the Contractor or may be deducted by the Employer from any amount due to the Contractor or claimed under the Plant Performance Guarantee, without prejudice to other rights, which the Employer may have against the Contractor in respect of such defects.

35.12 If the Facilities or any part thereof cannot be used by reason of such defect and/or making good of such defect, the Defect Liability Period of the Facilities or such part, as the case may be, shall be extended by a period equal to the period during which the Facilities or such part cannot be used by the Employer because of any of the aforesaid reasons. Upon correction of the defects in the Facilities or any part thereof by repair/replacement, such repair/replacement shall have the defect liability period of twelve (12) months from such replacement.

35.13 In addition, the Contractor shall also provide an extended warranty for any such component of the Facilities and for the period of time. Such obligation shall be in addition to the defect liability specified under Clause 35.2.

36. TERMINATION FOR DEFAULT

36.1 The Employer may, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Contractor, terminate the Contract in whole or in part.

36.2 If the Contractor fails to deliver or execute any or all of the goods within the time period(s) under the Contract or any extension thereof granted by the Employer pursuant to the clause for Delay in Execution or Failure to Supply or, if the Contractor fails to perform any other obligations(s) under the Contract.

36.3 In the event the Employer terminates the Contract in whole or in part, pursuant to above, the Employer may procure, upon such terms and in such manner as it deems appropriate, goods similar to those undelivered, the Contractor shall be liable to the Employer for any excess costs for such similar goods. However, the Contractor shall continue the Performance of the Contract to the extent not terminated.

36.4 In case termination of the Contract due to default, the Contractor may be debarred from participation in future tenders by Employer for a period to be specified.

37. BREACH & CANCELLATION OF THE CONTRACT

37.1 In case of non-Performance in any form or change of the covenant and conditions of the Contract by the Contractor, Employer shall have the power to annul, rescind, cancel or terminate the order and upon its notifying in writing to the Contractor that it has so done, this Contract shall absolutely determine. The decision of the Employer in this regard shall be final and binding.

37.2 The following conditions shall contribute to the breach of contract:

a) If the Contractor fails to deliver any or all of the Goods within the period(s) specified in the Contract; or

b) If the Contractor fails to perform any of their obligations(s) under the Contract, and

c) If the Contractor, in either of the above circumstances does not rectify his failure within a period of 30 (Thirty) days (or such longer period as the Employer may authorize in writing) after receipt of the default notice from the Employer

38. FORCE MAJEURE

38.1 Neither Party to this contract shall be liable to the other for any loss or damage which may be suffered by the other due (directly) to the extent and for the duration of any cause beyond the reasonable control of the Party unable to perform ("Force Majeure") events such as but not limited to acts of God not confined to the premises of the Party claiming the Force Majeure, flood, drought, lightning or fire, earthquakes, strike, lockouts beyond its control, labour disturbance not caused at the instance of the Party claiming Force Majeure, acts of Government or other competent authority, war, terrorist activities, military operations, riots, epidemics, civil commotions etc. No failure, delay or other default of any contractor or sub-contractor to either Party shall entitle such Party to claim Force Majeure under this Article.

38.2 The Party seeking to rely on Force Majeure shall promptly, within 2 days, notify the other Party of the occurrence of a Force Majeure event as a condition precedent to the availability of this defence with particulars detail in writing to the other Party and shall demonstrate that it has and is taking all reasonable measures to mitigate the events of Force Majeure.

38.3 In the event the Force Majeure substantially prevents, hinders or delays the successful bidder's performance of Services necessary for project's implementation or the operation of Project's critical business functions for a period in excess of 3 days, the KSRSAC may declare that an emergency exists. However, when the situation arising out of force Majeure comes to an end in the assessment of KSRSAC, the successful bidder shall resume normal activities under this contract immediately. If KSRSAC considers it necessary, may grant an extension of time to the successful bidder for resuming normal activities under this contract. If the successful bidder does not resume normal activities immediately or within the extended period, if any, granted by the KSRSAC, the KSRSAC will have the option to invoke the Performance Guarantee, levy liquidated damages, obtain substitute performance from an alternate supplier at the cost of successful bidder and/or terminate this contract.

38.4 Notwithstanding the terms of this Article, the failure on the part of the successful bidder terms under the Tender to implement any disaster contingency planning, insurance coverage and back-up and other data safeguards in accordance with the terms of the Tender or this CONTRACT against natural disaster, fire, sabotage or other similar occurrence shall not be an event of Force Majeure.

39. INSURANCE

39.1 During the Contract period all insurance related expenses shall be borne by the Contractor.

39.2 The goods supplied under the Contract shall be fully insured against the loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in such a manner that Employer shall not incur any financial loss, as long as the plant continues to remain under the custody of the Contractor.

39.3 In case of any loss or damage or pilferage or theft or fire accident or combination of the said incidents etc. under the coverage of insurance, the Contractor shall lodge the claim as per rules of insurance. Any FIR required to be lodged to local Police Station shall be the responsibility of the Contractor.

39.4 The Contractor shall arrange to supply/ rectify/ recover the materials even if the claim is unsettled for timely Completion of the Project. The final financial settlement with the insurer shall be rested upon the Contractor.

39.5 In case of any delay of the project attributable to the Contractor, the Contractor himself in consultation with Employer should take the extension of insurance. Any financial implications shall, however, be borne by the Contractor.

39.6 The Contractor should arrange for providing insurance coverage to its workmen under Workmen's Compensation Act or similar Rules and Acts as applicable during execution of work for covering risk against any mishap to its workmen. The Contractor shall also undertake a Third Party Insurance. The Employer will not be responsible for any such loss or mishap.

39.7 All other insurance like, Contractor All Risk, Erection All Risk, insurance against theft and acts of GOD, as required for the construction and CMC of the plant and to indemnify the Employer/ equipment/ material and resources shall be borne by the contractor. Fire insurance is to be arranged by the Contractor up to the years of CMC of the Facility.

39.8 The insurance is suitably taken for the activity/ act which is required to cover all the risk associated to the activity / act. The Contractor shall be responsible to take suitable insurance till the completion of the CMC and indemnify the Employer from all associated risks.

39.9 During the CMC period, the insurance coverage against theft, fire, burglary, act of GOD, terrorist activities, etc shall be taken in the name of Employer and policy document shall be handed over to the Employer. The insurance premium shall be borne by the Contractor for the term of this Contract.

40. STATUTORY ACTS AND RULES

The work shall be executed in conformity with Indian Electricity Act 2003, Central Electricity Authority Regulations, Explosive Act 1948, Petroleum Act 1934, National Building Code, hazardous waste management rules 2009, e – waste (Management& Handling) rules 2011 and relevant Rules/ Acts in vogue at the time of execution including CMC period.

41. HAZARDOUS MATERIAL

Any hazardous material used during construction or used as part of the plant has to be taken back by the supplier for recycling or dumping purpose after its operating / working life, so that it may not affect the environment or any living being. Contractor(s) have to comply with Karnataka State Pollution Control Board regulation.

42. STOPPAGE OF WORK

Employer shall not be responsible and not liable to pay any compensation due to stoppage of work as a reaction from local public due to any undue action on the part of the Contractor causing annoyance to local people.

43. HINDRANCE REGISTER

The Contractor may also maintain a Hindrance Register where reasons for delay may be recorded from time to time and at the time of occurrence of the hindrance and get it duly certified by the Engineer-in-Charge or his Authorized Representative.

44. MANUALS

The Contractor shall supply all necessary erection and Commissioning manuals, CMC manuals etc. as and when required. Six sets of test results, manuals etc. shall be submitted by the Contractor on Completion of the work.

45. DELIVERY OF EQUIPMENT

45.1 The Contractor shall deliver the equipment of the plant and machineries in accordance with the terms of the Contract at the time(s) to the place(s) and in the manner specified in the Contract. The Contractor shall comply with instructions that may be given by the Employer from time to time regarding the transit of the plant and material.

45.2 Notification of delivery or dispatch in regard to each and every consignment shall be made to the Employer immediately after dispatch or delivery from the manufacturing works. The Contractor shall supply to the Employer the required documents/ invoice to avail input tax credit

45.3 In case of any occurrence of loss or damage in transit, it shall be the liability of the Contractor to initiate or pursue the claim with insurance company. It should take immediate steps to repair the damaged apparatus or replacement there to.

46. LIABILITIES DURING TRANSIT

The Contractor shall be responsible for loss, damages, or depreciation to goods or of plant, equipment, and machineries up to delivery at Site.

47. DEDUCTION FROM CONTRACT VALUE

47.1 All costs, claims, damages or expenses, which the Employer may have paid for which the Contractor is liable, will be deducted by the Employer from deposited Performance Bank Guarantee or from any money due or which become due to him under this Contract or any contract are being executed elsewhere with the Employer.

47.2 Any sum of money due and payable to the Contractor, as per the Contract Agreement, may be appropriated by the Employer and set off against any claim of the Employer, for the payment of a sum of money arising out of or under any other contract made by the Contractor with the Employer. It is an agreed term of the Contract that the sum of money, withheld or obtained under this clause by the Employer, will be kept withhold or retained as such by the Employer or till this claim arising out of in the same Contract is either mutually settled or determined by the arbitrator, or by competent court, as the case may be, and that the Contractor shall have no claim for interest or damages whatsoever on this account or any other account in respect of any sum of money withheld or retained under this clause and duly notified as such to the Contractor.

48. WARRANTY / GUARANTEE

48.1 PV modules used in grid connected solar power plants must be warranted for peak output wattage, which should not perform at rated capacity of lesser than 90% at the end of 10 years and 80% at the end of 25 years.

48.2 The modules shall be warranted for at least 10 years for failures due to material defects and workmanship.

48.3 Inverters/PCU shall be warranted for five years from the date of COD or the warranty period provided by the original equipment manufacturer, whichever is higher.

48.4 The mechanical structures, electrical equipments, works and overall workmanship of the grid connected solar power plant must be warranted for a minimum of 05 years.

48.5 The Contractor must ensure that the goods supplied under the Contract are new, unused and of most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.

48.6 During the period of Warranty / Guarantee the Contractor shall remain liable to replace any defective parts, that becomes defective in the plant, of its own manufacture or that of its Sub-contractors, under the conditions provided for by the Contract under and arising solely from faulty design, materials or workmanship, provided such defective parts are not repairable at Site. After replacement, the defective parts shall be returned to the Contractors works at the expense of the Contractor unless otherwise arranged.

48.7 At the end of guarantee period, the Contractor's liability shall cease. In respect of goods not covered by the first paragraph of this clause, the Employer shall be entitled to the benefit of such guarantee given to the Contractor by the original contractor or manufacturer of such goods.

48.8 During the CMC and guarantee period, the Contractor shall be responsible for any defects in the work due to faulty workmanship or due to use of sub- standard materials in the work. Any defects in the work during the guarantee period shall therefore, be rectified by the Contractor without any extra cost to the Employer within a reasonable time as may be considered from the date of receipt of such intimation from the Employer failing which the Employer shall take up rectification work at the risk and cost of the Contractor.

49. FINAL BILL

49.1 The final bill relating to the EPC Contract shall be prepared only after the Guaranteed Performance of the plant has been observed. It will include the adjustments of all claims against the Contractor by the Employer and awarded in its favour by the Arbitrator, up to the date of preparation of the final bill.

49.2 The CMC shall be comprehensive. The maintenance service provided shall ensure project functioning of the Solar PV system as a whole and Power Evacuation System to the extent covered in the Contract. All preventive / routine maintenance and breakdown / corrective maintenance required for ensuring maximum uptime shall have to be provided. Accordingly, the Comprehensive CMC shall have two distinct components as described below:

49.2.1 Preventive / Routine Maintenance:

This shall be done by the Contractor regularly and shall include activities such as cleaning and checking the health of the Solar PV system, cleaning of module surface, tightening of all electrical connections, and any other activity including the associated civil works, as mentioned in GCC clause 7, wear and tear that may be required for proper functioning of the Solar PV system as a whole. Water will be provided by the centre.

49.2.2 Breakdown / Corrective maintenance:

Whenever a fault has occurred, the Contractor has to attend to rectify the fault & the fault must be rectified within 48 hours' time from the time of occurrence of fault, failing which the Contractor will be liable for additional liquidated damages as per terms & conditions under Plant Performance Guarantee and under Warranty mentioned in SCC.

