**HARYANA POWER GENERATION CORPORATION LIMITED**
**Regd. Office – C-7, Urja Bhawan, Sector-6, Panchkula**
**Corporate Identity Number: U45207HR1997SGC033517**
**Website: www.hpgcl.org.in E-mail: ceplg@hpgcl.org.in**

**e-NIT No: 23/CE/PLG/SPP-335** **Dated: 17.02.2021**

# E-TENDER FOR

# DESIGN, ENGINEERING, PROCUREMENT & SUPPLY, CONSTRUCTION, COMISSIONING AND COMPREHENSIVE OPERATION & MAINTENANCE FOR FIVE (5) YEARS EXTENDABLE FOR ANOTHER FIVE (5) YEARS OF 10 MW SOLAR PHOTOVOLTAIC GRID-CONNECTED POWER PLANT AT VILLAGE-DHANDLAN, BLOCK-BERI, DISTRICT-JHAJJAR, STATE- HARYANA

## ISSUED BY:

## CHIEF ENGINEER/DCRTPP (PLANNING SECTION, HQ)
## HARYANA POWER GENERATION CORPORATION LIMITED (HPGCL)
## C-7, URJA BHAWAN, PANCHKULA (HARYANA)

**HARYANA POWER GENERATION CORPORATION LIMITED**
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**Corporate Identity Number: U45207HR1997SGC033517**
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**Ref: e-NIT no. 23/CE/PLG/SPP-335 Dated: 17.02.2021**

## NOTICE INVITING e-Tender

**SUB: "TENDER FOR DESIGN, ENGINEERING, PROCUREMENT & SUPPLY, CONSTRUCTION, COMISSIONING AND COMPREHENSIVE OPERATION & MAINTENANCE FOR FIVE (5) EXTENDABLE FOR ANOTHER FIVE (5) YEARS OF 10MW SOLAR PHOTOVOLTAIC GRID-CONNECTED POWER PLANT AT VILLAGE-DHANDLAN, BLAOCK-BERI, DISTRICT-JHAJJAR, STATE- HARYANA.**

e-Tender in two parts are invited on behalf of Haryana Power Generation Corporation Limited (HPGCL), Panchkula from eligible parties for the work as under:

Haryana Power Generation Corporation Limited (HPGCL) invites interested parties to participate in this Request for Proposal (this **"Tender")** for bidding and selection process for the appointment of Contractor for "Design, Engineering, Procurement & Supply, Construction, Commissioning and Comprehensive Operation and Maintenance for Five (5) years extendable for another Five (5) years for the following "**Projects"**:

i. 10MW Solar Photovoltaic Grid Connected Power Plant using PV technology at village Dhandlan, block-Beri, district-Jhajjar in the State of Haryana.
   The 10 MW grid-connected solar PV Project is to be developed on the Panchayat land. The proposed land is in shamilat deh measuring 45 Acre 5 Canal 7 Marla measuring Khasra No. 86//2/2(7-0), 3(8-0), 4(8-0), 5(7-12), 79//2/2(7-0), 3(8-0), 4(8-0), 5/1(5-8), 5/2(2-4), 6/1(7-12), 7(8-0), 8(8-0), 9/1(7-0), 8(8-0),9/1(7-0), 12/2(7-0), 79//13(8-0), 14(8-0) 15(7-12), 16(7-12), 17(8-0), 18(8-0), 19/1(7-0), 22/2(7-0), 23(8-0), 24(8-0), 25(7-1), 65//2/2(7-0), 3(8-0), 4(8-0), 5(7-12), 6(7-12), 7(8-0), 8(8-0), 9/1(7-0), 12/2(7-0), 13(8-0), 14(8-0), 65//15(7-12), 16(7-12), 17(8-0),18(8-0), 9/1(7-0) 22/2(6-8), 23(7-7), 24(7-7), 25(6-19), 39//22/2(7-0), 23(8-0), 24(8-0), 25(8-0) at Village Dhandlan, Block-Beri, District-Jhjjar, State- Haryana.

Tender Documents may be downloaded from Website https://etenders.hry.nic.in For view download and any other updates regarding this Tender, kindly check https://etenders.hry.nic.in or www.hpgcl.org.in. Proof of Tender Fee, e-service fee & EMD shall be submitted along with online submission of Tender Documents before the due date. All the relevant documents of the Tender shall also be submitted physically by Registered Post A.D. or Speed Post or in person only which shall be addressed to: **The Chief Engineer/DCRTPP (Planning Section,HQ) Haryana Power Generation Corporation Limited (HPGCL)**, **Ground Floor, C-7, Urja Bhawan, Sector-6, Panchkula-134109, Haryana** super scribing the envelope with Tender No. and Description. The bidder can submit the Tender in person to the office of Tender Issuing Authority before stipulated timeline.

### TABLE A: IMPORTANT DATES

| Sr. | Event | Date & Time |
|---|---|---|
| **i.** | Date of upload of this RFP | 17.02.2021 |
| **ii.** | Last date and time of On-line (e-tendering) tender/offer submission (the "Bid Submission Deadline") | 24.03.2021 at 13:00 Hrs |

| | | |
|---|---|---|
| | **{This is mandatory}** | |
| **iii.** | Tentative date of opening of Technical Bid | 26.03.2021 at 15:00 Hrs |
| **iv.** | Tentative date of opening of online Financial Bid | Shall be intimated later preferably through email. |
| **v.** | Bid Validity | One Hundred and Eighty (180) days from the date of opening of the Price Bid of this Tender |
| **vi.** | Target date for Commissioning of Project | 190 days from Letter of Intent |
| **vii.** | Tentative Date for Operational Acceptance Test | 220 days from Letter of Intent |
| **viii.** | Performance Guarantee Testing Period | One (1) year from date of both,<br>**A)** Successful Operational Acceptance Test, and<br>**B)** Completion of Facilities.<br>(whichever is later) |
| **ix.** | Operation and Maintenance Period | Five (5) years from date of both,<br>A) Successful Operational Acceptance Test of Project, and<br>B) Completion of Facilities.<br>(whichever is later)<br>The O&M can be extended solely on the discretion of the Company for another Five (5) years after the completion of first Five (5) years of O&M. |

Note: The abovementioned dates are subject to amendment, in which case the amendments shall be intimated.

Executive Engineer/Planning-I
for CE/DCRTPP (Planning Section, HQ)
HPGCL, Panchkula.

## TABLE B: IMPORTANT AMOUNTS

<table>
<tr><th>Sr.</th><th>Head</th><th>Amount (and validity)</th></tr>
<tr><td>i.</td><td>Tender Fees (non-refundable)</td><td>Rupees 5,900/- inclusive of GST (and V)</td></tr>
<tr><td>ii.</td><td>E- services fee</td><td>Rupees 1,000/-</td></tr>
<tr><td>iii.</td><td>Earnest Money Deposit (EMD) in RTGS/NEFT/ (Refundable/adjustable)</td><td>@ Rs 10 Lakh / MW of the total capacity i.e.<br>• <u>For 10MW</u>: Rupees 1,00,00,000/- (EMD should be in the shape of Bank Guarantee (BG) with validity of 12 months, further extendable, if required).<br>(Original Hard copy of the bank guarantee should be submitted along with Part-I).</td></tr>
<tr><td>iv.</td><td>Performance Bank Guarantee (PBG)<br>(As per Director General Supplies & Disposal Department, Haryana vide Order No. DGS&D/Admin/Performance Security/2020/8780-8959 dated 14.12.2020)
<table>
<tr><th>Sr. No</th><th>Type of Firm/Enterprises</th><th>Value of Performance Security Deposit</th></tr>
<tr><td>1</td><td>Haryana based firms:-<br>(i) # Haryana Based Micro and Small Enterprises (MSEs)<br>(ii) Haryana based other firms/enterprises</td><td>(i) @0.2% of the value of contract<br>(ii) @2% of the value of contract</td></tr>
<tr><td>2</td><td>Other States/ UTs based firms</td><td>@3% of the value of contract</td></tr>
<tr><td colspan="3"># Haryana based MSEs will be eligible for performance security deposit @ 0.2% who have filed SSI Certificate/EM Part-II/Udyog Aadhaar Memorandum (UAM)/Udyam Registration in Haryana and who participate directly in the tendered/quoted items and offering to supply the entire Work/Supply Order by their enterprise.</td></tr>
</table></td><td><u>First Stage (Supply and Services):</u> The First Stage (Supply & Services) value of the Performance Guarantee shall be furnished as per Director General Supplies & Disposal Department, Haryana vide Order No. DGS&D/Admin/Performance Security/2020/8780-8959 dated 14.12.2020 of the Contract Value (i.e., total sum of the Supply Contract & Service Contract) and will remain valid 90 (Ninety) days beyond half of the prescribed O & M Period, i.e. 5 (five) Years. Henceforth, Performance Bank Guarantee needs to be furnished for the first 5 (five) Years of the O & M period (i.e. 63 Months).</td></tr>
<tr><td>v.</td><td>O&M Bank Guarantee (O&M BG)</td><td><u>Second Stage (O&M):</u> The Second Stage (O&M), Performance Bank Guarantee shall be furnished 30 days prior to completion of first 5 years of O&M and value of the Performance Bank Guarantee shall be 5% of the Contract Value (i.e., total sum of the Supply Contract & Service Contract) and will remain valid 90 (Ninety) days beyond the balance O & M Period, i.e. 5 (five) years. Henceforth,5% Performance Bank Guarantee needs to be furnished for the last 5 (five) years of the O & M period (i.e. 64 Months).</td></tr>
</table>

**<u>IMPORTANT NOTE TO BIDDERS:</u>**

**Timely Submission of offer to HPGCL:** In addition to bid submitted online**, it is mandatory that** the proof of Tender Fee, e-service fee and EMD be submitted physically in sealed cover so that the same is received in this office on or before the due date and time, otherwise tender will not be conisdered. All such documents should be strictly submitted by RPAD / speed post/ in person only. **<u>Please note that Price Bid is not to be submitted in physical form</u>** .

No tender shall be accepted in any case after due date and time of receipt of the Tender, irrespective of delay due to postal services or any other reasons and HPGCL does not assume any responsibility for late receipt of the Tender.

1. All interested parties are requested to understand this Tender in detail in order to comply with HPGCL's requirements including but not limited to the fees and deadlines, selection criteria, selection methodology, scope of work, and minimum technical standards. They

shall be strictly abide by ALL terms prescribed in this Tender and provide accurate information to the best of their knowledge without misleading the Company to be considered for participation in this Project.

2. It is **mandatory** for all the bidders to submit their **Financial Bid ONLINE only** via e-tendering portal.
3. **Technical Bid (techno-commercial bid)** to be submitted online in scheduled time. Further, all the bidders should also submit their Technical bid (Techno -commercial bid) alongwith relevant documents in hard copy in scheduled time.
4. **Technical bid (Techno-commercial bid)** envelope shall be super scribed as: "Tender e-NIT no. **23/CE/PLG/SPP-335 Dated: 17.02.2021**." Technical Bid (Techno-commercial bid) due for opening on 26/03/2021".
5. All the envelopes should be addressed to: *The Chief Engineer/ Planning, Haryana Power Generation Corporation Limited (HPGCL), Ground Floor, C-7, Urja Bhawan, Sector-6, Panchkula-134 109, Haryana*. Complete postal address of the bidder should appear on all the envelopes so that it is possible to find out whose bid it is without opening the envelope.
6. **Hard Copy** of proof of payments for Tender Fee, e–service and EMD (in the shape of BG) shall be submitted in scheduled time.
7. Tender Fee is non-refundable. Cheques are not acceptable.
8. Bidder(s) have to pay EMD as mentioned in NIT in the shape of BG..
9. It is mandatory for all bidders to submit their PRICE-BID (APPENDIX 14) only through online (e-tendering). Price bid submitted in physical form will not be considered for its opening and only online submitted price bid will be considered for evaluation. Bidders to note that Price Bid (APPENDIX 14) of those bidders shall be opened (Online/e-tendering) who is found technically qualified and is found reasonably responsive to HPGCL's tender terms and conditions and Scope of Works.
10. All the Bidders shall fulfill the pre-qualification criteria as stipulated in Clause No. 3.2.
11. Any technical/commercial query pertaining to this Tender should be referred to:

**The Chief Engineer/DCRTPP (Planning, HQ)**
**Haryana Power Generation Corporation Limited,**
**C-7, Urja Bhawan, Sector-6,**
**Panchkula-134 109, Haryana Ph: 0172- 2586861**
**Email: ceplg@hpgcl.org.in Website: www.hpgcl.org.in**

**Alternate Contact Details:**

1. Mr. Prem Kumar (XEN-Planning-I) - +91 9316083453
2. Mr. Mandeep Singh (AEE-Planning-I) - +91 9316479115

12. HPGCL reserve the rights to accept/ reject any or all tenders without assigning any reasons thereof. Bidders are requested to be in touch with above-mentioned websites till opening of the price bid to know the latest status.