Fault recovery time shall be maximum of 48 hours from the time of failure (not from the time of reporting/identification). In case the fault is not rectified within 48 hours, the penalty shall be levied from the time of fault occurrence.

The Penalty amount shall be a minimum of INR 4,000/ per day or product of DISCOM tariff and average daily generation arrived for the particular year considering the degradation, whichever is higher.

49.3 The date of comprehensive period shall begin on the date of demonstration of guaranteed PR. However, operation of the Power Plant means operation of system as per Bid and workmanship in order to keep the project trouble free covering the guarantee period. The Contractor must demonstrate the committed PLF at the end of every year in accordance with commitment made in the Techno-Commercial Enclosures of the Bid.

50. RISK PURCHASE

If the Contractor fails, on signing of the Contract, to take up the work within a reasonable period or leave the work Site after partial execution of the work, the Employer shall have the liberty to get the work done through other agency at the Contractor's own risk and additional cost if any has to be borne by the Contractor. If the situation, so warrants, to compel the Employer to cancel the Contract, it shall be liable to compensate the loss or damage, which the Employer may sustain due to reasons of failure on Contractor 's part to execute the work in time.

Further, based on reviewing the Project based on the approved L3 Project Schedule, if the progress is below expectation as demanded by the Employer then the Employer reserves right to reduce the scope of the Contractor in part or full and assign the same to other contractor(s) and get the work done at the risk and cost of the existing Contractor.

51. UNFORESEEN CONDITIONS

51.1 If, during the execution of the Contract, the Contractor shall encounter on the Site any physical conditions (other than climatic conditions) or artificial obstructions that could not have been reasonably foreseen prior to the date of the Contract Agreement by an experienced contractor on the basis of reasonable examination of the data relating to the Facilities, and on the basis of information that it could have obtained from a visual inspection of the Site (if access thereto was available) or other data readily available to it relating to the Facilities, and if the Contractor determines that it will in consequence of such conditions or obstructions incur additional cost and expense or require additional time to perform its obligations under the Contract that would not have been required if such physical conditions or artificial obstructions had not been encountered, the Contractor shall promptly, and before performing additional work or using additional Plant and Equipment or Contractor's Equipment, notify the Engineer-in-Charge in writing of

i) The physical conditions or artificial obstructions on the Site that could not have been reasonably foreseen

ii) The additional work and/or Plant and Equipment and/or Contractor's Equipment required, including the steps which the Contractor will or proposes to take to overcome such conditions or obstructions

iii) The extent of the anticipated delay

iv) The additional cost and expense that the Contractor is likely to incur.

On receiving any notice from the Contractor under this GCC Sub-Clause 51.1, the Engineer-in-Charge shall consult and decide upon the actions to be taken to overcome the physical conditions or artificial obstructions encountered. Following such consultations, the Engineer-in-Charge shall instruct the Contractor of the actions to be taken.

51.2 Any reasonable additional cost and expense incurred by the Contractor in following the instructions from the Engineer-in-Charge to overcome such physical conditions or artificial obstructions referred to in GCC Sub-Clause 51.1 shall be paid by the Employer to the Contractor as an addition to the Contract Value.

51.3 If the Contractor is delayed or impeded in the Performance of the Contract because of any such physical conditions or artificial obstructions referred to in GCC Sub-Clause 51.1, the Time for Completion shall be extended in accordance with GCC Clause 53 (Extension of Time for Completion).

52. CHANGE IN LAWS AND REGULATIONS

If, after the date of Bid submission, in the country where the Site is located, any law, regulation, ordinance, order or bye-law having the force of law is enacted, promulgated, abrogated or changed (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Value may be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the Performance of any of its obligations under the Contract. The increase and decrease in the contract price on account of change in law shall be arrived with respect to the price split agreed as per the clause 10.4

53. EXTENSION OF TIME FOR COMPLETION

53.1 The Time(s) for Completion specified in the SCC shall be extended if the Contractor has delayed or impeded in the Performance of any of its obligations under the Contract by reason of any of the following:

53.1.1 Any occurrence of Force Majeure as provided in GCC Clause 38 (Force Majeure), unforeseen conditions as provided in GCC Clause 51 (Unforeseen Conditions).

53.1.2 Any changes in laws and regulations as provided in GCC Clause 52 (Change in Laws and Regulations) or by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Contractor.

53.2 Except where otherwise specifically provided in the Contract, the Contractor shall submit to the Engineer-in-Charge a notice of a claim for an extension of the Time for Completion, together with particulars of the event or circumstance justifying such extension as soon as reasonably practicable after the commencement of such event or circumstance. As soon as reasonably practicable after receipt of such notice and supporting particulars of the claim, the Employer and the Contractor shall agree upon the period of such extension. In the event that the Contractor does not accept the Employer's estimate of a fair and reasonable time extension, then the matter will be settled in accordance with the provisions of GCC Sub-Clause 6.1.

53.3 The Contractor shall at all times use its reasonable efforts to minimize any delay in the Performance of its obligations under the Contract.

53.4 The Contractor shall be required to attend all weekly Site progress review meetings organized by the 'Engineer-in-Charge' or his Authorized Representative. The deliberations in the meetings shall include the weekly program, progress of work (including details of manpower, tools and plants deployed by the Contractor vis-à-vis agreed schedule), inputs to be provided by Employer, delays, if any and recovery program, specific hindrances to work and work instructions by Employer. The minutes of the weekly meetings shall be recorded in triplicate in a numbered register available with the 'Engineer-in-Charge' or his Authorized Representative. These recordings shall be jointly signed by the 'Engineer-in-Charge' or his Authorized Representative and the Contractor and one copy of the signed records shall be handed over to the Contractor.

54. CARE OF FACILITIES

The Contractor shall be responsible for the care and custody of the Facilities or any part thereof until the date of Completion of the Facilities pursuant to GCC Clause 18 or, where the Contract provides for Completion of the Facilities in parts, until the date of Completion of the relevant part, and shall make good at its own cost any loss or damage that may occur to the Facilities or the relevant part

thereof from any cause whatsoever during such period. The Contractor shall also be responsible for any loss or damage to the Facilities caused by the Contractor or its Sub-contractors in the course of any work carried out, pursuant to GCC Clause 35 (Defect Liability).

55. CONTRACTOR PERFORMANCE & FEEDBACK AND EVALUATION SYSTEM

The Employer has in place an established 'Contractor Performance and Feedback System' against which the Contractor's Performance during the execution of Contract shall be evaluated on a continuous basis at regular intervals. In case the Performance of the Contractor is found unsatisfactory on any of the following four parameters, the Contractor shall be considered ineligible for participating in future tenders for a period as may be decided by the Employer:

a) Financial Status

b) Project Execution and Project Management Capability

c) Engineering & QA Capability

d) Claims & Disputes

56. FRAUD PREVENTION POLICY

56.1 The Contractor along with their Associate/ Collaborator/ Sub-contractors/ sub-vendors/ Consultants/ Service Providers shall observe the highest standard of ethics and shall not indulge or allow anybody else working in their organization to indulge in fraudulent activities during execution of the Contract. The Contractor shall immediately apprise the Employer about any fraud or suspected fraud as soon as it comes to their notice.

Special Conditions of Contract (SCC)

Contents

1. PROJECT DESCRIPTION

The main objective of this Project is Execution of PPA with BESCOM, Design, engineering, procure, manufacture, supply, erection, testing and commissioning of 140 KWp Grid-Connected Solar Rooftop Photovoltaic Power Plant with all associated infrastructure including establishing a parking lot roof space for 50 KW solar installation with associated metering and switchgear and 5 (five) years comprehensive maintenance contract from the date of commissioning on turnkey basis.

2. PROJECT SITE

Project site shall be at Karnataka State Remote Sensing Applications Centre (KSRSAC), Department of Information Technology, Biotechnology and Science & Technology, Government of Karnataka, Doora Samvedi Bhavana, Major Sandeep Unnikrishnan Road, Doddabettahalli, Bengaluru- 560097. Details of the Project Site are mentioned under Schedule 5 – Technical Specifications of this Contract.

3. ENGINEER IN – CHARGE AND THIRD PARTY INSPECTOR

Engineer in - Charge will be appointed and will be intimated after issue of LoA. Third Party Inspector will be appointed and will be intimated to the Contractor.

4. SCOPE OF SERVICES

Engineering, procurement, supply and commissioning of 140 KWp Grid-Connected Solar Rooftop Photovoltaic Power Plant along with all equipment and infrastructure related to the Project which includes construction of parking lot of 50 KW Rooftop Solar PV module installation along with accessories and recommended & mandatory spares including, but not limited to that of mentioned in the Schedule 5 – Technical Specifications, transportation, unloading, receiving and storage at Site.

a. Arranging to repair and/or re-order and supply all damaged or short-supply items.

b. Final check-up of equipment and pre – commissioning, commissioning and putting the system into successful operation for performance demonstration while feeding power to the grid while keeping the plant up for 100%.

c. Comprehensive maintenance contract of the plants for 5 (Five) years after commissioning and PR and Plant Performance Guarantee Test.

5. TRAINING OF EMPLOYER'S PERSONNEL

On successful Commissioning of the Plant, the Contractor shall provide training on Rooftop Solar Power Plant operations and maintenance to a team of up to 2 personnel (Engineers / Technician/Operators) as nominated by Employer.

6. PERFORMANCE GUARANTEE

6.1 The Solar Power Plant performance will be evaluated through performance ratio test as per IEC 61724 and PLF calculation as per the formulas and procedures mentioned under Schedule 5 – Technical Specifications of this Contract.

6.2 The minimum acceptable Performance Ratio (PR) of the plant is 0.75 and CUF shall be 15% against installed plant capacity at STC for grid tied system.

Plant Load Factor (PLF) is the ratio between the actual energy generated by the plant to the MAXIMUM possible energy that can be generated with the plant working at its rated power and for duration of an entire year (i.e – 365 days).

$$CUF = \frac{\text{Units Generated in KWh}}{\text{Plant Capacity in KWac } \mathbf{X} \text{ No.of hours in a day X 365}}$$

6.3 As the PR of the Plant is dependent on the quality of plant equipment and optimum design of the plant, the Contractor shall demonstrate the PR of 0.75 as per the procedure mentioned at Clause 6.1 of SCC for Operational Acceptance of the Solar Power Plant.

6.4 The initial acceptance of the Solar Power Plant will be evaluated during commissioning by measuring PR for continuous 7 days. However, Contractor must demonstrate the PR for a period of 30 days as per the PR test procedure specified in Schedule 5 – Technical Specifications of this Contract.

6.5 The Acceptance of Plant will be evaluated based on minimum CUF demonstrated at the end of one year from the date Commissioning.

6.6 During CMC period, the Solar Power Plant performance will be evaluated based on annual Plant Load Factor. The PLF will be determined based on annual radiation measured at the plant and the guaranteed PR by the Contractor. Second year onwards plant degradation factor (0.7% dip) shall be considered to evaluate the CUF.

6.7 During the Performance Demonstration Period after the commissioning of the plant and during the CMC period, the Contractor need to maintain 100% uptime of the plant to achieve the proposed PLF at the end of each year. Any repair, replacement, overhauling, etc., are to be performed during night times so that no generation loss will be there in day time. All the replacement, overhauling, etc., are to be performed during night times so that there is no generation loss during day time. Contractor during the O&M shall understand the maintenance schedule of the BESCOM and plan for the plant and transmission line maintenance to avoid the generation loss during the grid outages.

6.8 The Contractor shall be responsible for achieving PR and CUF. For any shortfall in achieving PR and PLF, compensation shall be recovered from the Contractor as per SCC Clause 23.

6.9 The contractor shall produce manufacturer authorization certificate in the form given in appendix-III.

7. PROJECT TIME LINES:

The time line for execution of the Contract is 120 days from the date of signing of the Contract or handing over of the site whichever is later and as per the indicative milestones mentioned below.