Executive Engineer/Planning-I
for CE/DCRTPP (Planning Section, HQ)
HPGCL, Panchkula.

--- End of Section ---

**Document Checklist**

[Note: Document Checklist shall be attached with **Appendix 2**: Format for Covering Letter]

| Sr. | Document | Complied/ Attached? (Yes/ No) | For Official Use |
|---|---|---|---|
| 1. | Complete sets of Bids (original and copies) as prescribed in Section 4.3. | | |
| 2. | Signed Tender Document(s) in Cover-I as described in Section 4.3.3. | | |
| 3. | Enclosures of the Bid including the Covering Letter as per the format prescribed in **Appendix 2**: Format for Covering Letter in Cover-II. | | |
| 4. | Proof of Tender Fees in the form of Demand Draft in Cover-III. | | |
| 5. | Proof of e-service fee in the form of Demand Draft in Cover-III. | | |
| 6. | Proof EMD in the shape of BG in Cover-III. | | |
| 7. | Details of the Bidder as per format prescribed in Appendix 3: Format of Details of Bidder | | |
| 8. | Attested copy of Tax Registration Certificate of Bidder. | | |
| 9. | Attested copy of PAN Card for Bidder. | | |
| 10. | Attested Certificate of Commencement of Business issued by the Registrar of Companies for the Bidder. | | |
| 11. | Attested copy of Provident Fund Code of Bidder. | | |
| 12. | Details of similar technical experience of the Bidder as per format prescribed in **Appendix 4**: Format of Details of Similar Technical Experience. | | |
| 13. | Curriculum Vitae of all qualified technical staff indicated in **Appendix 5**: Format of Details of Qualified Technical Staff. | | |
| 14. | Details of proposed PV technologies as per format prescribed in **Appendix 6**: Format of Disclosure of PV Technology Proposed | | |
| 15. | Project execution plan as mentioned in **Appendix 7**: Format of Project Execution Plan | | |
| 16. | Declaration of Compliance as per format prescribed in **Appendix 8**: Format of Declaration of Compliance. | | |
| 17. | No Deviation Certificate as per format prescribed in **Appendix 9**: Format of No Deviation Certificate. | | |
| 18. | Declaration of Bidder's relation to Directors of HPGCL as per format prescribed in **Appendix 10**: Format of Declaration on Bidder's Relation to Directors. | | |
| 19. | Power of Attorney by the Bidder authorizing the signatory as per format prescribed in **Appendix 11**: | | |
| 20. | Format of Summary of audited financial statements as per format prescribed in **Appendix 12**: Format of summary of Audited Financial Statements. | | |
| 21. | Audited financial statements of the Bidder for the years indicated in **Appendix 12**: Format of summary of Audited Financial Statements | | |
| 22. | (If applicable) Authorization of use of financial capability by Parent as per format prescribed in **Appendix 13**: Format of Authorization by Parent Company the necessary financial statements and summary required from the Bidder. | | |
| 23. | Financial Proposal (unpriced) as per the format prescribed in **Appendix 14**: in Cover-IV. | | |
| 24. | Project Operation & Maintenance (O&M) Schedule with resource planning in the form of Gantt/ Pert Charts | | |
| 25. | Technical specifications and warranty document of PV modules | | |

| | | | |
|---|---|---|---|
| 26. | Design, specifications and document of Solar Tracking solutions (if proposed by Bidder) | | |
| 27. | Basic engineering drawings pertaining to the proposed plant as prescribed in Clause No. 5 | | |
| 28. | Specifications / Drawings / Designs and datasheets for all electrical work / components as prescribed in Clause No. 5.1.12 | | |
| 29. | Technical specifications and warranty document of Inverters | | |
| 30. | Transformers, associated switchgear and others: Bidder shall furnish in detail its warranties/guarantees for these items. | | |

Executive Engineer/Planning-I
for CE/DCRTPP (Planning Section, HQ)
HPGCL, Panchkula.

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Table of Contents

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# Chapter-1

## 1 Definitions, Interpretation and Brief Introduction on HPGCL

### 1.1 Definitions

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

1.1.1 "Actual Delivered Energy" means the net energy in kilo-watt hour (kWh) from Solar PV plant as measured at the Metering Point.

1.1.2 "Adjudicator" means the person, who shall be an engineer or a firm of engineers who is appointed by HPGCL to act as the adjudicator to make a decision on or to settle any dispute or difference between HPGCL and the Contractor referred to it by the parties pursuant to Tender (Adjudicator) hereof.

1.1.3 "Applicable Law" means any statute, law, regulation, ordinance, notification, rule, regulation 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.

1.1.4 "Base NEEGG" for a year is calculated by using the Net Electrical Energy Generation Guarantee (NEEGG) quoted in the Bid offer by the Contractor adjusted with a correction factor to take into account the actual average global solar radiation measured by the calibrated pyranometer for that year.

1.1.5 "Bid" shall mean the bid submitted by the Bidder in response to this Tender Ref. No. e-NIT no. **23/CE/PLG/SPP-335 Dated: 17.02.2021** issued by HPGCL.

1.1.6 "Bidder"- Any reference to the Bidder includes Bidding Company including its successors, executors and permitted assignee. severally, as the context may require;

1.1.7 "Capacity Utilization Factor (CUF)" shall have the same meaning as provided in CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2009 as amended from time to time.

1.1.8 "Chartered Accountant" shall mean a person practicing in India or a firm whereof all the partners practicing in India as a Chartered Accountant(s) within the meaning of the Chartered Accountants Act, 1949.

1.1.9 "Commissioning" means the satisfactory, continuous and uninterrupted operation of the equipment/system as specified after all necessary statutory approvals, initial tests, checks and adjustments for a period of at least 3 days to the satisfaction of HPGCL and necessary certificates are issued by the all concerned/ nodal agencies appointed by HPPC /HPGCL/ HAREDA/ HVPNL/ UHVBN.

1.1.10 "Company" means HPGCL, the same definition applies as per Clause 1.1.31.

1.1.11 "Completion of the Facilities" means that the Facilities (or a specific part thereof where specific parts are specified in the Scope of Work) have been completed operationally and structurally and put in a tight and clean condition and that all work in respect of Commissioning of the Facilities or such specific part thereof has been completed as per

the Scope of Work

1.1.12 “Consultant” shall mean any consultant hired by HPGCL or the company for the purpose of this project.

1.1.13 “Contract” or “Contract Agreement” means the Contract signed between HPGCL and the Contractor to execute the entire Scope of Work as given in Appendix 20: Format of Agreement between HPGCL and the Contractor.

1.1.14 “Contract Documents” means the documents listed in Appendix 20: Format of Agreement between HPGCL and the Contractor

1.1.15 “Contractor” means the Successful Bidder with whom contract is signed by HPGCL includes the legal successors or permitted assignee of the Contractor.

1.1.16 “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.

1.1.17 “Day” means calendar day of the Gregorian calendar.

1.1.18 “Delivery Point” shall be the interconnection point at which solar power developer (SPD) shall deliver the power to the Haryana State Transmission Unit/ Discom substation. The metering shall be done at this point of interconnection.

1.1.19 “Defect Liability Period” means the period of validity of the warranties given by the Contractor, during which the Contractor is responsible for defects with respect to the Facilities (or the relevant part thereof) as provided in Clause No. 6.13 hereof.

1.1.20 “DHBVNL” shall mean Dakshin Haryana Bijli Vitran Nigam Limited.

1.1.21 “Effective Date” for this Contract shall mean the date of issuance of Letter of Intent by HPGCL.

1.1.22 “Engineer-in-Charge” shall mean the engineer appointed at Project site by HPGCL.

1.1.23 “Facilities” means the Plant and Equipment to be supplied and installed, as well as all the Installation Services to be carried out by the Contractor under the Contract for enabling the installation, construction, testing and commissioning of the Solar Power System(s).

1.1.24 “Financial Bid” or “Financial Proposal” means the proposal submitted by the Bidder online and by post (unpriced) as a part of the Bid including the EPC Contract Price, O&M Contract Price and Guaranteed Generation as per format prescribed in Appendix 14: .

1.1.25 “Guaranteed CUF” means the CUF calculated as per Clause No. 1.1.7 considering NEEGG quoted by the Bidder in the Tender document at the time of submission of Bid.

1.1.26 "Government Authority" means Government of India, any state government or any governmental department, commission, board, body, bureau, agency, authority, undertaking, or administrative body or any sub-division or instrumentality thereof, central, state, or local, having jurisdiction over the Contractor, the Facility, or the performance of all or any of the services, obligations or covenants of Contractor under or pursuant to this Contract or any portion thereof.

1.1.27 "Guarantee Test(s)" means the Performance & Guarantee Test(s) specified in this Tender to be carried out to ascertain whether the Facilities or a specified part thereof is able to attain the Functional Guarantees.

1.1.28 "HAREDA" shall mean Haryana Renewable Energy Development Agency.

1.1.29 "HERC" shall mean Haryana Electricity Regulatory Commission constituted under section 82 of Electricity Act 2003 or its successors.

1.1.30 "HPGCL" means Haryana Power Generation Corporation Limited (HPGCL) and includes the legal successors or permitted assigns.

1.1.31 "HPPC" shall mean Haryana Power Purchase Centre.

1.1.32 "HVPNL" shall mean Haryana Vidyut Prasaran Nigam Limited.

1.1.33 "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, expediting, Site preparation works (including the provision and use of Contractor's Equipment and the supply of all civil, structural and construction materials required), installation, Commissioning, carrying out guarantee tests, operations, maintenance, the provision of operations and maintenance manuals, training of HPGCL's personnel etc.

1.1.34 "JNNSM" means the Jawaharlal Nehru National Solar Mission.

1.1.35 "Metering Point" for purposes of recording of Delivered Energy will be the Delivery Point.

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

1.1.37 "MNRE" means Ministry of New and Renewable Energy, Government of India.

1.1.38 "Price Bid" means the same as per Clause No. 1.1.24.

1.1.39 "PTPS" means Panipat Thermal Power Station.

1.1.40 "O&M" means Operations and Maintenance.

1.1.41 "Owner(s)" means HPGCL and includes the legal successors or permitted assigns.

1.1.42 "Party" or "Parties" means individually any one of the Bidder, Contractor or HPGCL; or collectively any or all of the Bidder, Contractor or HPGCL; respectively.

1.1.43 "Plant(s)" means the 10 MW Grid-Connected Solar Photovoltaic Power Plant proposed at Dhandlan, Jhajjar, State: Haryana as per the provisions in this Tender.

1.1.44 "Plant Capacity" is defined as the function of cumulative rated DC capacity of all solar

PV modules under STC conditions as defined and measured in adhering to the guidelines of latest version of applicable IEC standard for crystalline silicon PV module technologies as well as cumulative rated AC capacity of the grid connected inverters, utility interface, performance measurement and safety norms in accordance the relevant guidelines of MNRE/ UHVBN / any other Haryana State Agencies guidelines as well as the requirements stipulated by HPGCL.

1.1.45 "Project" means the the 10 MW Grid-Connected Solar Photovoltaic Power Plant proposed at Dhandlan, Jhajjar, State: Haryana as per the provisions in this Tender including but not limited to its design, engineering, procurement & supply, construction, commissioning, compressive operation and maintenance.

1.1.46 "Project Manager" means the person appointed by HPGCL in the manner provided in the Tender (Project Manager) hereof and named to perform the duties delegated by HPGCL.

1.1.47 "Prudent Utility Practices" means those practices, methods, techniques and standards, that are generally accepted for use in electric utility industries taking into account conditions in India, and commonly used in prudent electric utility engineering and operations to design, engineer, construct, test, operate and maintain equipment lawfully, safely, efficiently and economically as applicable to power stations of the size, service and type of the Project, and that generally conform to the manufacturer's operation and maintenance guidelines.

1.1.48 "Power Purchase" means whosoever with whom HPGCL has signed a Power Purchase Agreement (PPA) for offtake of power from the proposed 10 MW Solar PV Plant.

1.1.49 "SECI" means Solar Energy Corporation of India.

1.1.50 "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.

1.1.51 "Solar Power System(s)" means the solar photovoltaic grid connected power system(s) to be established at the site specified in the Tender.

1.1.52 "Subcontractor", 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.

1.1.53 "Successful Bidder" means the Bidder who is financially and technically eligible and qualified, and evaluated as the Lowest Evaluated Bidder as per the provisions in this Tender and to whom the contract is awarded.

1.1.54 "Tender" or "Tender Document(s)" shall mean this Tender Ref. No. e-NIT no. **23/CE/PLG/SPP-335 Dated: 17.02.2021** issued by HPGCL including its annexures, appendices, attachments, amendments and any other documents as added or modified by HPGCL as per the provisions in this Tender.

1.1.55 "Tender Issuing Authority" means the office of Chief Engineer/ Planning, Haryana Power

Generation Corporation Limited (HPGCL), Panchkula.

1.1.56 “Time for Completion” shall be the date on or before which Completion of the Facility has to be achieved to the satisfaction of HPGCL and such date is specified in NIT.

1.1.57 “UHVBNL” shall mean Uttar Haryana Bijli Vitran Nigam Limited.

**1.2 Interpretations**

1.2.1 Language: Unless otherwise agreed by the parties in writing, the parties shall use the English language and the Contract and the other Bid documents, all correspondence and communications to be given, and all other documentation to be prepared and supplied under the Contract shall be written in English, and the Contract shall be construed and interpreted in accordance with that language. If any of the Contract Documents, correspondence or communications are prepared in any language other than English, the English translation of such documents, correspondence or communications shall prevail in matters of interpretation.

1.2.2 References: All Clauses, Sections, Chapters, Appendices, Annexure or any other objects mentioned in this Tender shall refer to the same in this Tender unless specified otherwise.

1.2.3 Singular and Plural: The singular shall include the plural and the plural the singular, except where the context otherwise requires.

1.2.4 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.

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

1.2.6 Men: The word ‘Men’ in this Tender shall mean all genders i.e. male, female and others.

1.2.7 Entire Agreement: The Contract constitutes the entire agreement between HPGCL 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. Should there be any discrepancy, inconsistency, error or omission in the Contract documents, the matter may be referred to the Adjudicator and the Contractor shall carry out work in accordance with the decision of the Adjudicator.

1.2.8 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.

1.2.9 Time: Any time, unless mentioned otherwise, shall be as per Indian Standard Time (IST).

1.2.10 Currency: All amounts mentioned as Rupees, Rs. or INR shall be interpreted as Indian Rupees.

1.2.11 Independent Contractor: Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed.

a. All employees, representatives or subcontractors 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 HPGCL and nothing contained in the Contract or in any sub-contract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives or Subcontractors and HPGCL.

b. Not in any case the sub-contractor shall claim or shall put any binding to HPGCL and the sub-contractor must be handled by the Contractor and HPGCL shall not be responsible for any claims at anytime by the Contractor in relation to the sub-contractor.

1.2.12 Non-Waiver:

a. Subject to Clause1.2.12 (b) below, no relaxation, forbearance, delay or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect or restrict the rights of that party under the Contract, nor shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

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

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

1.2.14 Country of Origin: "Origin" means the place where the materials, equipment and other supplies for the facilities are mined, grown, produced or manufactured, as the case may be, and from which the services are provided. This shall be according to MNRE/ HVPNL/ UHVBN/ HPPC guidelines as well as in accordance to the relevant provisions of Haryana Solar Policy 2014 and subsequent amendments.

## 1.3 About HPGCL

Haryana is one of the forerunners to initiate reforms in its power sector in 1997. Pursuant to these reforms the State Electricity Board was unbundled and reorganized on 14 August 1998. Two wholly State-owned Utilities were established to independently perform the functions of generation, transmission and distribution of power. Subsequently, two more Utilities were created for looking after power distribution.

HPGCL was incorporated as a company on 17 March 1997 and was given the responsibility of operating and maintaining State's own generation projects. The business of Generation of Power of erstwhile Haryana State Electricity Board (HSEB)

was transferred to HPGCL on 14 August 1998 pursuant to Power Reforms in Haryana. As a result, HPGCL came into existence on 14 August 1998 for bringing in excellence in power generation in the State's own generating stations. In addition, it has been entrusted with the responsibility of setting up of new generating stations in order to keep pace with the ever increasing demand of power. HPGCL has installed generation capacity of 2582.4 MW comprising of following thermal/ hydel/ solar power stations.

- 710 MW Panipat Thermal Power Station, Panipat
- 10 MW Solar PV Plant, Panipat
- 600 MW Deenbandhu Chhottu Ram Thermal Power Station, Yamunanagar
- 1200 MW Rajiv Gandhi Thermal Power Station, Hisar
- 62.4 MW hydel project at Western Yamuna Canal(WYC), Yamunanagar

The HPGCL has embarked on a mission to establish itself as a modern, growth oriented organization and to make its presence felt in the country's dynamic power sector. HPGCL has a vision to become a modern world class power generation company, committed to powering Haryana's growth on all fronts by maximizing generation and minimizing the cost of power from existing plants and by planning and implementing new generation projects.

HPGCL raised the level of its operations to global standards after obtaining ISO: 9001, ISO: 14001 and OHSAS: 18001 Certifications, for its power stations at Yamuna Nagar, Hisar & Panipat and Corporate Office at Panchkula.

1.3.1 Haryana Power Purchase Centre (HPPC), presently headed by Chief Engineer/HPPC, is a joint forum created by Haryana DisCom i.e. Uttar Haryana Bijli Vitaran Nigam Limited (UHBVNL) and Dakshin Haryana Bijli Vitaran Nigam Limited (DHBVNL). HPPC is responsible for purchase of long/short term power, on behalf of Haryana DisCom's including Solar Power to meet with the solar RPO. Further, Haryana Renewable Energy Development Agency (HAREDA) being nodal agency of Haryana Government for non-conventional and renewable sources of energy in the State is also responsible for development of solar & non-conventional sources.

Executive Engineer/Planning-I
for CE/DCRTPP (Planning Section, HQ)
HPGCL, Panchkula.

--- End of Section ---

# Chapter-2

## 2 Information regarding online payment of Tender Document, e-service & EMD Fee

1. The Bidders can download the Tender Documents from the Portal https://etenders.hry.nic.in

2. The Bidders shall have to pay for the Tender Documents, EMD Fees & eService Fee.

3. The Bidders shall submit their Tender Documents (Online) alongwith proof of Tender Fees, e-service and EMD as per the details given in NIT and Appendix 1: Instruction to Bidder on Electronic Tendering system.

**NOTE:**

1. If the Tender is cancelled or recalled on any grounds, the Tender Document Fees & e-Service Fee will not be refunded to the agency.
2. Those agency who are exempted from EMD, should submit proof of related documents at least 10 days before end date of **"Downloading of Tender Documents & Bid Preparation" stage to publisher of the tender i.e. Chief Engineer/ Planning, HPGCL, Panchkula, Haryana.**

The following will be exempted from depositing the earnest money: -

i) Central / Haryana State Government agencies applying in response to the tender. Provided further that the provision of this regulation may not apply to a Public Sector Undertaking of the Central / Haryana State Government with whom separate terms regarding Security Deposit, if any, may be negotiated / provided for.

ii) Bidder(s) borne on D.G.S.&D / DS&D Haryana rate contracts. The exemption shall be for the specified items which are available on DGS&D / DS&D rate contract.

iii) Bidder(s) registered with the Director of Industries, Haryana or registered with National Small Industries Corporation, Govt. of India. The exemption shall be for the specified items which are available on Director of Industries, Haryana / National Small Industries Corporation rate contract.

iv) Bidder(s) borne on the HPGCL's approved list of suppliers which may have made a permanent earnest money deposit of Rs.10.00 Lakh for quoting at the respective project / office of HPGCL or Rs.20.00 lakh for quoting anywhere in the HPGCL, if they quote the registration number given by the respective project / office of HPGCL in their tender papers.

v) The Haryana based Micro, Small and Medium Industrial Enterprises (MSME) shall be provided exemptions/concessions in EMD/Bid Security, performance security and financial criteria etc. as per the Haryana State Public Procurement policy for MSME - 2016 issued vide orders no. G.O. No.- 2/2/2016-41B11 (1) dated 20.10.2016 & G.O. No.- 2/2/2016-41B11 (2) dated 20.10.2016 . For exemption the bidders has to upload with Techno-commercial bid (Part-I) the format of affidavits Annexed as **Annexure –I** and **Annexure –II** with the above referred order for concessions.

--- End of Section ---

# Chapter-3

## 3 Instructions to Bidders

### 3.1 General Instructions

3.1.1 The current document is the Tender, which is issued to all the potential Bidders, requesting a Bid for implementation of the Project on a fixed price basis. A Contractor would be selected through competitive bidding process for execution of the Project.

3.1.2 Any information regarding tender can be obtained from the office of Chief Engineer/ Planning, HPGCL, Panchkula at (ceplg@hpgcl.org.in) on any working day well in time prior to last date of submission of tenders.

3.1.3 Before submitting tenders, the instructions may be read carefully regarding submission of tender. If any bidder finds discrepancies or omissions in the Tender documents or is in doubt as to the true meaning of any part, he shall clarify same from the Tender issuing office in writing before the due date of submission of the queries.

3.1.4 Unless exempted specifically, tenders not accompanied with the prescribed EMD, Tender Fees & e-Service fee shall be rejected. EMD / Tender Fees shall be in the prescribed mode of payment as asked in the NIT otherwise the tender shall be liable to be rejected.

3.1.5 The validity of the Tender / offer shall be for 180 days from the date of opening of the Price Bid.

3.1.6 The details of NIT along with Tender Documents can be seen and downloaded from the portal https://etenders.hry.nic.in as well as HPGCL website www.hpgcl.org.in .

3.1.7 The committee nominated by HPGCL shall evaluate all the bids received against NIT on the parameter indicated under heading Pre-Qualifying Requirement (PQRs)/ Eligibility conditions in Clause 3.2 and other relevant clause of the Tender. The decision of the committee shall be final.

3.1.8 Issuance of Tender Documents to any party shall not construe that such party is considered to be qualified.

3.1.9 In case due dates of sale / receipt /opening of the Tender happens to be holiday in HPGCL, Panchkula, the needful will be done on next working day.

3.1.10 The bidders/ contractors shall observe the highest standards of ethics during the submission of tender, procurement and execution of the contract. In case of evidence of cartel formation by the Bidder(s) EMD is liable to be forfeited.

3.1.11 The bidder shall bear all costs including bank charges if any, associated with the preparation and submission of his bid and the purchaser will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

3.1.12 Tender Issuing Authority reserves the right to cancel the NIT or to change qualifying

requirement or to reject any or all the tenders so received without assigning any reason.

3.1.13 The Site for the work is either available or it shall be made available in the parts in a manner so as not to hamper the progress of work.