Timelines for Scope of work

Sl. No	Stage	Reference from D
1.	Signing of EPC Contract	Zero Date (D)
2.	Approval of drawings	D+30
3.	Execution of PPA	D+30
4.	Completion of supply of major equipment like SPV Modules (including structure for the above), Inverters, etc.	D+55
5.	Completion of Parking lot construction	D+80
6.	Completion of MMS pedestal work	D+85
7.	Completion of MMS & Inverter installation	D+90
8.	Interconnection of all major equipment and completion of installation	D+115
9.	Completion, testing and commissioning, Commercial Operation of Solar PV power plant	D+120
10.	Operational Acceptance (PR test demonstration)	D+127

8. MODE OF EXECUTION

The entire work shall be executed on turnkey basis. Any minor item(s) not included in the schedule but required for completion of the work shall have to be carried out/supplied without any extra cost. Such works, not listed in the schedule of works but elaborately described to perform or to facilitate particular operation(s) required for completion of the project shall deemed to have been included in the scope of this work and the Contractor shall supply, install the same without any extra cost.

9. PROGRAMME OF WORK

The Contractor shall submit the programme of work within 15 days from the date of receipt of LoA. The programme shall include a Bar Chart indicating there in the starting position and completion date of each of the major items of work.

10. STARTING OF WORK

The Contractor shall be required to start the work within 15 (fifteen) days from the date of signing of Contract and shall thereof, report to the Employer accordingly.

11. COMPLETION SCHEDULE

11.1 The Time for Completion of the construction activities is 120 days from the date of singing of Contract or handing over the site, whichever is later. Thereafter, 5 years of CMC Contract from the date of Acceptance of the Solar Power Plant.

11.2 The Contractor shall inform the Employer at least 30 days in advance in written notice, and a final notice 7 days in advance to enable the Employer inform the commissioning committee of the date on which it intends to synchronize the Solar Power Plant to the grid system.

11.3 The Contractor shall prepare the completion schedule accordingly and inconformity with provisions of Technical Specifications and carry out the work as per the Technical Specifications subject to "Force

Majeure" conditions. The Contractor shall mobilize resources keeping in view, the above Time for Completion.

12. TERMS OF PAYMENT

12.1 Employer shall pay the Contractor in the following manner and at the following time:

Contract price bifurcation

Split – 1: Solar PV System – 90% (inclusive of applicable GST),

If required, successful contractor may draft a separate billing schedule in consent with KSRSAC for the purpose on smooth invoicing.

Split – 2: 5 year CMC Payment – 10% (inclusive of applicable GST)

Invoicing:

- Split – 1: Contractor shall raise the invoice for 100% of the Solar PV system against the supply of the materials
- Split – 2: Contractor may raise the invoice for 100% of the CMC period on successful completion of the 'Performance Guarantee Test' ('PG Test') or shall raise on prorate basis on the end of every CMC year.

S No	Split	Description	Basic	GST	Total	Remarks
1	1	Solar PV system			90%	
2	2	CMC			10%	
a)	2	1st Year				2% of TQP
b)	2	2nd Year				2% of TQP
c)	2	3rd Year				2% of TQP
d)	2	4th Year				2% of TQP
e)	2	5th Year				2% of TQP
		Total Quoted Price (TQP)			100%	

Payment Terms

Split – 1: Solar PV System

- 40% of the Basic invoice value with 100% GST shall be released against 'Supply and Receipt, inspection clearance of material at site'.
- 20% of the Basic invoice value shall be released after successful 'Installation and inspection' of the Solar Power Plant.
- 25% of the Basic invoice value shall be released after successful 'Commissioning and COD' of the Solar Power Plant.
- 15% of the Basic invoice value shall be released after 'Performance Guarantee Test' ('PG Test') & reconciliation

Contractor shall be eligible for an advance amount of 10% of the Basic contract price value. The advance shall be released after the issuance of the Work Order/Contract and on submission of 'Advance Bank Guarantee (apart from Contract Performance BG). The Advance Bank Guarantee shall be valid till the completion of installation and commissioning of the solar power plant and receipt of final acceptance certificate. The advance amount if received from KSRSAC shall be adjusted in prorate basis in the Solar PV System (Split -1) payments

Split – 2: CMC Payments

- Upon the successful PG Test, 10% of the total cost shall be released as 'CMC' payment, paid on pro rate basis by end of every year.
- Upon the successful PG Test, Contractor may alternatively invoice the entire CMC value in advance on submission of separate Bank Guarantee equivalent to the CMC payment. The CMC Bank Guarantee shall be released on prorate basis upon successful completion of every CMC year (after reconciliation)

12.2 Contractor shall raise the invoice in-line with the agreed Project schedule (L-3 schedule) and approved Bill of Quantity. Contractor shall be eligible for the payment in-line with the agreed Project Schedule only.

12.3 The CMC Bank Guarantee shall be released on prorate basis upon successful completion of every CMC year (after reconciliation)

12.4 Mobilization advance shall be payable against submission of unconditional and irrevocable Mobilization Advance payment Bank Guarantee of equivalent amount mobilization advance payment plus applicable interest as per format in Schedule 2 issued by the bank as enlisted at Schedule 4. This Bank guarantee valid till 180 days from the date of issue of signing of contract. The recovery of mobilization advance shall be made in accordance with GCC clause 12.2.2.

12.5 Subject to any deduction which the Employer may be authorized to make under this Contract, and or to any additions or deductions provided for in this Contract, the Contractor shall be entitled to payment as follows:

12.5.1 All payments shall be made in Indian Rupees, unless otherwise specified in the Contract Agreement. All payment shall be made on the basis of certified invoices.

12.5.2 The Contractor shall submit the bill / invoice for the work executed showing separately the SGST/CGST/IGST and any other statutory levies in the bill / invoice.

12.5.3 All taxes and deductions shall be applicable as per prevailing income tax, Works Contract Tax and other statutory rules and provisions in force.

12.5.4 The Contractor, while submitting the Invoices, shall provide the breakup of supply, services & other works and applicable taxes separately.

13. PRICE ESCALATION

No Price escalation is allowed. The rate(s) quoted against the work shall remain firm during the entire Contract period. Any change in Forex rate shall not be considered for price variation.

14. TAXES AND DUTIES

14.1 Except as otherwise specifically provided in the Contract, the Contractor shall bear and pay all taxes, duties, royalties, levies and charges in connection with the Project

14.2 In order to claim the concessions and exemptions under the State and Central Government including Customs duty, excise duty etc, the Contractor shall make the necessary submissions / applications on behalf of the Employer in accordance with the applicable rules. Failure to get the exemption shall not be grounds for claiming duties or taxes which the Employer would have otherwise been exempted from paying to the concerned authorities.

15. PROCUREMENT OF MATERIALS

The Contractor shall procure all necessary material required for the Project work and arrange to store them properly. Test certificate in accordance with the specifications are to be furnished by the Contractor to the Employer for approval in respect of the materials procured by the Contractor.

16. SAMPLES

Employer reserves the right to choose samples from the supplied lot for conforming to the quality from laboratories of its choice for acceptance of the equipment's and materials.

17. DELETED

18. NOTICE OF OPERATION

The Contractor shall not carry out important operation without the consent in writing of the Employer or his representative. For carrying out such important activity, the Contractor shall intimate to the Employer at least 72 hours before starting of the job.

19. REJECTION OF MATERIALS

The Engineer in Charge's decision in regard to the quality of the material and workmanship will be final. The Contractors at its own cost and risk without any compensation shall immediately remove any material rejected by the Engineer in Charge from the Site of work.

20. WORKMEN ENGAGEMENT

The Contractor shall be responsible to provide all wages and allied benefits to its workmen engaged for execution of the project work and also to carry out CMC service. The Contractor shall remain liable to the authorities concerned for compliance of the respective existing rules and regulations of the government for this purpose and shall remain liable for any contravention thereof. The Contractor is required to obtain necessary EPF sub-code within 15 (fifteen) days from the date of issuance of LOA/mobilization at site whichever is earlier from Regional Provident Fund Commissioner, Bengaluru.

21. HANDING OVER –TAKING OVER

The work shall be taken over by the Employer upon successful completion of all tasks to be performed at Site on equipment supplied, installed, erected and commissioned by the Contractor in accordance with provision of the Contract. During handing over complete Project work, the Contractor shall submit the following for considering final payment:

21.1 All as- Built Drawings and documents as per the contract coordination procedure set out for the successful completion of the Project.

21.2 Detailed Engineering Document with detailed specification, schematic drawing, circuit drawing, cable routing plans and test results, manuals for all deliverable items, Operation, Maintenance & Safety Instruction Manual and other information about the Project.

21.3 Bill of material.

21.4 Inventory of recommended and mandatory spares at Project Site.

21.5 Immediately after taking over of complete facilities (s), the same will be handed over to the Contractor for CMC for a period of as mentioned in the SCC Clause 4 (c).

21.6 Complete set As-built drawings required no of copies for CMC and customer.

22. LIQUIDATED DAMAGES

Liquidity damages for the delay in construction of the plant shall be as per the GCC Clause 34.

23. LIQUIDATED DAMAGES FOR PR AND PLF DEVIATIONS

23.1 During the Operational Acceptance any shortfall in the Performance Ration (PR) as determined through the PR Test Procedure specified in Schedule 5 – Technical Specifications of this Contract will attract imposition of liquidated damages. For every 0.01 shortfall in PR below 0.75 by the Contractor, a penalty of 1% of the Contract Value shall be levied. In case 0.05 shortfalls in the Plant PR below 0.75, remaining 4% of the Contract Value shall be levied.

23.2 In case of any defect in the system after Commissioning, the Contractor shall repair it within 48 hours. Otherwise LD shall be charged and the same shall be deducted from the Performance Security submitted to the Employer.

The Penalty amount shall be a minimum of Rs. 4,000/- per day or product of DISCOM tariff and average daily generation arrived for the particular year considering the degradation, whichever is higher. The penalty for Breakdown is separate from the PLF penalty

23.3 Liquidated Damages for lesser PLF shall be charged at a rate of:

(Difference in units derived from committed and achieved PLF during any year of O&M after Commissioning) x Rs. [Tariff charged to Employer by ESCOM at the end of relevant year].

Liquidated Damages shall be recovered from the CMC payment payable to the Contractor.

24. MISCELLANEOUS

24.1 Based on reviewing the Project, if the progress is below expectation as demanded by the Employer then the Employer reserves right to reduce the scope of the Contractor in part or full and assign the same to other contractor(s) and get the work done at the risk and cost of the existing Contractor.

24.2 The Contractor shall continue to provide all the monitoring services, licenses, software, access to all information (real-time or stored) that were been used during the CMC to the Employer and to the transmission authority.

24.3 The Contractor shall construct a temporary facility/ arrangement at site or otherwise for the stay of Employer's employee/ consultant at the time of construction of the Solar Power Plant.

24.4 Provision for installing any additional monitoring equipment to facilitate on- line transfer of data to the competent authority shall be provided by the Contractor.

24.5 In case of discrepancy between GCC Clause and SCC Clause on a particular subject, SCC conditions will prevail.

Schedule 1: Format for Performance Bank Guarantee

To,
The Director
Karnataka State Remote Sensing Applications Centre,
Department of Personnel and Administrative Reforms (e-Governance),
Government of Karnataka,
Doora Samvedi Bhavana, Major Sandeep Unnikrishnan Road,
Doddabettahalli, Bengaluru – 560 097.

Sir,
Performance Bond No……

Whereas M/s. ……. (hereinafter called the Contractor) has been awarded a service Contract dated ……. of ……. 2020 for Design, Supply, Installation, Commissioning of 140 kWp Rooftop Solar PV Power Plant and Undertake Comprehensive Maintenance for Five years in KSRSAC for the value of Rs……..……. (Rupees ……..).

AND WHEREAS, under the terms of the said Contract the contractor is required to furnish to the Karnataka State Remote Sensing Applications Centre, the Client, a Performance Bond in the form of a Bank Guarantee for a value of ten (10%) percent of the contract value to guarantee the due performance of the Contract.

AND WHEREAS the Contractor has requested the ……. (Bank), who's central office is at ……. to issue a Performance Bond for a value of Rs. ……. being 10% of the Contract value, to guarantee the due performance for and on behalf of the Contractor or to you, should the Contractor defaults in his performance under the Contract.

NOW by this Bond, we, ……. (Bank) having address as ……., agree to make unequivocally and unconditionally, payment of a sum of Rs……. (Rupees……..) being TEN (10) percent of the Contract value under this Bond on your first written demand, without any reference to or contestation on behalf of the Contractor, provided claim is received by us on or before…….