3.1.14 The Bidder whose Bid is accepted will be required to furnish by way of Performance Bank Guarantee the amount as prescribed in the NIT for the due fulfilment of his Contract.

3.1.15 Canvassing in connection with tenders is strictly prohibited and the tenders submitted by the Bidders who resort to canvassing will be liable to rejection straight way.

3.1.16 All rates shall be quoted on the proper form i.e. price bid supplied as part of the Tender documents on e-tender portal by the Department.

3.1.17 On acceptance of the Tender, the name of the authorized representative(s) of the Successful bidder, who would be responsible for taking instructions from the Engineer-in-Charge and shall be communicated to the Engineer-in-Charge immediately after the allotment / start of work.

3.1.18 The Haryana Power Generation Corporation Limited does not bind itself to accept the lowest tender and reserves to itself the right to accept the whole or any part of the Tender and the Bidder shall be bound to perform the same at the rate quoted in this Tender.

3.1.19 No contractor is permitted to tender for the works if any of his near relatives is posted to deal with day to day duties in the passing of bill etc. and who is working in any capacity requiring him to give instructions / advice and in particular any office / official of the Company including the member of the Board. Any breach of this condition by any one shall render him liable to be removed from the list of the contractors for the Haryana Power Generation Corporation Limited and the work entrusted to him may be terminated.

***Note:**

1. By the terms near relatives meant wife/ husband, parents and grandparents, children and Grandchildren, brothers and sisters, uncles and cousins and their corresponding in-laws.
2. The bidder shall attach the list of officers and employees of HPGCL related to him with this tender.

## 3.2 Pre-Qualifying Requirements (PQRs)/ Eligibility Conditions

### 3.2.1 GENERAL

i. The Bidder shall be a body incorporated in India under the Companies Act, 1956 or 2013 including any amendment thereto. A copy of certificate of incorporation shall be furnished along with the bid in support of above.

## 3.22 TECHNICAL

1 (i) The bidder shall have experience of design, supply, installation, commissioning and operation of at least two solar power plants in India of capacity 5 MW or more, which have been successfully commissioned after 01 Jan 2012 and are in operation for atleast one (1) year as on due date for bid submission.
5MW or above capacity solar plant may be situated at the same place or different places, however, the bidder shall submit the supporting documents as mentioned below for individual solar power plant.

(ii). The bidder shall have an experience of design, supply, installation and commissioning of solar photovoltaic based grid connected power plants of cumulative installed capacity of 15 MW or above in or outside India, with a minimum megawatt scale plant.

(iii). In case the bidder(s) want to fulfill the eligibility criterion through its own power plant, then a self declaration on the letter head of the bidder duly signed by the authorized signatory to that effect will be required to be submitted.

The perspective bidder(s) should submit, in support to the above, the list of projects commissioned along with their Work Order (WO)/Letter of Intent (LOI) and the commissioning certificates along with the certificate that plant is in operation.

Or

2 (a) The bidder should have executed in the last ten (10) years an industrial project either as developer or as EPC Contractor in the area of power/ steel/ oil and gas/petro-chemical/ fertilizer/ cement/coal mining including coal handling plant and/ or any other process industry, of a value of Rs. 60 Crore (Indian Rupees Sixty Crore only) or more in a single project or single work respectively and the same should be in successful operation for atleast one (1) year prior to the date of techno-commercial bid opening.

(b) The bidder should have executed at least one (1) Electrical Sub-station of 33 kV or above voltage level, consisting of equipment such as 33kV or above voltage level circuit breakers and Power transformer, either as developer or as EPC Contractor which should be in successful operation for at least one (1) year prior to the date of techno-commercial bid opening.

The works referred to at clause 2 (a) & 2 (b) can be in same or different projects.

**Note:-**

I. In case of developer as bidder in clause 2 (above), the documentary evidence (certified by Chartered Accountant) for value of executed reference work must be submitted by the bidder.

II. Developer means an entity who has either executed or got executed the work/ project as owner of industrial projects.

III. The execution of industrial project as EPC Contractor under Clause no. 2 means such EPC Contractor is responsible for all the activities i.e. Design/Engineering, Procurement, Construction and Commissioning of a project/work.

## 3.23 FINANCIAL

i. Average Annual Turnover in last three (3) consecutive financial years shall be at least Rupees Five Crore Only (Rs. 5,00,00,000/-).

ii. The Bidder shall submit audited annual report of FYs 2017-18, 2018-19 & 2019-20.

### 3.2.4 OTHER

i. The Tender of only those bidders will be considered who will produce documentary proofs, self-attested to meet the following requirements: The Bidders to have valid Proof of Permanent EPF account no., ESI registration no. and GST no.

ii. The agency should have valid license under contract labour regulation and abolition Act-1970 from labour department Haryana or should give an undertaking that he will get himself registered within one month if work is allotted to him.

iii. A self-attested certificate from the Bidder to the effect that the Bidder is not blacklisted from any Public Sector undertakings of Central Govt. / State Govt. /SEBs / Corporations/ HPGCL/ any other reputed Thermal/ Hydel Plant etc.

## 3.3 Local Conditions

3.3.1 The Bidder is advised to visit and examine the site conditions, traffic, location, surroundings, climate, availability of power, water and other utilities for construction, access to site, handling and storage of materials, weather data, applicable laws and regulations, and obtain for itself on its own responsibility all information that may be necessary for preparing the Bid and entering into the Contract Agreement. The costs of visiting the Site shall be at Bidder's own expense.

3.3.2 The Bidder and any of its personnel or agents shall be granted permission by HPGCL to enter upon its premises and lands for the purpose of such inspection, but only upon the express condition that the Bidder, its personnel or agents, shall release and indemnify HPGCL and its personnel and agents from and against all liability in respect thereof and shall be responsible for personal injury (whether fatal or otherwise), loss of or damage to property and any other loss, damage, costs and expenses however caused, which, but for the exercise of such permission would not have arisen.

3.3.3 Failure to visit the Site or failure to study the Tender Document shall in no way relieve the Successful Bidder from furnishing any material or performing any work in accordance with the Tender Document.

3.3.4 In no case the Target Date for Completion of Project shall be extended, due to the failure of the Bidder to visit the site. The Bidder must conduct its own inspection of the Project Site, access to the Project Site and surroundings at its own cost in order to make a proper estimate of the works to be performed under consideration of site- specific constraints. This applies in particular to the transportation of equipment to the Project site and the scope of site works. The Bidder shall also inspect the site and the access to site from the point of manufacture to make sure that its equipment is suitable for the available access and the site terrain.

3.3.5 It shall be deemed that by submitting a Bid, the Bidder has:

a. made a complete and careful examination of the Tender Document;
b. received all relevant information requested from HPGCL;
c. acknowledged and accepted the risk of inadequacy, error or mistake in the

information provided in the Tender Documents or furnished by or on behalf of HPGCL relating to any of the matters referred to in this Tender;

d. satisfied itself about all matters, things and information including matters referred to in the Tender Document, necessary and required for submitting an informed Bid, execution of the Project in accordance with the Tender Document and performance of all of its obligations there under.

e. acknowledged and agreed that inadequacy, lack of completeness or incorrectness of information provided in the Tender Document or ignorance of any of the matters referred to in the Tender herein shall not be a basis for any claim for compensation, damages, extension of time for performance of its obligations, loss of profits etc. from the HPGCL, or a ground for termination of the Contract Agreement; and

f. agreed to be bound by the undertakings provided by it under and in terms hereof.

3.3.6 HPGCL shall not be liable for any omission, mistake or error on the part of the Bidder in respect of any of the above or on account of any matter or thing arising out of or concerning or relating to the Tender Document or the Bidding Process, including any error or mistake therein or in any information or data given by HPGCL.

### 3.4 Local Regulatory Frame Work

3.4.1 It shall be imperative for each Bidder to fully inform itself of all local conditions, laws and factors which may have any effect on the execution of the Contract as described in the Bidding Documents. HPGCL shall not entertain any request for clarification from the Bidder, regarding such local conditions.

3.4.2 It is the responsibility of the Bidder that such factors have properly been investigated and considered while submitting the Bid proposals and that no claim whatsoever including those for financial adjustment to the Contract awarded under this Tender shall be entertained by HPGCL and that neither any change in the time schedule of the Contract nor any financial adjustments arising thereof shall be permitted by HPGCL.

### 3.5 Clarifications to Tender Document

3.5.1 A Bidder requiring any clarification of the Tender documents may notify HPGCL in writing or by facsimile or by e-mail to HPGCL's contact:

**The Chief Engineer/ DCRTPP (Planning Section-HQ)**
**Haryana Power Generation Corporation Limited (HPGCL),**
**Ground Floor, C-7, Urja Bhawan**
**Panchkula -134 109, Haryana**
**Email: ceplg@hpgcl.org.in**
**seplg@hpgcl.org.in**
**xenplgp1.pkl@hpgcl.org.in**
**Website: www.hpgcl.org.in**

### 3.6 Amendments to Tender Document

3.6.1 HPGCL may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective Bidder, modify the Tender Documents.

3.6.2 The amendments will be notified on website as mentioned in Notice Inviting e-Tender of this Tender.

3.6.3 In order to allow the prospective Bidder(s), reasonable time in which to take the amendment into account in preparing their Bids, HPGCL at its discretion, may extend the deadline for the submission of Bids.

### 3.7 Acceptance of Bids

3.7.1 HPGCL neither bind itself to accept the lowest or any nor to assign any reason for the rejection of any Bid. It is also not binding on HPGCL to disclose any analysis report.

### 3.8 Withdrawal of Invitation to Bid

3.8.1 While HPGCL has floated this Tender and has requested Bidders to submit their proposals, HPGCL shall always be at the liberty to withdraw this invitation to bid at any time before the acceptance of bid offer.

### 3.9 Representative/ Agent of Bidder

3.9.1 All the Bidders are requested to mention the name of their authorized representative/ agent, if any, with full address in the Bid. In case the representative is changed during the bidding process such changes shall be notified by the Bidder, failing which, HPGCL shall not accept any responsibility.

### 3.10 Financial Proposal and Currencies

3.10.1 The Bidders shall quote the prices inclusive of all the taxes, while also providing the breakup of taxes as mentioned in **Appendix 14**: the similar format will be present in the e-tender for online submission. The Bidder shall indicate the price in Financial Proposal in Indian National Rupee only.

### 3.11 Bank Guarantees & EMD

3.11.1 EMD should be in the shape of Bank Guarantee (BG) with validity of 12 months, further extendable, if required. The format of BG is attached at **Annexure-18 (A)**.

3.11.2 The validity of EMD shall be as per mentioned in NIT.

3.11.3 The EMD shall specifically bind the Bidder to keep its Bid valid for acceptance and to abide by all the conditions of the Tender Documents in the event of HPGCL desiring to award the work to the said Bidder. HPGCL shall have an unqualified discretion to forfeit the EMD in the event: (i) Bidder fails to keep the Bid valid up to the date specified/ required; or (ii) refuses to unconditionally accept Letter of Intent and carry it out the work in accordance with the Bid in the event such Bidder is chosen as the Successful Bidder.

3.11.4 The Company shall, however, arrange to release the EMD in respect of unsuccessful Bidders, without any interest, only after issue of LOI to the Successful Bidder and their acknowledgement of the same.

3.11.5 In case of unsuccessful bidder, the earnest money (Bank Guarantee) will be refunded/released without any interest within thirty (30) days only after issuance of Letter of Intent to successful bidder(s). In case of successful bidder, the earnest money deposited (BG) shall be released on the submission of Performance Bank Guarantee and verification of the same by HPGCL for faithful execution of work including O&M

period.

The bidders who are exempted for submitting EMD as per this tender shall have to submit Performance Bank Guarantee amount on becoming successful bidder within 15 days of issuance of LOI which will be valid upto faithful execution of work including O&M period.

3.11.6 The EMD shall be forfeited and appropriated by HPGCL as per the discretion of HPGCL without prejudice to any other right or remedy that may be available to HPGCL hereunder or otherwise, under the following conditions:

a. If a Bidder submits a non-responsive Bid;

b. If a Bidder engages in a corrupt practice, fraudulent practice, coercive practice, or restrictive practice;

c. In the case of Successful Bidder, if it fails within 7 days from the issue of LoI – (a) to sign the Contract Agreement and/ or (b) to furnish the Performance Bank Guarantee within the period prescribed.

d. In case the Successful Bidder, having signed the Contract Agreement, commits any breach thereof prior to furnishing the Performance Bank Guarantee.

3.11.7 The Successful Bidder shall furnish the following Bank Guarantees:

| Sr. No | Type of Firm/Enterprises | Value of Performance Security Deposit |
|---|---|---|
| 1 | Haryana based firms:-<br>(iii) # Haryana Based Micro and Small Enterprises (MSEs)<br><br>(iv) Haryana based other firms/enterprises | (iii) @0.2% of the value of contract<br><br>(iv) @2% of the value of contract |
| 2 | Other States/ UTs based firms | @3% of the value of contract |
| *# Haryana based MSEs will be eligible for performance security deposit @ 0.2% who have filed SSI Certificate/EM Part-II/Udyog Aadhaar Memorandum (UAM)/Udyam Registration in Haryana and who participate directly in the tendered/quoted items and offering to supply the entire* Work/Supply Order by their enterprise*.* | | |

i) First Stage (Supply and Services): The First Stage (Supply & Services) value of the Performance Guarantee shall be furnished as per **Director General Supplies & Disposal Department, Haryana vide Order No. DGS&D/Admin/Performance Security/2020/8780-8959 dated 14.12.2020** of the Contract Value (i.e., total sum of the Supply Contract & Service Contract) and will remain valid 90 (Ninety) days beyond half of the prescribed O & M Period, i.e. 5 (five) Years. Henceforth, Performance Bank Guarantee needs to be furnished for the first 5 (five) Years of the O & M period (i.e. 63 Months). Performance Bank Guarantee as per the format given in **Appendix 18 (B).**

ii) Second Stage (O&M): The Second Stage (O&M), Performance Bank Guarantee shall be furnished 30 days prior to completion of first 5 years of O&M and value of the Performance Bank Guarantee shall be 5% of the Contract Value (i.e., total sum of the Supply Contract & Service Contract) and will remain valid 90 (Ninety) days beyond the balance O & M Period, i.e. 5 (five) years. Henceforth,5% Performance Bank Guarantee needs to be furnished for the last 5 (five) years of the O & M period (i.e. 64 Months).

The format of the O&M Bank Guarantee is given in **Appendix 19**: Format of O&M Bank Guarantee.

3.11.8 Any lapse in the timely renewal of the O&M Bank Guarantee shall entitle HPGCL to encash it without assigning any further reason thereof.

**3.12 Project Management Consultant and Third Party Inspection Agency**

3.12.1 A Project Management Consultancy (PMC) or Third Party Inspection agency (TPI) may be appointed by HPGCL, at its sole discretion, to conduct any kind of inspection regarding procurement, fabrication, installation, hook-up, quality, execution, commissioning, operation and maintenance during the span of the Project. The Contractor shall provide necessary access and coordination to conduct such inspections. The Contractor shall provide all necessary access and cooperation for inspection by National or State agency.

**3.13 Right to Accept or Reject any or all Bids**

3.13.1 Notwithstanding anything contained in this Tender, HPGCL reserves the right to accept or reject any Bid and to annul the bidding process and reject all Bids at any time without any liability or any obligation for such acceptance, rejection or annulment, and without assigning any reasons thereof.

3.13.2 HPGCL reserves the right to reject any Bid and appropriate the EMD if:

a. after reviewing the Bid there is doubt that the offered works, materials or equipment are not state of the art and/ or not suitable for the site operating conditions;
b. at any time, a material misrepresentation is made or uncovered, or
c. the Bidder does not provide, within the time specified by the HPGCL, the supplemental information sought by HPGCL for evaluation of the Bid.

3.13.3 Such misrepresentation/ improper response shall lead to the disqualification of the Bidder. If such disqualification / rejection occur after the Bids have been opened and the Successful Bidder gets disqualified / rejected, then HPGCL reserves the right to:

a. select the next Bidder with the Lowest Evaluated Bid Value as the Successful Bidder;

or

b. take any such measure as may be deemed fit in the sole discretion of HPGCL, including annulment of the bidding process.

3.13.4 In case it is found during the evaluation or at any time before signing of the Contract or after its execution and during the period of subsistence thereof, that one or more of the pre-qualification conditions have not been met by the Bidder or the Bidder has made material misrepresentation or has given any materially incorrect or false information, the Bidder shall be disqualified forthwith, if not yet appointed as the Contractor either by issue of the LoI or entering into of the Contract Agreement, and if the Successful Bidder has already been issued the LoI or has entered into the Contract Agreement, as the case may be, the same shall, notwithstanding anything to the contrary contained therein or in this Tender, be liable to be terminated, by a communication in writing by HPGCL to the Contractor, without HPGCL being liable in any manner whatsoever to the Bidder or Contractor, as the case may be. In such an event, HPGCL shall forfeit and appropriate the bank guarantees without prejudice to any other right or remedy that may be available to HPGCL.

3.13.5 HPGCL reserves the right to verify all statements, information and documents submitted by the Bidder in response to the Tender Documents. Failure of HPGCL to undertake such verification shall not relieve the Bidder of its obligations or liabilities hereunder nor will it affect any rights of HPGCL there under.

**3.14 Net Electrical Energy Generation Guarantee (NEEGG)**

3.14.1 The Bidder shall be required to quote the Net Electrical Energy Generation Guarantee (NEEGG) for ten (10) years period. The Bidder shall give NEEGG per annum after considering proposed configuration and all local conditions, solar insolation, wind speed and direction, air temperature & relative humidity, barometric pressure, rainfall, sunshine duration, grid availability and grid related all other factors and losses due to near shading, incidence angle modifier, irradiance level, temperature loss, array loss, module quality loss, module array mismatch loss, soiling loss and various inverter losses etc. To assess/ verify feasibility of quoted NEEGG, Bidders are required to provide computation documents along with considered factors based on which NEEGG has been computed.

3.14.2 Bidders are expected to undertake their own study of solar profile and other related parameters of the area and make sound commercial judgment about power output i.e. Net Electrical Energy Guaranteed Generation. The Site information and solar data provided in this Tender except the reference radiation for the twelve months is only for preliminary information purpose. No claim or compensation shall be entertained on account of this information. It shall be the responsibility of the Bidder to access the corresponding solar insolation values and related factors of solar plant along with expected grid availability. The Bidder should access all related factors about the selected Site for the Project and then quote the NEEGG for the proposed Project.

3.14.3 The Contractor shall be responsible for achieving NEEGG. For any shortfall in NEEGG corresponding to the offer, the compensation shall be recovered from the Contractor. The Contractor shall maintain the Plant equipment including its repair, replacement, overhauling, etc., so as to give the agreed NEEGG per year, for which HPGCL shall pay the agreed O&M Contract Price and the applicable taxes.

3.14.4 The Bids with NEEGG of less than or equal to 1,83,96,000 kWh for 10 MW for the first year shall be summarily rejected.

3.14.5 The NEEGG quoted for each consecutive year should have maximum 1% annual degradation factor in NEEGG. If the bidder anticipates any degradation of the modules during the first year, it shall be taken care of to provide additional capacity of solar PV modules to meet guaranteed generation at the end of first year to avoid liquidated damages/compensation on account of Performance Guaranteed Generation. The NEEGG of consecutive year should not be more than the previous year's NEEGG. Bids not following these conditions shall be summarily rejected.

3.14.6 This NEEGG shall be used for the evaluation of the Bids as specified in **Appendix 14 .**

Executive Engineer/Planning-I
for CE/DCRTPP (Planning Section, HQ)
HPGCL, Panchkula.

--- End of Section ---

# Chapter-4

## 4 Submission of Bid

### 4.1 General Terms

4.1.1 A Bidder is eligible to submit only one Bid for the Project. Any form of Consortium is not allowed.

4.1.2 Along with electronic submission of Bid as mentioned in **Chapter-2** and **Appendix 1**: Instruction to Bidder on Electronic Tendering system, the bid has to be also submitted in post as indicated in Clause 4.3 for Technical Bid and Price Bid (**unpriced**).

4.1.3 Notwithstanding anything to the contrary contained in this Tender, the detailed terms specified in the draft Contract Agreement shall have overriding effect; provided, however, that any conditions or obligations imposed on the Bidder hereunder shall continue to have effect in addition to its obligations under the Contract Agreement.

4.1.4 The Bid should be furnished in the formats mentioned in the Tender Document, which shall be duly signed by the Bidder's authorized signatory, provided that the Financial Proposal (unpriced) will be submitted in separate envelope.

4.1.5 The Bidder should submit a power of attorney as per the format given in **Appendix 11**

4.1.6 Any condition or qualification or any other stipulation contained in the Bid other than those already existing in the Tender Document shall render the Bid liable to rejection as a non-responsive Bid. The complete Bid shall be without alterations, interlineations or erasures, except those to accord with instructions issued by HPGCL, or as necessary to correct errors made by the Bidder, in which case such corrections shall be initialled by the person or persons signing the Bid.

4.1.7 The Tender Documents, Bid Documents and all attached documents are and shall remain the property of HPGCL and are transmitted to the Bidders solely for the purpose of preparation and the submission of a Bid in accordance herewith. Bidders are to treat all information as strictly confidential and shall not use it for any purpose other than for preparation and submission of their Bid. HPGCL will not return any Bid or any information provided along therewith.

4.1.8 Bidder shall note that Price Bid of only those Bidders shall be opened who are found technically qualified and responsive to HPGCL's Tender terms and conditions including but not limited to the Scope of Work.

### 4.2 Format and Signing of Bid

4.2.1 The Bidder shall provide all the information sought under this Tender. HPGCL will evaluate only those Bids that are received in the required formats and complete in all respects.

4.2.2 The Bid shall be typed or written in indelible ink and signed by the authorized signatory of the Bidder who shall also initial each page, in blue ink. All the alterations, omissions, additions or any other amendments made to the Bid shall be initialled by the person(s) signing the Bid.

### 4.3 Sealing and Marking of Bid

4.3.1 The Bid of the Bidder shall be contained in one (1) single "Main" Envelope.

4.3.2 The Main Envelope shall contain two (2) Envelopes as follows:

1. "Original" Envelope;
2. "CD" Envelope.

4.3.3 The "Original," Envelopes shall contain the following Envelopes:

a. Cover-I: Signed Copy of the Tender Document(s)

b. Cover-II: Enclosures of the Bid

c. Cover-III: Proof of EMD, e-service fee and Tender Fee

d. Cover-IV: Financial Proposal unpriced by duly signed and stamped

4.3.4 The "CD" Envelope shall contain one (1) CDs containing the following folders with the same information submitted in the Original Envelope:

a. Cover-I: Signed Copy of the Tender Document(s)

b. Cover-II: Enclosures of the Bid

c. Cover-III: Proof of EMD, e-service fee and Tender Fee

4.3.5 All original attested Tender Documents, Bid Enclosures, EMD and Tender Fee, and Financial Proposal (**un-priced**) shall be contained in the "Original" Envelope.

4.3.6 All soft/ scanned copies of the original attested Tender Documents, Bid Enclosures, EMD and Tender Fee shall be contained in the CD in an appropriately organized manner as in the physical copies, and enclosed in the "CD" Envelope.

**IMPORTANT: THE COPY OF THE FINANCIAL BID SHALL NOT BE INCLUDED IN THE CDS**.

4.3.7 Envelopes shall be clearly marked as "Original," and "CD".

4.3.8 The content of documents uploaded on (etenders.hry.nic.in) and hard copies submitted should be same and in case of any discrepancy all documents uploaded on **etenders.hry.nic.in** portal shall stay valid.