Liability of ……. (Bank) under this Bond is limited to Rs……. (Rupees……. only) and this Bond shall be effective from ……. And shall be valid and binding on the Bank up to ……. after which date our liability cease. The Guarantee shall not be terminated or effected by notice of any change in the Constitution of the Bank or of the firm of Contractors or by any other reason whatsoever and the Bank's liability hereunder shall not be impaired or discharged by any extension of time or variation or alterations in the contract value or scope of service, given, conceded, agreed to, without our knowledge or consent, by or between the parties to the said written Contract.

This Guarantee should be returned to us upon its expiry or upon fulfilment of our undertaking whichever is the earlier.

Authorized Signatories

NOTE: Nothing to be entered in this Form in the document issued to the Bidder except initial and seal at right-hand bottom corner, the Form is to be adopted by the Bank which provides the Performance Guarantee for preparation of its Performance Guarantee.

(To be issued by a local branch of a Schedule Commercial Bank)

Schedule 2: Format of Advance Bank Guarantee for Mobilization

To,
The Director
Karnataka State Remote Sensing Applications Centre,
Department of Personnel and Administrative Reforms (e-Governance),
Government of Karnataka,
Doora Samvedi Bhavana, Major Sandeep Unnikrishnan Road,
Doddabettahalli, Bengaluru – 560 097.

Sir,
Advance Bank Guarantee No……

Whereas M/s. ……..…….. (hereinafter called the Contractor) has been awarded a service Contract dated ……. of ……. 2020 for Design, Supply, Installation, Commissioning of 140 kWp Rooftop Solar PV Power Plant and Undertake Comprehensive Maintenance for Five years in KSRSAC for the value of Rs……. (Rupees ……..).

AND WHEREAS, under the terms of the said Contract the contractor is required to furnish to the Karnataka State Remote Sensing Applications Centre, the Client, an advance bank guarantee in the form of a Bank Guarantee for a value of ten (10%) percent of the contract value for receipt of advance.

AND WHEREAS the Contractor has requested the ……. (Bank), who's central office is at ……. to issue a Guarantee Bond for a value of Rs. ……. being 10% of the Contract value, to guarantee towards the advance amount to be received on behalf of the Contractor to you, should the Contractor defaults in his performance under the Contract,

NOW by this Bond, we, ……. (Bank) having address as ……., agree to make unequivocally and unconditionally, payment of a sum of Rs. …….. (Rupees……..) being TEN (10) percent of the Contract value under this Bond on your first written demand, without any reference to or contestation on behalf of the Contractor, provided claim is received by us on or before…….

Liability of ……. (Bank) under this Bond is limited to Rs……. (Rupees……. only) and this Bond shall be effective from ……. And shall be valid and binding on the Bank up to …… after which date our liability cease. The Guarantee shall not be terminated or effected by notice of any change in the Constitution of the Bank or of the firm of Contractors or by any other reason whatsoever and the Bank's liability hereunder shall not be impaired or discharged by any extension of time or variation or alterations in the contract value or scope of service, given, conceded, agreed to, without our knowledge or consent, by or between the parties to the said written Contract.

This Guarantee should be returned to us upon its expiry or upon fulfilment of our undertaking whichever is the earlier.

Authorized Signatories

NOTE: Nothing to be entered in this Form in the document issued to the bidder except initial and seal at right-hand bottom corner, the Form is to be adopted by the Bank which provides the advance bank Guarantee for preparation of its advance payment.

(To be issued by a local branch of a Schedule Commercial Bank)

Schedule 3: Indemnity Bond to be executed by The Contractor for The Removal / Disposal of Scrap/Disposal of Surplus Material

(TO BE EXECUTED ON STAMP PAPER OF APPROPRIATE VALUE)

INDEMNITY BOND

This INDEMNITY BOND executed this …… day of ……. 20….. by ….....(Name of Company)……., a Company registered under the Companies Act, 1956/2013. and having its registered office(s) at……..(Office Address)……, hereinafter called the Indemnifier/Contractor (which expression shall, unless excluded by or repugnant to the context, be deemed to mean and include its successors, administrators, executors and permitted assigns).

IN FAVOUR OF

Karnataka State Remote Sensing Applications Centre, a an autonomous body under the Department of Personnel and Administrative Reforms (e-Governance), GoK, having its registered office at 'DOORA SAMVEDI BHAVANA', Major Sandeep Unnikrishnan Road, Doddabettahalli, Bengaluru-560 097 (hereinafter referred to as "KSRSAC").

1. Employer has awarded the Contractor, contract for execution of work ("Scope of Work") as mentioned in the Contract no…….. dated ....., entered into between Employer and Contractor, relating to ……..(Name & Address of Project/Station)…… (hereinafter called 'the Project').

2. The Indemnifier for the purpose of execution of its Scope of Work had from time to time procured and stored ……..(Details of Material)……. at the Project Site.

3. After completion of the Scope of Work by Indemnifier, it has been identified that scrap …… (Details of Scrap Material & its Quantity)……..and/or surplus …… (Details of Surplus Material & its Quantity)…….. belonging to Indemnifier is lying at the said Project Site.

4. Now, the scrap…….(Details of Scrap Material & its Quantity)…..and/or surplus …… (Details of Surplus Material & its Quantity)…….. belonging to the Indemnifier, requires to be removed by Indemnifier from the Project Site.

NOW THEREFORE THIS INDEMNITY BOND WITNESSETH AS UNDER:

1. That Indemnifier by way of this indemnity requests Employer to issue approval in favour of Indemnifier for removal of scrap ……(Details of Scrap Material & its Quantity)……..and/or surplus ……(Details of Surplus Material & its Quantity)…….. belonging to Indemnifier, from the project.

2. That the Indemnifier shall ensure clearing of its scrap …… (Details of Scrap Material & its Quantity)……..and/or surplus …… (Details of Surplus Material & its Quantity)…….. by itself, as aforesaid.

3. That Indemnifier in consideration of the premises above, for itself and its respective, executors, administrators and assigns, jointly and severally agree and undertake from time to time and at all times hereafter to indemnify Employer and keep Employer indemnified from and against all claims, demands, actions, liabilities and expenses which may be made or taken against or incurred by Employer by reason of the issue of necessary approval by Employer and permitting Indemnifier to remove scrap ……(Details of Scrap Material & its Quantity)……..and/or surplus ……(Details of Surplus Material & its Quantity)…….. Belonging to Indemnifier, from the project.

4. That Indemnifier undertakes to indemnify and keep Employer harmless from any act of omission or negligence on the part of the Contractor in following the statutory requirements with regard to removal/disposal of scrap and surplus belonging to Indemnifier, from the Project Site aforesaid, by the Indemnifier. Further, in case the laws require Employer to take prior permission of the relevant Authorities before handing over the scrap and/or surplus to the Indemnifier, the same shall be obtained by the Indemnifier on behalf of Employer.

IN WITNESS WHEREOF, the Indemnifier, through its authorized representative, has executed these presents on the Day, Month and Year first mentioned above at

…….. (Name of the Place)

…….. Indemnifier

(Authorised Signatory)

Witnesses:

1. ……

2. ……

Schedule 4: List of Banks

1. SCHEDULED COMMERCIAL BANKS	2. OTHER PUBLIC SECTOR BANKS
SBI AND ASSOCIATES	1. IDBI Bank Ltd.
1. State Bank of India	3. SCHEDULED PRIVATE BANKS
NATIONALISED BANKS	1. Federal Bank Ltd.
1. Allahabad Bank	2. ING Vysya Bank Ltd.
2. Andhra Bank	3. Axis Bank Ltd.
3. Bank of India	4. ICICI Bank Ltd.
4. Bank of Maharashtra	5. HDFC Bank Ltd.
5. Canara Bank	6. Yes Bank Ltd.
6. Central Bank of India	
7. Corporation Bank	
8. Dena Bank	
9. Indian Bank	
10. Indian Overseas Bank	
11. Oriental Bank of Commerce	
12. Punjab National Bank	
13. Punjab & Sind Bank	
14. Syndicate Bank	
15. Union Bank of India	
16. United Bank of India	
17. UCO Bank	
18. Vijaya Bank	
19. Bank of Baroda	

Schedule 5: Technical Specifications

DISCLAIMER:

1. Though adequate care has been taken while preparing the RFQ document, the Bidders shall satisfy themselves that the document is complete in all respects. Intimation of any discrepancy shall be given to this office immediately. If no intimation is received from any Bidder within twenty (20) days from the date of notification of RFP and Issue of the Bid documents, it shall be considered that the Bid document is complete in all respects and has been received by the Bidder.

2. Employer, reserves the right to modify, amend or supplement this Bid document including all formats and Annexures.

3. While this RFP has been prepared in good faith, neither Employer nor their employees or advisors make any representation or warranty, express or implied, or accept any responsibility or liability, whatsoever, in respect of any statements or omissions herein, or the accuracy, completeness or reliability of information, and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of this RFP, even if any loss or damage is caused by any act or omission on their part.

4. The specification mentioned for the equipment's viz., Solar modules, inverter, combiner boxes, DC cables, module mounting structures, interfacing panels, switch gears and other associated equipment to complete the Rooftop solar power project and evacuation of power from the solar power plant to metering point. It may be subjected to changes/ alterations as per the design/ planning from the successful Bidder. It is advised that the Bidder must satisfy himself with the prevailing site conditions before submission of his Bid with respect to design proposed. The design must be optimized for the site conditions and directed to achieve the maximum output from the installed capacity at all times. Moreover, the components not mentioned, but are required to complete the plant for operation is also included in the scope of bidder and shall be vetted by Employer.

Place:

(Signature)

Date: Name and Designation of bidder

I. TECHNICAL DETAILS

A. SITE DATA

Particulars	Description
Details of proposed capacity of the solar power plant	140 kWp Rooftop Solar PV Power Plant
Site Address	Karnataka State Remote Sensing Applications Centre, 'DOORA SAMVEDI BHAVANA', Major Sandeep Unnikrishnan Road, Doddabettahalli, Bengaluru-560 097
Location	Bengaluru
Sanction Load	140 KW
Latitude	13.093298
Longitude	77.561821
Altitude	931 metre
Estimated life of PV Power plant	25 years
RCC Roof area	11000 Sq.Ft
Parking lot	Existing parking lot to be dismantled and 50 KW Roof area to be constructed
Nearest Urban Area	Yelahanka
Nearest Highway	NH-44
Nearest Airport	Bengaluru International Airport
CUF	**Min 15% in first Year and standard degradation in the subsequent years.**
Water and Power for Construction	Available within site

B. DESIGN PHILOSOPHY

2.1 The main objective of the design philosophy is to construct the complete Rooftop Solar PV Power Plant with in-built Quality to achieve high availability and reliability with minimum maintenance efforts. In order to achieve this, the following principles shall be adopted while designing system.

2.2 Technology: Mono PERC Solar PV Module of high efficiency and 25 Years linear power output warranty.

2.3 100KW of Grid Interactive Inverter shall be used and for the balance 40KW of Hybrid Type (grid interactive with storage) inverter shall be supplied. The Hybrid inverter shall charge the battery.

2.4 Adequate capacity of SPV modules, Junction boxes with proper protection, Inverters, Cables of appropriate rating (DC and AC) etc. to ensure generation of power as per design estimates. This is

to be done by applying liberal de-rating factors for the PV array and recognizing the component, system efficiency parameters of Inverters etc.

2.5 Use of equipment and systems with proven design and performance that have a high availability track record under similar service conditions.

2.6 Selection of the equipment and adoption of a plant layout to ensure ease of maintenance as well as to enhance the solar plant performance.

2.7 Strict compliance with the approved and proven quality assurance norms and procedures during the different phases of the project, and always use the manuals and specifications issued by the manufacturer

2.8 Proper arrangements with respect to synchronizations to ensure evacuation of power to the grid.

2.9 The plant instrumentation and control system should be designed to ensure high availability and reliability of the plant to assist the operators in the safe and efficient operation of the plant with minimum effort.

2.10 It should also provide for the analysis, study and evaluation of the historical data and help in the plant maintenance people to take up the plant and equipment on preventive maintenance.

2.11 Provide String level monitoring for all the Solar PV modules. The Power generated shall be connected to Inverter through the required number of String Monitoring.

2.12 Appropriate generation voltage of 300-415V AC at Inverter level has to be matched to facilitate onward evacuation to the grid at the point of metering and interconnection. The Contractor is free to select appropriate DC voltage at Inverter input level based on SPV cluster leading to Inverter considering least I^2R loss in DC side.

2.13 The power plant has to operate in parallel with the grid system which is infinite electrical system. Any faults not taken care will result in damage of only SPV power plant without affecting STUs infinite system. Thus the Solar Power Plant has to protect its equipment against any of possible fault or other disturbances from the grid.

2.14 Very fast responsive microprocessor based Directional and Reverse power flow protection should be provided to ensure isolation of the solar power plant from the grid at the time of any fault or/and any additional suitable protection.

2.15 Auxiliary power requirement shall be met through within KSRSAC premises. Necessary equipments, metering panels and related components required for drawing the power shall be in the scope of Contractor Installation shall be done as per relevant IS standards.

2.16 The basic and detailed engineering of the plant shall aim at achieving high standards of operational performance especially considering following:

i. Plant layout to ensure optimum availability for generation during the day time without any shading.
ii. High DC system voltage and low current handling requirements.
iii. Selection of inverters with proven performance and ready availability of requisite spares.

iv. Based on the SOLAR INSOLATION data from reliable sources, the solar PV system should be so designed that it shall take into account the mean energy output after allowing for various losses, temperature corrections, on an average day for each month of the year.

v. Careful logging of operational data / historical information from the Data Monitoring Systems, and periodically processing it to determine abnormal or slowly deteriorating conditions.

vi. Solar PV Power Plant should be designed to operate satisfactorily in parallel with the grid within permissible limits of high voltage and frequency fluctuation conditions, so as to export the maximum possible units generated to the grid. It is also extremely important to safeguard the system during major disturbances, like tripping / pulling out of big generating stations and sudden overloading during falling of portion of the grid loads on the power plant unit in island mode, under fault / feeder tripping conditions.

vii. The specifications provided with this bid document are a functional one; any specifications provided in this document is only meant for ensuring optimum standards and there is no bar to use the equipment's of standards exceeding the standards mentioned. The Bidder must submit a proposal based upon their own design. Bidder must optimize their own design for Solar Photovoltaic (SPV) system with proven technology so that it shall best meet to guarantee the performance factors as it is a part of the acceptance criteria given in this bid document. The bidders are advised to visit the site before designing the plant. The tenderer is free to study the actual condition of the existing location, and required to design proposed step-up substation at Inverter level and pooling sub-station of V level, which shall include the switchgear, communication equipments and systems as required by STU. The Bidder is required to understand and Evaluate the scope of work after visiting KSRSAC office, Bangalore. And subsequently, Tenderer can prepare a suitable, appropriate technical design, necessary site specific drawings, complete bill of materials (BOM) and full technical specifications, compatible to the proposed work.

2.17 Selected Contractor shall prepare the detailed BOQ (Bill of Quantities) and submit a copy to Employer/PMC for evaluation within 15 days from the date LOI /signing of the Contract (whichever is earlier).

2.18 Each component offered by the bidder shall be of established reliability. The minimum target reliability of each equipment shall be established by the bidder considering its failure, mean time between failures and mean time to restore, such that the availability of complete system is assured. The guaranteed annual system availability shall not be less than 99.9%. Bidder recommendation of the mandatory spares shall be on the basis of established reliability.

2.19 Bidder shall design the plant in order to have sustained life of 25 years with minimum maintenance requirements. The supply, erection, commissioning and all other allied works for 140KW (AC) SPV Power Plant shall be completed within 4 months from the date of signing of the Contract or handover of the site, whichever is later.

C. TECHNICAL SPECIFICATION

a) PHOTOVOLTAIC MODULES

i. Solar photo voltaic module array shall consist of high efficiency Solar Modules utilizing Mono PERC indigenous (Made in India) high power Silicon Solar Photovoltaic cells.

ii. Solar photovoltaic module capacity shall not be less than 325Wp at STC.

iii. Solar module shall be laminated using lamination technology using established polymer (EVA) and Tedlar / Polyester laminate. Anti-reflection coating to be applied on cells to improve light absorption and to increase cell performance.

iv. The modules shall be connected in suitable series / parallel combination to meet the voltage / current requirements of the Inverter units.

v. Solar Photovoltaic module efficiency shall be minimum 15% and power tolerance shall be in the range of 0 to +3%. The temperature co-efficient of power for PV modules should be less than or equal to -0.45% per deg C.

vi. The rated output power of any supplied module shall not have negative tolerance.

vii. Module shall be made of high transmissivity glass front surface giving high encapsulation gain and hot butyl rubber edge sealant for module protection and mechanical support.

viii. All materials used must have a proven history of reliable and stable operation in external outdoor applications.

ix. Solar modules shall be designed to operate and perform in relative humidity up to 85% with temperatures between -40 Deg C and +85 Deg C and with stand gusts up to 200 km/h from back side of the panel.

x. The Solar PV modules and production processes employed in the manufacture of the offered module shall be in accordance with the requirements of IEC 61215 Ed 2, IEC 61730 Part 1 & 2, IEC 61701 for operation in corrosive atmosphere.

xi. The above specifications are the minimum requirement of the KSRSAC, however the below MNRE regulations shall also be applicable for the supply and the quality of the PV modules

   a. The Solar PV module manufacturer shall be as per MNRE guidelines "OM: Approved models and manufacturers of Solar Photovoltaic Module, dated 2nd January 2019", and any amendments issued by MNRE till the date of NIT issuance.
   b. Quality of Solar Photovoltaic Module shall be as per the MNRE guidelines, "F.No.223/12/2018-R&D Coord. (QC) Dated on 16th April 2019" and "F.No.223/12/2018-R&D Coord. Dated on 4th November 2019", and any amendments issued by MNRE till the date of NIT issuance.

xii. SPV Modules shall be certified by NABL/IECQ accredited test center. Copy of the above IEC Certifications must be provided along with offer. Undertaking from manufacturer / supplier that the modules being supplied are as per above shall also accompany the offer.

xiii. The module frame must be made of corrosion resistant materials, which is electrolytically compatible with the structural material used for mounting the module.

xiv. Module Junction box shall of Flame proof / Explosion proof type be designed for long life outdoor operation in harsh environment and shall be IP 65 or better.

xv. Efficiency of solar PV system shall be guaranteed to 90% for up to 5 years & 80% for up to 25 years.

xvi. The solar modules shall have suitable encapsulation and sealing arrangements to protect the silicon cells from the environment. The arrangement and the material of encapsulation shall be compatible with the thermal expansion properties of the Silicon cells and the module framing arrangement / material. The encapsulation arrangement ensures complete moisture proofing during life of the solar modules.

xvii. Each module must have low iron tempered glass front for strength and superior light transmission. It also must have tough multilayered back sheet for environment protection against moisture and high voltage electrical insulation.

xviii. The fill factor of modules shall not be less than 0.70%

xix. The Max. System Voltage of the modules used shall be 1000-V DC.

xx. Each PV module shall have an RF identification tag (RFID) fixed inside the module laminate, but able to withstand harsh environmental conditions, containing following information.

- Name of manufacturer of PV Module
- Name of manufacturer of Solar cells
- Month & Year of manufacture (separately for Solar cells & module)
- Country of origin (separately for Solar cells & module)
- I-V Curve for the module
- Peak wattage Im, Vm and FF for the module
- Unique serial no. and model of the module
- Date and year of obtaining IEC PV module qualification certificate
- Name of the test lab issuing IEC certificate
- Any other relevant information on traceability of solar cells and module as per ISO 9000 series.

xxi. Modules shall be North-South oriented.

xxii. MCB of suitable rating to be provided for connecting / disconnecting solar array and PCU for maintenance purposes.

xxiii. The Solar PV Modules shall meet all the requirements of latest MNRE guidelines.

xxiv. Mechanical Features

- Solar Photovoltaic Module shall be made of toughened, low iron content, high transmissivity front glass.
- Anodized Aluminum Frame shall be provided around the module.
- The module shall be encapsulated with Ethyl Vinyl Acetate (EVA).
- Silicon edge sealant shall be provided around laminate.
- The back surface shall be Tedlar /Polyester trilaminate.
- Weather proof (IP 65) terminal box shall be provided for the module output terminations.
- The module shall be Resistant to water, abrasion, hail impact, humidity & other environmental factors for the worst situation at site.
- Bypass diode arrangement shall be provided.
- All nuts and bolts shall be made of very good quality stainless steel (SS 304 minimum)

xxv. Marking:

Each module shall carry the following clear indelible markings as minimum:

- Name of the manufacturer of Module
- Name of the manufacturer of Solar cells
- Month and year of the manufacturing (separately for solar cells and module)
- Country of origin (separately for solar cells and module)
- I-V curve of each module
- Peak Wattage, Im, Vm and FF of each module
- Unique Serial Number and Model Number of each module
- Date and year of obtaining IEC PV module qualification certificate
- Name of the test laboratory issuing IEC certificate

b) Module Mounting Structure

i. Module Mounting Structure should be as per industry standard specifications and supply & installation shall be in scope of contractor.

ii. The structure shall be designed in accordance with the latitude of the place of installation. The array mounting structure shall be designed to allow easy replacement of any module and shall be in line with site requirement. Structure shall be designed for simple mechanical and electrical installation. It shall support SPV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly.

iii. The array structure shall have tilt arrangement to adjust the plane of the solar array for optimum tilt.

iv. The array structure shall be made of hot dip galvanized MS angles/anodized aluminum. The minimum thickness of galvanization shall be at least 80 microns. All nuts & bolts shall be made of very good quality GI. The minimum clearance of the lowest part of the module structure and the developed ground level shall not be less than 500 mm.

v. Leg assembly of module mounting structure made of different diameter galvanized tubes are accepted. The work should be completed with supply, fitting fixing of clamps, saddles, nut & bolts etc. While quoting the rate, the contractor may mention the design & type of structure offered. All nuts & bolts shall be made of very good quality stainless steel.

vi. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from SPV panels at the same time it will withstand wind speed up to maximum of 50 km/hr.

vii. The contractor shall specify installation details of the PV modules and the support structures with appropriate diagrams and drawings after receiving the offer.

viii. PCC ARRAY FOUNDATION BASE: The legs of the structures made with GI angles will be fixed and grouted in the PCC foundation columns made with 1:2:4 cement concrete. The minimum clearance of the lowest part of any module structure shall not be less than 500 mm from ground level. While making foundation design, due consideration shall be given to weight of module assembly, maximum wind speed of 180 km/hr and seismic factors for the site.

ix. The contractor should visit the site before quoting the rate for civil works. After taking in to consideration all aspects of the site, condition of roof etc., the contractor shall quote for civil works. No extra claim shall be entertained at post project stage.

x. The array structure shall support SPV modules at a given orientation and absorb and transfer the mechanical loads to the rooftop columns properly. All nuts and bolts shall be of very good quality stainless /galvanized steel.

xi. In case of any defects arising in the building during guarantee period of Five year, the contractor shall rectify the same at their own cost.

xii. **Parking lot:**

1. Parking area of 50 KW Rooftop Solar PV module installation to be constructed by dismantling the old parking area structures. Contractor should come with their own design to ensure desired life of structures. The shed must be designed and constructed as per relevant IS standards with a guaranteed life of 25 years.
2. All related civil works, disposal of scrap is part of this contract.
3. Design shall be submitted for approval Employer/PMC approval.