### 4.4 Enclosures of the Bid

4.4.1 Cover-I shall be duly marked as "Signed copy of the Tender Document(s)" and shall include the duly signed and sealed Tender Document including its annexure, appendices, attachments, amendments and any other documents as added or modified by HPGCL as per the provisions in this Tender.

4.4.2 The documents accompanying the Bid other than the attested Tender Document(s), and Proof of Tender Fee and EMD shall be placed in Cover-II and marked as "Enclosures of the Bid". These documents shall include:

a. The Covering Letter as per the format prescribed in **Appendix 2**: Format for

Covering Letter.

b. Details of the Bidder as per format prescribed in **Appendix 3**: Format of Details of Bidder

c. Attested copy of Service Tax/ GST Registration Certificate of Bidder.

d. Attested copy of PAN Card for Bidder.

e. Attested Certificate of Commencement of Business issued by the Registrar of Companies for the Bidder.

f. Attested copy of Provident Fund Code of Bidder.

g. Details of similar technical experience of the Bidder as per format prescribed in **Appendix 4**: Format of Details of Similar Technical Experience.

h. Details of qualified technical staff as per format prescribed in **Appendix 5:** Format of Details of Qualified Technical Staff.

i. Curriculum Vitae of all qualified technical staff indicated in **Appendix 5**: Format of Details of Qualified Technical Staff.

j. List of proposed PV technologies as per format prescribed in **Appendix 6**: Format of Disclosure of PV Technology Proposed.

k. Project execution plan as mentioned in **Appendix 7**: Format of Project Execution Plan.

l. Declaration of Compliance as per format prescribed in **Appendix 8**: Format of Declaration of Compliance.

m. No Deviation Certificate as per format prescribed in **Appendix 9**: Format of No Deviation Certificate.

n. Declaration of Bidder’s relation to Directors of HPGCL as per format prescribed in **Appendix 10**: Format of Declaration on Bidder's Relation to Directors.

o. Power of Attorney by the Bidder authorizing the signatory as per format prescribed in **Appendix 11.**

p. Format of Summary of audited financial statements as per format prescribed in **Appendix 12**: Format of summary of Audited Financial Statements.

q. (If applicable) Authorization of use of financial capability by Parent as per format prescribed in **Appendix 13**: Format of Authorization by Parent with the necessary financial statements and summary required from the Bidder.

r. Project Operation & Maintenance (O&M) Schedule with resource planning in the form of Gantt/ Pert Charts

s. Technical specifications and warranty document of PV modules

t. Design, specifications and document of Solar Tracking solutions (if proposed by Bidder)

u. Basic engineering drawings pertaining to the proposed plant as prescribed in Clause No. 5

v. Specifications / Drawings / Designs and datasheets for all electrical work / components as prescribed in Clause No. 5

w. Technical specifications and warranty document of Inverters

x. Transformers, associated switchgear and others: Bidder shall furnish in detail its warranties/guarantees for these items.

4.4.3 Cover–III shall be duly marked as "copy of Proof of EMD, e-service fee and Tender Fee" and shall contain the copy of proof of Tender Fee, e-service fee and EMD.

4.4.4 Cover-IV shall be duly marked as "Financial Proposal unpriced but duly signed and stamped" and shall contain the Financial Proposal (**unpriced duly signed and stamped**) as per the format prescribed in **Appendix 14**.

4.4.5 All Bid documents shall be placed in hard binding and the pages shall be numbered serially. Each page thereof shall be initialed in blue ink by the authorized signatory.

4.4.6 All envelopes in the Bid Documents shall be sealed. The outer envelope shall clearly bear the following identification.

**Outer Envelope**

"Bid for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years for 10 MW Grid-Connected Solar Photovoltaic Power Plant at village Dhandlan (Jhajjar)".

**Cover-I shall bear the following identification:**

"Cover-I: Signed Tender Documents for Bid for Tender for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years for 10 MW Grid-Connected Solar Photovoltaic Power Plant at village Dhandlan (Jhajjar)".

**Cover -II shall bear the following identification:**

"Cover-II: Enclosures of the Bid for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years for 10 MW Grid-Connected Solar Photovoltaic Power Plant at village Dhandlan (Jhajjar)".

**Cover -III shall bear the following identification:**

"Cover-III: Proof of EMD, e-service fee and Tender Fee for the Bid for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance Five (5) Years Extendable for Five (5) Years for 10 MW Grid-Connected Solar Photovoltaic Power Plant at village Dhandlan (Jhajjar)".

**Cover -IV shall bear the following identification:**

"Cover-IV: Financial Proposal (unpriced but duly signed and stamped) for the Bid for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance Five (5) Years Extendable for Five (5) Years for 10 MW Grid-Connected Solar Photovoltaic Power Plant at village Dhandlan (Jhajjar)".

4.4.7 Each of the envelopes shall clearly indicate the name and address of the Bidder. In addition, the Bid Due Date should be indicated on the right hand top corner of each of the Envelopes. Each of the envelopes shall be addressed to:

**ATTN**.:

**The Chief Engineer/ DCRTPP (Planning Section, HQ)**
Haryana Power Generation Corporation Limited (HPGCL),
C-7, Urja Bhawan, Sector-6,
Panchkula 134 109, Haryana
Tel. No.: +91 172 2586861

4.4.8 Bids submitted by fax, telex, telegram or e-mail shall not be entertained and shall be rejected.

### 4.5 Bid Due Date

4.5.1 Bids should be submitted before the Deadline for Submission of Bid as specified in NIT.

4.5.2 HPGCL may, in its sole discretion, extend the Bid due date by issuing an Amendment/ Addendum in accordance with Clause No. 3.6 uniformly for all Bidders.

### 4.6 Late Bids

4.6.1 Bids received by HPGCL after the specified time on the Bid due date shall not be eligible for consideration and shall be summarily rejected. In case it happens to be holiday on the prescribed closing/ opening day of the Bid, the next working day shall be treated as the scheduled prescribed day of closing/ opening of the Bid.

### 4.7 Confidentiality

4.7.1 Information relating to the examination, clarification, evaluation and recommendation for the Bidders shall not be disclosed to any person who is not officially concerned with the process or is not a retained professional advisor/ consultant advising HPGCL in relation to or matters arising out of, or concerning the bidding process. HPGCL will treat all information, submitted as part of the Bid, in confidence and will require all those who have access to such material to treat the same in confidence. HPGCL may not divulge any such information unless it is directed to do so by any statutory entity that has the power under law to require its disclosure or is to enforce or assert any right or privilege of the statutory entity and/ or HPGCL.

### 4.8 Correspondence with the Bidder

4.8.1 The Company shall not entertain any correspondence with any Bidder in relation to acceptance or rejection of any Bid.

### 4.9 Bid Opening and Evaluation

4.9.1 The Company shall open, examine and evaluate the Bids in accordance with the provisions set out in this Tender.

4.9.2 To facilitate evaluation of Bids, the Company may, at its sole discretion, seek clarifications in writing from any Bidder regarding its Bid.

4.9.3 After the receipt of Bids, the Company may at its discretion send a team of engineers and other staff if necessary to inspect the engineering facilities, to ensure suitability and satisfactory working conditions at the Bidder's work(s)/ yard(s) and equipment listed to be used by the Bidder for the work. The Bidder shall ensure that the aforesaid team shall at all the times have access to visit and inspect works, equipment etc.

**4.10 Tests of Responsiveness**

4.10.1 Prior to evaluation of Bids, the Company shall determine whether each Bid is responsive to the requirements of the Tender. A Bid shall be considered responsive only if:

a. it is received by the Bid due date including any extension thereof.

b. it is received in the manner prescribed in this Tender;

c. it is accompanied by the requisite Tender Fee, e-service fee and EMD.

d. it is received with all the Enclosures of the Bid as prescribed in Clause 4.4.

e. its Enclosures are received as per the formats specified in Appendices as well as the Tender.

f. it contains all the information (complete in all respects) as requested in this Tender (in the same formats as specified) .

g. it complies will all the terms, conditions and provisions specified in this Tender; and

h. it does not contain any conditions or deviations.

4.10.2 HPGCL reserves the right to reject any Bid which is non-responsive and no request for alteration, modification, substitution or withdrawal shall be entertained by HPGCL in respect of such Bid.

**4.11 Modification and Withdrawal of Bids**

4.11.1 In case any clarifications are sought by HPGCL after opening of Bids then the replies of the Bidder should be restricted to the clarifications sought. Any Bidder who modifies its Bid (including a modification which has the effect of altering the value of its Financial Proposal) after opening of Bid without specific reference by HPGCL, shall render the Bid liable to be rejected without notice and without further reference to the Bidder and its EMD shall be forfeited.

4.11.2 Withdrawal or unsolicited modification of a Bid during this interval shall result in the Bidder's forfeiture of its EMD.

**4.12 Evaluation of Bid and selection of Bidder**

4.12.1 HPGCL will examine the Bid to determine whether they are complete, whether any

computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the Bid is generally in order.

4.12.2 Prior to the detailed evaluation, HPGCL will determine the substantial responsiveness of each Bid. A substantially responsive Bid is one which conforms to all the terms and conditions of the Tender Documents without material deviations. Deviations from or objections or reservations to critical provisions such as those concerning EMD, Applicable Law and Taxes and Duties will be deemed to be a material deviation. HPGCL's determination of a Bid's responsiveness is to be based on the contents of the Bid itself without recourse to extrinsic evidence.

4.12.3 If the Bid is not substantially responsive, it will be rejected by HPGCL and may not subsequently be made responsive by the Bidder by correction of the nonconformity.

4.12.4 HPGCL will evaluate and compare Bids which have been determined to be substantially responsive.

4.12.5 Following factors shall be required for evaluation of Bid:

a. The Evaluated Bid Value (EBV) shall be calculated using the following parameters:

i. Engineering Procurement Commissioning (EPC) Contract Price;
ii. Net Present Value (NPV) of O&M Price of ten (10) years;
iii. Net Electrical Energy Generation Guarantee; and
iv. Constant parameters as indicated in the Tender.

b. The Bid with the Lowest Evaluated Bid Value shall be considered as L-1 and the Successful Bidder. The Bid with next highest value shall be considered as L-2 and so on for more understanding please refer **Appendix 15**: Bid Evaluation Criteria (BEC). An example has also been done for Bidder's comprehension.

4.12.6 In no case, a Bidder shall have the right to claim to be the Successful Bidder for its Bid.

**4.13 Contacts during Bid Evaluation**

4.13.1 Bids shall be deemed to be under consideration immediately after they are opened and until such time HPGCL makes official intimation of award/ rejection to the Bidders. While the Bids are under consideration, Bidders and/ or their representatives or other interested parties are advised to refrain from contacting by any means, HPGCL and/ or their employees/ representatives on matters related to the Bids under consideration.

**4.14 Employment of Officials/ Ex-Official of HPGCL**

4.14.1 Bidders are advised not to employ serving HPGCL employees. It is also advised not to employ ex-personnel of HPGCL within the initial two years period after their retirement/ resignation/ severance from the service without specific permission of HPGCL. HPGCL may decide not to deal with such firm(s) who fails to comply with this provision.

**4.15 Declaration on Bidder's Relation to Directors**

4.15.1 The Bidders are required to certify in prescribed format **Appendix 8: Format of Declaration of Compliance**, whether he/ they is/ are related to any of the Directors/ Senior Personnel of HPGCL in any of the ways mentioned in the Certificate. It is clarified that any such affirmative certificate shall not, by itself, prejudice consideration of the Bid. This certificate must accompany the Bid.

### 4.16 Letter of Intent ("LOI") and Notification to Proceed

4.16.1 After selection of the Successful Bidder, a Letter of Intent (the "LoI") shall be issued, in duplicate, to the Successful Bidder. The Successful Bidder shall not be entitled to seek any deviation from the Contract, as may have been amended by HPGCL prior to the bid submission date.