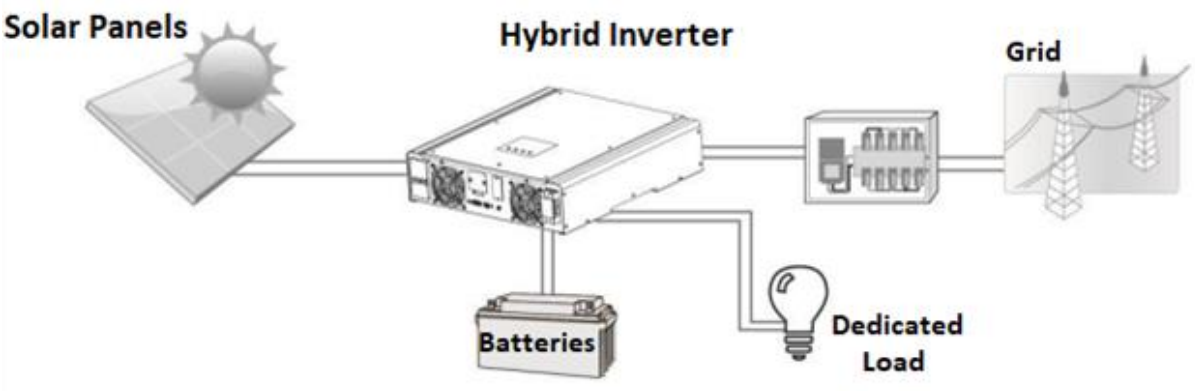
c) DC Combiner Box/Array Junction Box

i. The junction boxes shall be dust proof and made of FRP/powder coated Aluminum.
ii. The terminals shall be connected to copper bus bar arrangement of proper sizes. The junction boxes shall have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and outgoing cables and earthing provision shall be available.
iii. Suitable markings shall be provided on the bus bar for easy identification and cable ferrules shall be fitted at the cable termination points for identification. Each main junction box shall be fitted with appropriate rating blocking diode.
iv. The junction boxes shall be of reputed make and conform to IP65 standards and IEC 62208. Door shall be of hinged door with EPDM rubber gasket to prevent water entry.
v. The junction boxes shall have suitable arrangement for the Following:
    - Combine groups of modules into independent charging sub-arrays that shall be wired to the controller.
    - Provide arrangement for disconnection for each of the groups.
    - Provide a test point for each sub-group for quick fault location.
    - To provide group array isolation.
    - The rating of the JB's shall be suitable with adequate safety factor to inter connect the Solar PV array.
    - Suitable capacity MOVs shall be provided within the box to protect against lightning

vi. Fuse Protection on Strings: DC fuses rated from 2A to 25A from leading manufacturers to be used in the combiner box to provide over-current protection. Fuses to be provided with indication.
vii. Surge Protection Device: Surge Protection devices or SPD to be provided to protect the combiner/junction box from any power surge and voltage spike. SPD to be used should meet Type 2 regulations, and to be typically rated between 600 to 1000V.
viii. Input Glands/ Connectors: The combiner/ array junction box offered is to be provided with IP 67 rated Cable Glands or MC 4 connectors at the input side to lead the array strings into the box.

d) Hybrid Inverter (On Grid Inverter with Battery Backup- BESCOM Approved)

This Hybrid inverter (ON Grid inverter with battery backup for 3 hours) should provide power to connected loads by utilizing PV power, utility power and battery power, and Excess Energy can be exported to Grid with Net metering facility.



Solar PV systems shall generate power to feed the Grid (UTILITY), Charge the batteries and support to the connected load. The string of solar PV panels is mounted on the roof top and when the sunlight falls on these PV panels the solar energy is converted in to DC Voltage. The generated DC voltage from the solar PV panel shall be applied to the solar charge controller provided as built-in Hybrid Inverter so as to control the output voltage (in the charge controller) to the required level depending up on the battery voltage and the inverter shall be able to generate power to feed the Grid (Utility) through Net meter after providing power to the load requirement and charging of batteries through solar power.

A highly reliable microcontroller based digital logic shall ensure that priority is always given to solar. The offered solar Inverter system shall charge batteries as well as cater to the output load and shall export left out power to the grid. In case there is no load and battery is fully charged then entire solar generated shall be exported to the grid. The batteries shall charge through solar until the solar power drops below a predetermined level, in case of power failure the battery should support the dedicated load, without any interruption of power supply.

Once the solar is not healthy through digital logic shall ensure that the Inverter is automatically connected to the mains voltage. The digital logic shall also incorporate a special feature wherein it keeps tracking the healthiness of solar once in every half an hour so that the inverter can be transferred to solar mode once it is healthy. This ensures that maximum utilization of the solar energy even on a partial cloudy day. The hybrid inverter confirming the following specifications should be certified by the original equipment manufacturer and attached along with the technical bid for evaluation.

i. The solar Hybrid Inverter/PCU has the following features with

A) Inverter/PCU

i. PCU Capacity min 10 KW BESCOM approved make
ii. Micro controller based digital logic controller
iii. It should be possible to disable the export of power to grid until the NET meter get installed.
iv. MPPT based high frequency charger
v. Paralleling Up to 6 times
vi. CCCV mode of operation
vii. Overload and short circuit protection
viii. Micro controller based intelligent logic controller for a fail safe and reliable operation
ix. Maximum utilization of solar energy made possible due to the digital intelligent logic controller
x. Intelligent self-test option
xi. Visual LED indication for mode change from solar to mains and vice versa
xii. Highly efficient algorithm.

Sl.no	IEC Standards for Inverter	
1	Efficiency Measurement	IEC 61683/ Equivalent BIS Std.
2	Environmental testing	IEC 60068-2 (1,2,14,30) / Equivalent BIS Std.
3	Interfacing with utility grid	IEC 61727

4	Islanding Prevention Measurement	IEC 62116
5	EMI/EMC	IEC 61000 IEC 61000
6	Safety	IEC - 62109-1 (2010/4) IEC - 62109-2 (2011/6)
All above IEC certificates should be from NABL/ IEC Accredited Testing Laboratories or MNRE Approved Test Centres /or any other International laboratories		

B) Battery bank:

i. Theoretical design, calculations and detailed explanations along with drawing shall be provided and approved by the PMC/Employer

ii. For sizing calculation, an aging factor of 0.8 and a temperature correction factor as per manufacturer's standard at 4°C electrolyte temperature (Based on temperature characteristics curve to be submitted by the Contractor at a temperature of 4°C), Capacity factor, float correction (if applicable) shall be taken into consideration. The sizing of the battery shall be as approved by PMC during detailed engineering. The Contractor shall typically consider a voltage drop of 4V from battery room to the inverter input while sizing the battery

iii. DC Batteries the batteries shall have the following specifications:

Type	: Tubular battery.
Rating	: 48 V, 200 Ah.
No of batteries	: 4 X 200 Ah per 10 KW Hybrid Inverter
Container	: Plastic Resin, ABS or PP

iv. The battery shall be provided with mounting racks and exhaust fan for removal of gasses released from the battery cells.

v. Batteries shall be warranted for five years from the date of COD or the warranty period provided by the original equipment manufacturer, whichever is higher.

e) Grid Interactive Inverter

i. On Grid Inverter Capacity shall be min 25 KW BESCOM approved make

ii. The Power Conditioning Unit (PCU) comprises the Inverter(s) and associated MPPT, control, protection, data logging devices etc.

iii. Solar array shall produce DC energy output which shall be supplied to the DC bus for inverting to AC voltage. Maximum Power Point Tracking (MPPT) system shall be an inherent feature of the system and shall be used to extract maximum energy from solar array to produce 415 VAC 3 ph 50 Hz output. The output shall be synchronized with the station's grid power.

iv. The system shall generate power for use during the day-light hours directly by the captive load.

v. The peak efficiency of PCU shall not be less than 97% & shall be designed to meet the Solar PV Array capacity control which will extract maximum energy from solar array and provides 415V

AC +/-10%, 50HZ, to synchronize (and not export) with local utility grid in Indian ambient conditions.

vi. The efficiency of PCUs at INSOLATION levels of 10% to 90% shall not be less than 90%.

vii. Output of Inverter shall be 3 phase, 415 v +/- 10%, 50 Hz sine wave with < 3% total harmonic distortion (THD). Additionally, it will provide protection features such as over current, short circuit, over temperature as a minimum.

viii. PCU shall be of very high quality having high peak efficiency of 97% and above. The PCU should be completely compatible with the SPV array voltage and local grid / DG supply voltage.

ix. Switching shall be MOSFET / IGBT based.

x. Idle current shall be less than 4% of rated capacity.

xi. The PCU shall be string type inverters to reduce the DC power losses & can have the flexibility to increase the capacity of the plant.

xii. The PCU shall be designed for continuous, reliable power supply as per specifications.

xiii. The PCU shall be capable of complete automatic operation and shall be capable to synchronize independently & automatically with the grid supply and DG Supply. The idea for installing SPV unit is to be utilize whatever power is available and directly feed into the system irrespective of whether grid supply is 'ON' or DG is 'ON' on SOLAR FIRST basis.

xiv. The PCU shall have a data logging facility to remotely monitor and control plant performance through external PC.

xv. The PCU shall have internal protection arrangement against any sustained fault. The dimension, weight, foundation details etc. of the PCU shall be clearly indicated in the detailed technical specification provided by the contractor.

xvi. It has user friendly LED / LCD Graphical display for programming and viewing of the Solar system parameters and protection status.

xvii. The operating temperature range shall be -20 to +50 deg C

xviii. Housing cabinet – IP-20(Minimum) for indoor, IP-65(Minimum) for outdoor

xix. Power factor shall be greater than 0.9

xx. Cooling shall be forced air cooling through cooling fan.

xxi. The system shall be capable of automatic operation with automatic wake-up in the morning and providing supply to the load after synchronizing with Grid/DG supply.

xxii. When the generated power is below a low, preset value or the solar insolation is below a set value for a pre-determined amount of time, the inverter shall be disconnected from the grid and shall be operated in a "sleep mode". In this mode, the inverter power stage components shall be switched off, thereby keeping the stand by losses to a bare minimum.

xxiii. Unique MPPT algorithm shall adjust the DC Link operating voltage to ensure that maximum power is extracted from the solar array in an efficient manner.

xxiv. Automatic "Sleep Mode" shall be provided to reduce standby losses.

xxv. The system shall be designed to minimize both conducted and radiated RFI emissions.

xxvi. The capacity of the Inverter shall be chosen based on the PV system wattage. However, the total Peak Output Power rating of all the PCU's at operating temperatures of 45 deg C shall not be less than name plate rating.

xxvii. Overload protection shall be min. 150% for one minute.

xxviii. The inverter must have a DC disconnect switch / device.

xxix. MCB of suitable rating to be provided for connecting / disconnecting Load and PCU.

xxx. The inverter must have an integrated MODBUS RS-485 interface for connectivity.

xxxi. Potential free contact shall be provided for the 'Solar system operation status' for remote monitoring.

xxxii. The PCU shall meet all the requirements of latest MNRE guidelines.

xxxiii. Metering at Generation side: It should be DC watt hour meter with USB port facility – 01 number.

A) Indications

- Inverter on
- Grid on
- Inverter under voltage / over voltage
- Inverter over load
- Inverter over temperature

B) Protections

- Over voltage at input
- Over current at output
- Over / under output voltage
- Over / under grid frequency
- Over temperature
- Short circuit
- DC reverse polarity
- Protection against lightning
- Surge voltage protection

C) Remote Monitoring

- DC power input
- DC input voltage
- DC input current
- AC power output
- AC voltage
- AC current
- AC frequency
- Power factor
- Energy harvested daily / monthly / yearly
- Inverter status
- Total power generated/operation time

Note: Total plant capacity of 140 KWp is bifurcated into 100 KWp On Grid type and 40 KWp Hybrid type. The PV system should be interfaced with existing UPS & Customer distribution network as per BESCOM standards.

f) AC Distribution Board (ACDB)

An AC distribution box shall be provided between the Inverter and the existing LT Panel. This panel shall have provision for protection, connection and disconnection of individual inverters from the AC system.

The AC Box will be used to combine AC power coming from the inverters.

- The AC Box shall be dust, vermin & made of FRP / ABS plastic /Powder coated material.
- The junction boxes shall have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and outgoing cables.

- Suitable markings shall be provided on the bus bar for easy identification and cable ferrules shall be fitted at the cable termination points for identification.
- It should have the facility to protect from over currents & isolate the AC box from the main AC line.
- The AC Box should have surge protection devices, to protect inverters from surges in the AC line.
- For service & emergency safety requirements, the circuit breakers / load– break switches must have facility for remote operation.
- The Solar Power should be exported to the LT Panel bus bar through an Energy Meter. The Energy meter should have Modbus RS- 485 communication interface.
- All switches and the circuit backers, connectors should confirm to IEC 60947, part I,II & III / IS 60947 / part I , II & III.
- All indoor panels will have protection of IP54 or better. All out door panels will have protection of IP 65 or better.
- Should confirm Indian electricity act & rules (till last amendment).

g) CABLES

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

- Shall meet IEC 60227/IS 694, IEC 60502/IS 1554
- Temp. Range : -100C to +800C
- Voltage rating 660/1000V
- Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- Flexible
- Sizes of cables between array interconnections, array to junction boxes, junction boxes, to inverter etc. shall be so selected to keep the voltage crop (Power loss) of the entire solar system to the minimum (2%)
- For the DC cabling, XLPE or XLPO insulated and sheathed, UV-stabilized single core multi-stranded flexible copper cables shall be used; Multi-core multi-stranded flexible copper cables shall be used; Outdoor AC cables shall have a UV-stabilized outer sheath.
- 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.
- 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.
- Cables and wires used for the interconnection of solar PV modules shall be provided with solar PV connectors(MC4) and couplers.
- 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 mm2 copper; the minimum AC cable size shall be 4.0 mm2 copper. In three phase systems, the size of the neutral wire size shall be equal to the size of the phase wires.
- 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.
- Cable Jacket should also be electron beam cross-linked XLPO, flame retardant, UV resistant and black in colour.
- 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 1.1kV as per relevant standards only.

- The ratings given are approximate. EoI holder to indicate size and length as per system design requirement. All the cables required for the plant shall be provided by the EoI holder. Any change in cabling sizes if desired by the EoI holder shall be approved after citing appropriate reasons. All cable schedules/ layout drawings shall be approved prior to installation.
- The total voltage drop on the cable segments from the solar PV modules to the solar grid inverter shall not exceed 5.0%
- The total voltage drop on the cable segments from the solar grid inverter to the building distribution board shall not exceed 5.0 %.
- Interface voltage level shall be decided based on approval of BESCOM

h) Cables and Accessories

- Grade and shall conform to IS & IEC Standards
- Cable should be Bright Annealed 99% pure Copper Conductor. Conductor shall be of electrolytic copper confirming to IS: 8130
- Cables shall be UV and weathering resistant.
- Voltage drop & losses to be kept to minimum. On DC side voltage drop to be max 1%.
- Cables shall be laid on prefabricated GI cable trays and through suitable HDPE pipes.
- All interfaces between panel integral cable and extension cable must be done using MC4 equivalent connectors only.
- The make of the cables should be Polycab / Finolex / Anchor/VGuard.

i) LT Panel & AC Distribution Box – Interconnection

The Inverter / Power conditioning unit converts DC energy produced by solar array to 3 phase AC power. The AC power output of the inverter shall be fed to the AC Distribution Box (metering panel & isolation panel) which also houses energy meter. The 415 V AC output from the AC distribution box is fed to the owner's LT panel for feeding the building load. The AC power from the Solar Inverter shall be synchronized with the station's supply grid and power is fed into the building load on continuous basis. The connectivity / interfacing of the AC power output from the Solar Inverter to the existing grid power shall be designed and carried out by the contractor. First preference for drawing power shall be from Solar Inverter, the balance power shall be automatically drawn from the grid supply. Contractor shall finalize the scheme of interconnection to LT Panel / load after approval of Employer/PMC. Typical Single Line Diagram is attached in Schedule 6 for reference.

j) Earthing and Lightning Protection

Earthing Protection:

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 provided inside the array field. Provision should be kept for shorting and grounding of the PV array at the time of maintenance work. All metal casing/shielding of the plant should be thoroughly grounded in accordance with Indian Electricity Act/IE Rules. Earth Resistance shall be tested in presence of the representative of KSRSAC as and when required after earthing by calibrated earth tester. PCU, ACDB and DCDB should also be earthed properly. Earth resistance shall not be more than 5 ohms for individual pit and shall be less than 1.0 Ohms for Grid in line. It shall be ensured that all the earths are bonded together to make them at the same potential. The earthing conductor shall be rated for the maximum short circuit current, and shall be

1.56 times the short circuit current. The area of cross -section of conductor shall not be less than 1.6 sq mm in any case. The earthing pits shall be made at locations approved by Employer/PMC.

Lightning protection.

The SPV power plant shall be provided with lightning & overvoltage protection for reducing overvoltage to a tolerable value before it reaches PV or other sub system components. The source of over voltage can be lightning, atmospheric disturbances etc.

The entire space occupying the SPV array shall be suitably protected against lighting by deploying required no of lightning arrestors. Lightning protection should be provided as per IEC 62305 standards. The protection against induced high voltages shall be provided by the use of Metal Oxide Varistors and suitable earthing such that induced transients find an alternate route to earth. Protection shall meet the safety rules as per Indian Electricity Act.

SURGE PROTECTION: -

Internal surge protection shall consist of three MOV type surge -arrestors connected from +ve and -ve terminals to earth (via Y arrangement)
Grid ISLANDING
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 "Island". Powered islands prevent a risk to workers who may expect the area to be unpowered, and they may also damage grid tide equipment. The Rooftop PV system shall be equipped with islanding protection. In addition to disconnect from the grid (due to islanding protection) disconnection due to under and over voltage conditions shall also be provided.
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.

k) METERING SYSTEM

i. The bi-directional electronic energy meter (accuracy class as per requirement of BESCOM) shall be installed for the measurement of import/Export of energy and make shall be as per BESCOM approved vendor.
ii. The bidder must co-ordinate for taking approval/NOC from the Concerned supply company for the connectivity, technical feasibility, and synchronization of SPV plant with distribution network and submit the same to DOP before commissioning of SPV plant. However any expenditure carried out for seeking approval viz. deposition of fee, form cost etc. shall be borne by the dept.
iii. Reverse power relay shall be provided by bidder (if necessary), as per the BESCOM requirement.

l) WEATHER MONITORING SYSTEM

i. As a part of weather monitoring station, Bidder shall provide following measuring instruments with all necessary software & hardware required to integrate with Web Monitoring station so as to enable availability of data in Server.

ii. PYRANOMETER

Contractor shall provide minimum one (01) number of pyranometers for measuring incident global solar radiation. One of them shall be placed on horizontal surface and the other on adjustable inclined plane. The specification for pyranometers shall be as follows:

S No	Details	Values
1.	Spectral Response.	0.31 to 2.8 micron
2.	Sensitivity	Min 7 micro-volt/w/m^2
3.	Time response (95%)	Max 15 s
4.	Non linearity	±0.5%
5.	Temperature Response	±2%
6.	Tilt error	< ±0.5%.
7.	Zero offset thermal radiation	±7 w/m^2
8.	Zero offset temperature change	±2 w/m^2
9.	Operating temperature range	0 deg to +80 deg.
10.	Uncertainty (95% confidence Level)	Hourly-Max-3%, Daily-Max-2%
11.	Non stability	Max ±0.8%
12.	Resolution	Min + / -1 W/m2
13.	Input Power for Instrument & Peripherals	230 Vac
14.	Output Signal	Analogue form which is compatible with the data

Each instrument shall be supplied with necessary cables. Calibration certificate with calibration traceability to World Radiation Reference (WRR) or World Radiation Centre (WRC) shall be furnished along with the equipment. The signal cable length shall not exceed 20m. Bidder shall provide Instrument manual in hard and soft form

iii. THERMOMETER

Contractor shall provide minimum two thermometers (one for ambient temperature measurement with shielding case and other for module temperature measurement). The thermometers shall be RTD / semiconductor type measuring instrument. Instrument shall have a range of 0°C to 80°C. The instrument shall have valid calibration certificate.

iv. ANEMOMETER

Contractor shall provide minimum one no. anemometer with Ultrasonic Type

S No	Details	Values
	Velocity range with accuracy limit	± 0.11 m/s upto 10.1 m/s ± 1.1 % of true when more than 10.1 m/s
	Wind direction range with accuracy limit	0 to 360 deg with accuracy ± 5 deg

The instrument shall have valid calibration certificate.

m) WEB BASED REMOTE MONITORING SYSTEM

The system performance monitoring and solar generation data is recorded using a data logger. The Monitoring system shall comprise of the following main components:

- PCU logs the inverter performance data and transmits the same to the Data logger.
- Data monitoring system logs irradiance (solar insulation) and ambient temperature. Necessary sensors required for the same shall be provided by the Contractor and sensor outputs interfaced to the Solar monitoring system
- Data logger gathers information and monitors the performance of the inverter. It also supports measurements from the external sensors. The data can be acquired through Ethernet port (RJ45) and shall be available to connect to KSRSAC network.
- The data acquisition system shall have a real-time clock and data storage capacity for recording data round the clock for min. one year.
- The monitoring of the Solar system and logging / viewing of system data shall be done through a PC to be supplied by the Contractor.
- PC Data logging software enables automatic long-term storage of measured data from SPV Plant. It allows visualization, monitoring, commissioning and service of the installation.
- The software package shall be preferably windows based.
- The Solar system data shall be logged in chronological order, date wise. The periodicity of data logging shall be configurable.
- Event logging shall be adjustable repetition from 01 second to 600 Seconds, with storage capacity up to 03 Years with 10 minute logs.
- The system shall be capable of providing graphical trends for viewing the system parameters on real time as well as historic basis. It shall be possible to generate reports based on the logged historic data which shall be exportable in MS Excel / PDF formats.
- System shall have provision for remotely viewing the System status on local LAN /INTRANET of KSRSAC.

n) 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 may be finalized in consultation with MEDA / owner.

o) FIRE EXTINGUISHERS:

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

i. Portable fire extinguishers in the control room for fire caused by electrical short circuits
ii. Sand buckets in the control room
iii. 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.

p) SAFETY MEASURES:

i. The contractor 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.

ii. DISPLAY BOARD: The contractor has to display a board at the project site (above 10 kWp) mentioning the following:

iii. Plant Name, Capacity, Location, Type of Renewable Energy plant (Like solar wind etc.) Date of commissioning details of tie-up with transmission and distribution companies, Power generation and Export FY wise.

iv. All the specifications mentioned are the minimum requirements and shall follow all the specifications as per the BESCOM net metering policy.

q) Approval of Designs / Drawings

i. All designs, specifications, reports, etc. shall be submitted to PMC/KSRSAC for approval and upon clearance works shall be executed

ii. Contractor shall submit in the Bid a comprehensive project management schedule in the form of a Gantt chart CPM/PERT chart and shall be liable for abiding by the schedule.

iii. All the Equipments supplied under this contract shall be as per BESCOM approved make and standards only.

II. INSPECTION

a) INSPECTION

i. PMC shall have free access to contractor manufacturer's works to inspect, expedite and witness shop floor tests. Any materials or work found to be defective or which does not meet the requirements of the specification will be rejected and shall be replaced at Bidder's cost. Owner reserves the right to carry out stage wise inspection of fabrication and components. The Contractor shall furnish a detailed quality assurance plan (QAP) for approval of PMC/KSRSAC. The QAP shall contain all the relevant routine test to be conducted as per IS/IEC standards. Type test certificates (obtained within 5 years) for similar design and rating shall be submitted for PMC/KSRSAC review.

ii. The test & inspection shall be carried out at manufacturer's work and at the site with the Contractor obligation. The test and Inspection shall be done in accordance with the relevant standards and the Manufacturer's standard before the delivery to site as well as after the erection and commission at site. The bidders shall give the list of tests that they will carry out at site to show the performance of plant.

iii. A detailed 'QAP' for Manufacturing and Inspection shall be submitted by the Contractor for PMC/KSRSAC approval. The data of each test and inspection shall be recorded and submitted as soon as the test/ trials are conducted and will also be a part of final documentation.

iv. Inspection Test Plan shall be defined by PMC/KSRSAC. Before despatch of Project Supplies from manufacturer premises, Contractor shall obtain despatch clearance from PMC/KSRSAC.

v. The PMC/KSRSAC will nominate its representatives (max. of 2 nos.) for inspection for the agreed equipments and contractor shall bear the cost of all conveyance, boarding & lodging for the inspector.

vi. Manufacturer has to submit procedure for Test carried out at their Factory:

1. Start Up Trials
2. Load Test
3. Records & Measurements

4. Safety Device List
5. Setting values for all sensors for Pressure and Temperature
6. Dimensional Check-up, Overall Inspection, Completeness of Scope of Supply
7. Shop Test/Load Test for Solar Power Plant

b) LOAD TRIALS & RELIABILITY TEST AT SITE

i. Performance Guarantee Test at Site for Grid Connect Solar Power Plant, HT Panel etc. These tests will be conducted at site as per site conditions at available load and after performing all pre-commissioning check and trials and after readiness of the entire Solar Power Plant system which are required to carry out the load trials.

ii. All the tests which are mentioned in the load test of Solar Power Plant will be carried out in presence of PMC at KSRSAC site at site conditions and the parameters checked in accordance with the data sheet and guaranteed parameters given by the Contractor.