4.16.2 On issue of the LoI by the Company, Authorised representative of the Successful Bidder shall sign the Contract Agreement within 7 (seven) days and submit the Bank Guarantee within the stipulated time. The authorized representative of the Successful Bidder shall sign the Contract Agreement.

### 4.17 Performance Guarantee

4.17.1 The Successful Bidder shall, within seven (7) days of the issue of the LoI, submit the Performance Bank Guarantee as per the format prescribed in **Appendix 18**: Format of Performance Bank Guarantee and sign the Contract Agreement with stipulated time.

4.17.2 The bank guarantee by the Contractor will be given from bank specified in **Appendix** 17: **List of Banks (for Bank Guarantee**) only. BG of any other Bank will not be treated as valid BG.

### 4.18 Fraudulent Practices

4.18.1 The Bidders may please note that HPGCL shall not entertain any correspondence or queries on the status of the Bids received against this Tender. Bidders are advised not to depute any of their personnel or agents to visit HPGCL's office for making such inquiries.

4.18.2 Any effort by a Bidder to influence HPGCL on the Bid evaluation, Bid comparison or Contract award decision may result in the rejection of the Bidder's Bid.

### 4.19 Negotiation with Bidders

4.19.1 The price discovery for the Contract shall be done based on the procedure described in **Appendix 15**: Bid Evaluation Criteria (BEC) .L1 shall be selected based on the Evaluated Bid Value (EBV) . Generally, the negotiations, if any, will be held with the L1 bidder. However, the negotiations can be held up to $L_3$ bidder, if the difference between the $L_1$ EBV and the EBV of $L_2$ and $L_3$ is within 5% of the $L_1$ EBV. In cases where the $L_1$ bidder refuses to further reduce his offered price and the $L_2$ or $L_3$ bidders come forward to offer a price which is better than the price offered by $L_1$ bidder, the bidder whose price is accepted becomes the $L_1$ bidder (as per the procedure of EBV calculation). However, in such a situation, the original $L_1$ bidder shall be given one more opportunity to match the discovered price. In case of acceptance, he would be treated as the $L_1$ bidder.

4.19.2 The merit order of L1, L2, L3 bidder will be decided as described in **Appendix 15**: Bid Evaluation Criteria (BEC).

4.19.3 **The work will be allotted in a single part to the bidder** who is evaluated as L1 on the basis of criteria mentioned in **Appendix 15**: Bid Evaluation Criteria (BEC).

Executive Engineer/Planning-I
for CE/DCRTPP (Planning Section, HQ)
HPGCL, Panchkula.

--- End of Section ---

# Chapter-5

## 5 Scope of Work

### 5.1 GENERAL SCOPE OF WORK

**Scope of Work for 10 MW Solar Plant at Dhandlan, Jhajjar**

The bids are invited for 10 MW Solar PV project, which comprises of minimum 10.5 MW DC equivalent to cumulative capacity of all solar PV modules under Standard Test Conditions (STC) as per IEC61215. The Contractor shall comply that the maximum AC capacity which shall not exceed 10 MW AC, maximum lower limit shall be -10%, measured at metering point. Wherever 10 MW capacity mentioned is to be considered as a 10 MW AC capacity. 10 MW AC is the maximum limit at the evacuation point with respect to minimum unit generation guarantee per year as per clause no. 3.14.4. So design of plant must be between two boundaries.

**General Scope of Work:** The general scope of work for the 10 MW solar PV power plant involves Engineering, Procurement & Supply and Construction (EPC) of the grid-connected solar photovoltaic power plant, commissioning and evacuation of power into the DisCom's 132/33 kV substation corresponding to the guaranteed plant performance in the form of guaranteed energy output.

**Evacuation of Power & Metering Point**: For the purpose of this project, the evacuation voltage shall be at 33 kV AC (three phase) wherein evacuating point cum metering point shall be installed at 33 kV interconnection point within the boundary of solar plant. From point of interconnection onwards **DISCOMs (UHBVN/DHBVN) will carry out all necessary arrangement to evacuate power supply.** One 33 kV Sub-station/ transmission line is available at a distance of approximate 2.0 Km from solar PV plant. ABT meter to measure net power evacuation shall be installed at 33 kV interconnection point near solar PV plant boundary. Connection upto DISCOMs interconnection point is under Contractor's scope.

5.1.1 Operation and Maintenance (O&M):

The scope of work includes Operation and Maintenance (O&M) of the plant for five (5) years extendable for another five (5) years, wherein the plant shall generate at least equivalent to the guaranteed Performance of Plant. The Bidder 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. Accordingly, the Comprehensive Operation and Maintenance shall have two distinct components as described below:

a. 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.

b. Breakdown/ Corrective Maintenance: Whenever a fault has occurred, the Contractor has to attend to rectify the fault, the fault must be rectified within 24 hrs time from the time of occurrence of fault failing which the Contractor will be penalized as per terms and conditions of this Tender.

c. The date of Comprehensive Operation and Maintenance Contract period of the Plant shall begin on the date as defined in the NIT of this Tender. Detailed scope of comprehensive operation & maintenance has been described in Chapter 5 of this document. However, operation of the Power Plant means operation of system as per bidding schedule and workmanship in order to keep the project trouble free covering the guarantee period.

5.1.2 Tracking Structures:

The Company encourages Bidders to employ proven and reliable seasonal tracking system, however the Bidder should note that total land available is approximately 45 acres 5 kanal 7 marla (maximum) for the 10 MW Project. The Bidder shall submit in the Bid, the details / specifications / designs / guarantees and warrantees / and any other claims on performance / output of the solar tracking solutions in the Bid document.

5.1.3 Electrical Work:

Consisting of installation of solar PV modules, junction boxes, grid-tied inverters, isolation transformers, meters, control panel, 33kV/66KV switchgear for evacuation, interconnection through wires, cables, bus bars, etc.; plant lighting system, automatic weather station, SCADA and remote web-based communication & monitoring hardware, software etc.; plant and human safety and protection equipment including danger signs etc.

5.1.4 Civil and Other Non-Electrical Work:

Module Mounting Structures (MMS): The Contractor shall design, fabricate, supply and install module mounting structures with all required accessories like clamps, nuts, bolts, cable ties etc., The structures can be of fixed/ seasonal tracker are accepted.

Foundations: The Contractor shall design and construct appropriate civil foundations for MMS, prefabricated structures/RCC, transformers, switchyard equipment, feeder bay etc.

Prefabricated Structures/ RCC Structures: The following prefabricated /RCC structures are to be planned and constructed by the Contractor for the 10MW Solar PV project:

- Prefabricated/ RCC Inverter rooms
- RCC Control room cum Conference room with Pantry and Toilet – 01 Nos.
- Prefabricated Watchman's cabin - 01 Nos.

- Store Room – 01 No. (15'X15')
- Office Room – 01 No. (12'X12')

Storm Water Drainage System: The Contractor shall provide storm water drainage system for entire plant.

Solar PV Module Cleaning System: The Contractor shall plan for one wash of all solar PV modules on weekly basis. For this, the Contractor shall construct and operate 1 Lakh litre capacity RCC/Sintex water storage tank. The Contractor also has to drill a bore (if required) and construct pipeline for carrying water to storage tank, provide electric panel and pump for bore and total water cleaning system. For module cleaning, the contractor can provide new tanker with pump; water jet and hose pipe or establish a pipeline network with valves. Considering the dust level, the Contractor may clean the module in an interval of weekly basis, but maximum limit of this interval shall not exceed 15 days.

Chain-Link Fencing and Boundary Wall: The Contractor shall provide chain-link fencing of the entire plant boundary for the plant site as detailed into the Clause No.5.3.

Approach / Internal Roads and Pathways: The Contractor shall provide internal roads and approach roads / pathways of asphalt type for the plant site.

Cable Trenches: Construction of RCC cable trenches with cable trays and covers in inverter and control rooms, earthen excavated cable trench with alternate layers of sand and brick as per relevant IS from PV arrays to inverter room to control room to switchyard shall be provided by the Contractor.

Main Gate: The Contractor shall provide main gate of structural steel material of appropriate design. Also, necessary arrangement has to be made by Contractor to erect the main gate on pylon stone.

5.1.5 Site levelling: The Contractor shall level the site, as required, so as to compact the plant in minimum possible area and also minimize shading losses because of solar PV module structures.

5.1.6 Communication: The Contractor shall provide complete plant SCADA with SCADA server having string level monitoring capabilities over remote server. Contractor shall lay the cable in appropriate cable trench, connect with suitable connectors and terminate to the SCADA server inside control room. The Contractor shall also provide necessary internet connection through GPRS enabled modem along with LAN connectivity for data communication over remote server and shall bear the cost of the same during the Contract period including O&M.

Internet connection can be in the name of HPGCL. However, all the charges to be paid by the Contractor during the O&M period including one time cost.

The Contractor shall provide necessary provision of RTU for communication with SLDC. The Contractor shall submit the below mentioned Technical Data Sheet for String RTU, TCP String, Central RTU in the prescribed format.

| Type Code |
| --- |
| **Power Entry Characteristics** |
| AC input voltage range ($V_{ac,\ min}$ $V_{ac,\ max}$) |
| Nominal AC input voltage ($V_{ac,n}$) |
| Rated frequency ($f_r$) |
| DC Input Voltage Range ($V_{dc,min}$..$V_{dc,max}$) |
| Nominal DC input voltage ($V_{dc,n}$) |
| **RS485 Section** |
| Serial interface type |
| Baud rate |
| Protocol |
| Number of devices |
| Line biasing resistor (wherever necessary) |
| Termination resistor |
| **RS485 MODBUS section** |
| Serial interface type |
| Baud rate |
| Protocol |
| Number of devices |
| Line biasing resistor (wherever necessary) |
| Termination resistor |
| **Physical and Environmental** |
| Environmental protection rating |
| Ambient temperature range |
| Relative humidity |
| **Compliance** |
| Isolation |
| Marking |
| Safety and EMC standard |

Essential list of I/O and equipment is given herewith, but scope is not limited to the Essential List, contractor is fully responsible to provide complete SCADA System which can be extensible / communicable with add additional / future solar plant.

| Sr. | Equipment to be monitored | Data to Be Monitor (Real Time) | Type of IO |
|---|---|---|---|
| **1** | String Monitoring / Array Monitoring | Each PV string needs to be monitored | Through Communication with SJB PLC/Card |
| **2** | String Junction Box / Array Junction Box (SJB = AJB) | SJB internal temperature and SJB Bus Voltage and Current | Through Communication with SJB PLC/Card |
| **3** | Inverter | All Electrical Parameters of Inverter along with Scanning, Records & Error communication | Through Communication with SJB PLC/Card |
| **4** | Inverter Transformer* | Oil and Winding Temp Monitoring | Analog Input |
| **5** | 33KV/11KV RMU | ON/OFF and Trip position of Each RMU | Through Communication with SJB PLC/Card |
| **6** | 33 KV/11KV Breakers | ON/OFF and Trip Position of Each Breaker and Energy Meter communication | DI and Communication |
| **7** | Weather Monitoring Station | Two no. of Class I Pyranometer (one for GHI, one at PV plane collector angle), Two numbers of contact type temperature sensors one at module front and the other at backside of the module. Ambient temperature sensor, Wind velocity and speed sensor. | Through Communication |
| **8** | 33KV/66KV VCB panel | ON/OFF and Trip Position of CB | Analog and Digital |
| **9** | Main and Check Meter | All electrical parameters recorded by energy meter Rule of Haryana State Authority or other Statutory Authority must be followed by the Contractor and the same to be considered as per EPC Contract. | Through RS-485/MODDBUS communication |

*Inverter Transformer upto 3 Windings acceptable.

5.1.7 Plant Safety Equipment:

5.1.8 The Contractor shall provide appropriate numbers of foam type fire extinguishers / $CO_2$ extinguishers, sand buckets and transformer discharge rod at Invertor Rooms, Control Room, Security Cabin and Switchyard/Substation. Further, all high voltage places to be provided with danger sign boards with appropriate size and material to last for 25 years.