III. INSTALLATION & COMMISSIONING

a) INSTALLATION

i. Tools & Tackles
The Contractor shall provide technically suitable tools and tackles for installation & erection of Plant & Machineries conforming to relevant BIS safety and technical standards for proper execution of work. The Employer, in no way, shall be responsible for supply of any tools and tackles for implementation of the work and also to carry out CMC activities.

ii. Setting up/Supervision/Labour /Bench Mark
The Contractor shall be responsible for the true and proper setting-up of the Facilities in relation to bench marks, reference marks which are mutually agreed upon by the Contractor and Employer.

iii. If, at any time during the progress of installation of the Facilities, any error shall appear in the position, level or alignment of the Facilities, the Contractor shall forthwith notify the Engineer-In-Charge of such error and, at its own expense, immediately rectify such error to the satisfaction of the Engineer-In-Charge.

iv. Contractor's Supervision:
The Contractor shall give or provide all necessary superintendence during the installation of the Facilities, and the Construction Manager or its deputy shall be constantly on the Site to provide full-time superintendence of the installation. The Contractor shall provide and employ only technical personnel who are skilled and experienced in their respective disciplines and supervisory staff who are competent to adequately supervise the work at hand.

v. Workmen:
The Contractor shall provide and employ on the Site in the installation of the Facilities such skilled, semi- skilled and unskilled workmen as is necessary for proper and timely execution of the Contract. The Contractor is encouraged to use local workmen that has the necessary skills.

vi. Unless otherwise provided in the Contract, the Contractor shall be responsible for the recruitment,

transportation, accommodation and catering of all workmen, local or expatriate, required for the execution of the Contract and for all payments in connection therewith.

vii. The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the entry of all workmen and personnel to be employed by Contractor on the Site.

viii. The Contractor shall at all times during the progress of the Contract use its best endeavours to prevent any unlawful, riotous or disorderly conduct or behaviour by or amongst its employees and the workmen of its Sub-contractors.

ix. The Contractor shall, in all dealings with its workmen and the workmen of its Sub-contractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the employment of workmen.

x. Contractor's Equipment
All equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the Engineer-In-Charge's consent that such Contractor's Equipment is no longer required for the execution of the Contract. Upon successful commissioning and approval from the KSRSAC Representatives and Independent Consultant, Contractor can remove excess materials

xi. Unless otherwise specified in the Contract, upon Completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor to the Site.

xii. Site Regulations and Safety
The Contractor shall have to provide necessary and adequate safety measures including personal protective equipment and precautions to avoid any accident, which may cause damage to any equipment / material or injury to workmen. The Employer shall not be responsible for any accidents at the Project Site. Also, Contractor shall engage sufficient security guards to protect Facility from any theft and unauthorized access to Site.

xiii. Site Clearance
Site Clearance in Course of Performance
In the course of carrying out the Contract, the Contractor shall keep the Site reasonably free from all unnecessary obstruction, store or remove any surplus materials, clear away any wreckage, rubbish or temporary works from the Site, and remove any Contractor's Equipment no longer required for execution of the Contract.

xiv. Site Clearance after Completion
After Completion of all parts of the Facilities, the Contractor shall clear away and remove all wreckage, rubbish and debris of any kind from the Site, and shall leave the Site and Facilities clean and safe.

xv. Disposal of Scrap
The Contractor shall with the agreement of the Employer promptly remove from the Site any 'Scrap' generated during Performance of any activities at Site in pursuance of the Contract. The term 'Scrap' shall refer to scrap/waste/remnants arising out of the unpacking of equipment, construction debris,

fabrication of structural steel work and piping work at the Project Site in the course of execution of the Contract and shall also include any wastage of cables during the termination process while installing the cables.

xvi. The ownership of such Scrap shall vest with the Contractor except in cases where the items have been issued by the Employer from its stores for their installation only without any adjustment to the Contract Value or any excess quantity lying at the Site after completion of the Project for which payment has been made by the Employer and is the property of the Employer. The removal of scrap shall be subject to the Contractor producing the necessary clearance from the relevant authorities (Custom, Excise etc.), if required by the law, in respect of disposal of the scrap. The liability for the payment of the applicable taxes/duties shall be that of the Contractor.

xvii. The Contractor shall also indemnify to keep the Employer harmless from any act of omission or negligence on the part of the Contractor in following the statutory requirements with regard to removal/disposal of scrap. The Indemnity Bond shall be furnished by the Contractor as per Proforma enclosed as Schedule 3. Further, in case the laws require the Employer to take prior permission of the relevant Authorities before handing over the scrap to the Contractor, the same shall be obtained by the Contractor on behalf of the Employer.

b) COMMISSIONING AND COMPLETION OF THE FACILITIES

i. Contractor shall submit the Commissioning procedure document for PMC/KSRSAC review. The Commissioning shall be done as per the approved procedure.

ii. As soon as installation of the Facilities has, in the opinion of the Contractor, been completed as specified in the Technical Specifications, excluding minor items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify the PMC/OWNER in writing for conducting Pre- Commissioning Test of the Facility in co-ordination with Employer representative.

iii. As soon as all works in respect of Pre-Commissioning are completed and, in the opinion of the Contractor, the Facilities are ready for Commissioning, the Contractor shall so notify the PMC/OWNER in writing.

iv. If the PMC/KSRSAC notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies, and shall repeat the procedure.

v. If the PMC/KSRSAC is satisfied that the Facilities have reached Completion, the PMC/KSRSAC shall, within seven (7) days after receipt of the Contractor's notice, confirm date for the PR guarantee test.

vi. PR guarantee test shall be done as per the procedure defined in the respective clause. Upon successful PR test, PMC/OWNER will issue a Completion Certificate stating that the Facilities have reached Completion as at the date of the Contractor's notice.

vii. As soon as possible after Completion, the Contractor shall complete all outstanding minor items so that the Facilities are fully in accordance with the requirements of the Contract, failing which the Employer will undertake such completion and deduct the costs thereof from any monies owing to the Contractor.

viii. Upon Completion and successful demonstration of the PR test, the Contractor shall be responsible for the care and custody of the Facilities, together with the risk of loss or damage thereto, and shall

thereafter take over the Facilities or the relevant part thereof for the agreed duration of CMC as stipulated and mutually agreed terms and conditions.

IV. PERFORMANCE MEASUREMENT PROCEDURE

i. Pr - Provisional Acceptance Test Verification Procedure
The Performance ratio test aims at the comparison of the actual PV plant energy production with the guaranteed value for a limited operation time of the PV plant of 7 consecutive days.

ii. After Commissioning of the Plant and after receiving all the satisfactory results regarding the correct operation of the plant, there will be continuous monitoring of the performance for 7days. This monitoring will be performed on the site under the supervision of the independent consultant / independent consultant 's engineer.

iii. Third party evaluation also can be carried out for the final acceptance.

iv. The final tests to prove the guaranteed performance parameters shall be conducted at site by the Contractor in presence of the Independent consultant. The Contractor's commissioning / start-up Engineer shall make the plant ready to conduct such tests. The Performance Guarantee Tests (PG tests) shall be commenced, within a period of one (1) month after successful Commissioning. Any extension of time beyond the above one (1) month shall be mutually agreed upon. These tests shall be binding on both the parties to the contract to determine compliance of the equipment with the guaranteed performance parameters.

v. The test will consist of guaranteeing the correct operation of each plant individually over 7 days, by the way of the efficiency rate (performance ratio) based on the reading of the energy produced and delivered to the grid and the average incident solar radiation.

vi. The Efficiency or performance ratio (PR) of the PV Plant is calculated as follows (according to IEC 61724)

$$\text{Performance Ratio (PR)} = [Y_A / Y_R]^* [1 - \alpha * (T_{Cell\ avg.} - T_{Cell})]$$

Where;
Y_A = Final PV system yield (representing the number of hours that the system would need to operate at its rated output power PNom to contribute the same energy to the grid as was monitored)

Or

$$Y_A = Eac / PNom$$

Y_R = Reference yield (representing the number of hours during which the solar radiation would need to be at STC irradiance levels in order to contribute the same incident energy as was monitored)

Or

$$Y_R = IR_{Site} / IR_{STC}$$

E_{ac} = AC energy injected into the grid during a clearly specified amount of time(kWh)

P_{Nom} = Installed nominal peak power of modules (Flash test rating at STC) (kWp)

IR $_{Site}$ = Irradiation on the module plane of array during a clearly specified amount of time (measured with a pyranometer installed on the array plane) (kWh/sq. m)

IR $_{STC}$ = Irradiance at STC (kW/ sq. m)

$T_{Cell\ avg}$ = Irradiance weighted module temperature for the measurement period (°C)

T_{Cell} = Predicted Irradiance weighted module temperature taken from PVsyst (°C)

α = temperature coefficient of power (negative in sign) corresponds to the installed module (%/°C)

Irradiance weighted module temperature (°C) $T_{Cell\ avg}$ can be calculated as follows

$$T_{cell\ avg,\ period} = \frac{\Sigma period\ (Ii\ x\ Tmod,i)}{\Sigma period\ Ii}$$

I_i : actual insolation in POA as measured by the pyranometer for the ith interval

$T_{mod,i}$: actual module temperature as measured by a thermocouple for the ith interval

vii. Monitoring System for PR Verification

The following instrumentation will be used to determine the Solar Plant Performance:

1. Power Meter at the delivery point.
2. Power Meter for each Inverter for reference only.
3. One nos. calibrated pyranometer to determine irradiance on the plane of array (with a target measurement uncertainty of ± 2).
4. One nos. calibrated pyranometer to determine irradiance on horizontal plane (with a target measurement uncertainty of ± 2)
5. Two nos. thermocouples to measure module temperature with a measurement uncertainty of ±1 °C.
6. Shielded ventilated thermocouple with a measurement accuracy of ±1°C.
7. An anemometer mounted on a 10m mast to measure wind speed (without additional shadowing on modules).

Data measurement shall be witnessed in the format mutually agreed before the start of PR test by the independent consultant and the contractor jointly for the said period.
The contractor shall show the specified PR for Operational Acceptance and committed Gross PLF for Final Acceptance.

V. COMPREHENSIVE MAINTANENCE CONTRACT

i. Contractor shall perform the comprehensive maintenance of the solar plant for a period of 5 years from COD.

ii. The CMC shall include the complete operation and maintenance of the plant, servicing of equipments, replacement spares, ensuring the committed energy generation as per the tender condition till the agreed period.

iii. Contractor shall submit the monthly energy generation forecast to KSRSAC/PMC as pre the instruction issued from time to time.

iv. Contractor shall bear all the expenses for the operation and maintenance of the plant

v. The scope of work includes Operation and Maintenance (O&M) of the plant for Five (5) years wherein the plant shall generate at least equivalent to the guaranteed Performance of the plant. The contractor shall submit in the Bid a comprehensive project execution schedule as well as Operation and Maintenance (O&M) schedule with resource planning in the form of Gantt chart and shall be liable for abiding by the schedule. It is the responsibility of the Contractor to perform the necessary maintenance/ timely replacement of all Civil /Mechanical or Electrical components of the project during this O&M period such that the guaranteed performance of the plant is not compromised. Any damage to CIVIL/ ELECTRICAL/ MECHANICAL components of the plant is to be reworked/ replaced/ supplied without any extra cost and time by the Contractor during complete O&M period. The Operation and Maintenance shall be comprehensive. The maintenance service provided shall ensure project functioning of the Solar PV system as a whole and Power Evacuation System to the extent covered in the Contract. All preventive/ routine maintenance and breakdown/ corrective maintenance required for ensuring maximum uptime shall have to be provided.

vi. Preventive / Routine Maintenance:
This shall be done by the Contractor regularly and shall include activities such as cleaning and checking the health of the Plant, cleaning of module surface, tightening of all electrical connections, and any other activity that may be required for proper functioning of the Plant as a whole. Necessary maintenance activities, preventive and routine for Transformers and associated switchgears also shall be included.

vii. Breakdown/ Corrective Maintenance:
Whenever a fault has occurred, the Contractor has to attend to rectify the fault, the fault must be rectified within 48 hrs time from the time of occurrence of fault failing which the Contractor will be penalized as per terms and conditions of this Tender

viii. Spares: Contractor shall supply additional one year mandatory spares to OWNER for the 6th year of maintenance. The spares list shall be finalised based on the plant performance and discretion of OWNER.