5.1.9 Statutory Requirements:

All construction, operation and maintenance procedures shall be carried out through appropriate relevant standards, regulations laid by HPGCL / HVPNL / UHBVNL / DHBVNL / HAREDA / MNRE and / or any other agency as and when applicable. Further,

this shall comply with the applicable labor laws. The Bidder shall make himself aware of such requirements and shall not solely depend on the Company to avail full information.

5.1.10 Planning and Designing:

i. The Contractor shall plan and design for the electrical / mechanical / civil requirements including but not limited to plant configuration, space optimization, distance between rows of modules, sufficient passage for vehicle and man-power movement in the plant, mounting structures, location of inverter room, cable routing, selection of equipment and items, procurement plan etc. to enhance plant output.

ii. The Contractor has to carry out the complete soil investigation of the site, through Government approved laboratory before designing various civil structures. The design of all civil foundations, R.C.C structures, buildings etc. will be carried out considering appropriate seismic zone of the area. All appropriate loads, wind velocity, seismic factors etc. will be considered as per the relevant IS Specifications while designing any civil structure. Also, the environmental conditions, soil characteristics, atmospheric effect, ground water table level, rain water data, land profile, etc. must be considered as per site actual condition and accordingly appropriate precautions and preventive measures will be taken while designing the structures. RCC structures will be adopted considering surrounding weather and soil conditions of site and as per the relevant IS codes. The concrete mix design test of minimum M20 grade with 380 kilograms of cement shall be carried out in Govt. certified laboratory or NABL accredited laboratory.

iii. The Contractor shall take into consideration all parameters like wind speed, seismic zone, safety factor and safe Soil Bearing Capacity (SBC) etc. for the purpose design and construction of civil foundations for all civil work as per relevant IS codes.

iv. The Contractor shall carryout Shadow Analysis at the site and accordingly design strings and arrays layout considering optimal usage of space, material and labor.

v. All designs & drawings have to be developed based on the governing standards and requirements of the project and also keeping in mind basic design specifications. Company may approve minor deviations or suggest required modifications in the same which are meant for increasing plant performance without sacrificing quality / workmanship norms.

vi. All designs, specifications, reports, etc. submitted or used by the Contractor at any point in time shall first be approved by the Company /Consultant and revised by Company /Consultant, if required, prior to execution.

vii. The technology offered shall be commercially established technology and at least one Project based on this technology shall be satisfactorily operational for at least one year in India. Details of the Project with location and the successful operational period of the Project utilizing this technology shall also be mentioned before the submission of first set of drawings for approvals.

viii. The Company reserves right to modify the specifications at any stage as per local site conditions / requirements and EPC contractor shall comply with modification without any extra cost and time.

ix. The Contractor has to arrange the facility for testing bulk material at site such as elcometer for testing the galvanization, cube-testing machine for testing the strength of cube samples etc.

x. The Contractor has to send samples of the material to Govt. accredited / NABL accredited laboratory for testing as when required by the Company.

5.1.11 Approval of Designs / Drawings

i. The following procedure has to be followed for assessment and approval of designs, specifications and drawings during the course of the project: The Contractor shall submit to the Company/Consultant the documents in hard copy and soft copy to both with proper reference and drawing numbers. The respective documents for selection, supply, installation, erection, commissioning of equipment/ structures have to be submitted at least 15 days in advance to the planned start of the activity as per Contractor's project schedule. The Contractor shall submit documents as required for this project according to his design and specifications. The Company / Consultant (on behalf of the Company) will assess and approve the documents within 10 days of submission of documents; and only after the approval the Contractor shall release the documents on site for execution. The documents shall be revised by the Contractor as per instructions /comments given by the Company / Consultant (on behalf of the Company) if required, prior to execution. Subsequent revisions and the final version of the documents shall also be submitted in hard and soft copy to the Company and the Consultant. The Contractor has to take into account the above mentioned process of revisions (if required) and adjust the preparation and delivery of the documents such that the overall planned project schedule is not affected.

ii. The Contractor has to submit all drawings, which are related to plant for approval and the Contractor, shall not claim any drawing as their intellectual property. Drawing which is developed for project will be the intellectual property of the Company.

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

iv. The Bidder shall submit in the Bid, basic engineering drawings of all civil work, including but not limited to, layout of the power plant indicating rows of photovoltaic modules, layout of different buildings, basic MMS design, civil foundations and anchoring design / details, electrical SLD, shading analysis and generation estimation report etc.

v. The bidder shall submit in the Bid technical specifications / drawings / designs and datasheets for all electrical work including but not limited to electrical component of the power plant including photovoltaic modules, cables, connectors, junction boxes, inverters, transformers, monitoring and auxiliary systems, etc. for the 10 MW/6MW/20MW Solar PV project.

vi. The Contractor shall submit a comprehensive maintenance schedule for operation and maintenance of the photovoltaic power plant along with checklists before commencement of work on site and shall be liable for abiding by the schedule. All construction, operation and maintenance procedures shall be carried out through appropriate relevant standards, regulations and labour laws.

5.1.12 Final Commissioning

The commissioning procedure shall be as per UHVBN/ HAREDA/ HVPNL/ Chief Electrical Inspector to Government (CEIG) requirements. The Contractor shall also ensure the following:

i. Obtaining written certificate of commissioning of the facility and permission to connect to the grid from the office of the Chief Electrical Inspector of the state and any other authorized representative from Government of India (GoI)/ GOH/ HVPNL.

ii. Inspection and successful electrical commissioning certificate from the Company.

iii. Obtaining all certificates required by DisCom from agency appointed by them.

iv. Satisfactory completion certificate towards completion of all other contractual obligations by the Contractor as stipulated from the Company.

5.1.13 Comprehensive Operation and Maintenance Contract

The Bidder shall separately quote in **Appendix 14** for Operation and Maintenance of the power plant for Five (5) Years Extendable for Five (5) Years, wherein the plant should perform at a minimum annual NEEGG derated every year by not more than 1% referring to the installed DC capacity of the plant indicated by the Bidder. 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 maintenance period. This means after completion of O & M period every component of the plant should be in good and working condition.

**Disclaimer:** Any civil / electrical / other work, which is not mentioned or included in this Tender document but necessary for the construction and O&M of 10 MW Solar PV plant at Dhandlan (Jhajjar) shall be borne by the Contractor. The Contractor shall, unless specifically excluded in the Contract, perform all such works and /or supply all such items and materials not specifically mentioned in the Contract/ Tender Document but can be reasonably inferred from the Contract as being required for attaining completion, commissioning and performance of the facilities, delivering NEEGG and maintaining the plant & achieving NEEGG during O&M period of 10 MW Solar PV Power Plants as if such work and / or items and materials were expressly mention in the Contract without any extra cost implication and liability to HPGCL. All specifications mentioned in this Tender indicates minimum technical requirement. The Contractor may propose alternate specifications or design though the final acceptance of the same is subject to the Company's discretion.

## 5.2 DETAILED ELECTRICAL WORK

5.2.1 Photovoltaic modules

The Contractor shall employ solar PV module of Crystalline-Si (Poly / Multi or Mono/ Single) solar technology only. The Contractor shall provide detail Technical Data Sheets, Certifications of Standard Testing Conditions (STC: defined as Standard Testing Condition with air mass AM1.5, irradiance 1000W/$m^2$, and cell temperature 25°C) as per the latest edition of IEC 61215 and as tested by IEC / MNRE recognized test laboratory. The Bidder shall also specify the minimum guaranteed energy output of solar PV module as per the Site Condition in the Bid.

i The PV modules to be employed shall be of minimum 72 cell configuration with rated power of module ≥280 Wp as certified for solar PV module power performance test as prescribed by latest edition of IEC 61215 and as tested by

IEC / MNRE recognized test laboratory. The maximum tolerance in the rated power of solar PV module shall have maximum tolerance of +3%. No negative tolerance in the rated capacity of solar PV module is allowed.

i. All modules shall be certified IEC 61215 2nd Ed. (Design qualification and type approval for Crystalline Si modules), IEC 61730 (PV module safety qualification testing @ 1000 V DC or higher).

ii. Minimum certified module efficiency shall be 15% for crystalline. The temperature co-efficient of the module shall not be more than 0.50% / °C.

iv. All photovoltaic modules should carry a performance warranty of >90% during the first 10 years, and >80% during the next 15 years. Further, module shall have performance warranty of > 97% during the first year of installation.

v. The module mismatch losses for modules connected to an inverter should be less than 1%.

vi. SPV module shall have module safety class-II and should be highly reliable, light weight and must have a service life of more than 25 years.

vii. The SPV module shall be made up of high transmitivity glass & front surface shall give high encapsulation gain and the module shall consists of impact resistance, low iron and high transmission toughened glass. The module frame shall be made of corrosion resistant material, which shall be electrically compatible with the structural material used for mounting the modules.

viii. The SPV modules shall have suitable encapsulation and sealing arrangements to protect the silicon cells from environment. The encapsulation arrangement shall ensure complete moisture proofing for the entire life of solar modules.

ix. The module frame should have been made of Aluminium or corrosion resistant material, which shall be electrolytically compatible with the structural material used for mounting the modules with sufficient no. of grounding/installation.

x. All materials used for manufacturing solar PV module shall have a proven history of reliability and stable operation in external applications. It shall perform satisfactorily in relative humidity up to 95% with temperature between -40°C to +85°C and shall withstand adverse climatic conditions, such as high speed wind, blow with dust, sand particles, saline climatic / soil conditions and for wind 170 km/hr on the surface of the panel.

xi. Modules only with the same rating and manufacturer shall be connected to any single inverter. Modules shall compulsorily bear following information in the form of ID encapsulated with solar cell in the manner so as not to cast shadow on the active area and to be clearly visible from the top. The ID encapsulation is meant for RFID tags.

xii. The Bidder shall provide to the Company in the Bid, power performance test data sheets of all modules. The exact power of the module shall be indicated on the data sheet consists of a range of modules with varying output power.

xiii. Only those types of crystalline modules which are supplied for a capacity more than 20 MW in other projects across the world and is successfully operational for at least one year shall be considered for this Project. On this account, the Contractor shall provide full information, to the satisfaction of HPGCL, before placing final order for the modules. The Contractor shall also submit the proof of

original purchase.

xiv. HPGCL or its authorized representative reserves the right to inspect the modules at the manufacturer's site prior to dispatch. Cost of travel including the lodging & boarding to be borne by HPGCL. However, all the cost related to testing facilities shall be borne by the Contractor.

xv. The Bidder is advised to check and ensure the availability of modules prior to submitting the Tender Document. To have flexibility to meet the timelines of the project, **maximum three (03) manufacturers are allowed of same technical platform. Bidder(s) will use only one make and type in the project as directed by HPGCL.**

xvi. The Contractor would be required to maintain accessibility to the list of module IDs along with the above parametric data for each module.

**Table 5-1 Information to be displayed on solar PV module**

| Sr. | Particulars |
|---|---|
| **1** | Name of the manufacturer of the PV module and RFID code |
| **2** | Name of the manufacturer of solar cells |
| **3** | Month & year of the manufacture (separate for solar cells and modules) |
| **4** | Country of origin (separately for solar cells and module) |
| **5** | I-V curve for the module at standard test condition (1000 w/$m^2$ , AM 1.5, 25$^o$C |
| **6** | Wattage, Imp, Vmp, Isc, Voc, temperature co-efficient of power and FF for the module |
| **7** | Unique Serial No. and Model No. of the module |
| **8** | Date and year of obtaining IEC PV module qualification certificate |
| **9** | Name of the test lab issuing IEC certificate |
| **10** | Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO 14001 |
| ***** | For point no. 5, 8, 9 & 10, the clause will be applicable to the successful bidder. |

5.2.2 Junction Box / Combiner Box

i. The Contractor shall provide sufficient no. of Array Junction Boxes / PV combiner boxes / DCDBs.

ii. All switch boards shall be provided with adequately rated copper bus-bar, incoming control, outgoing control etc. as a separate compartment inside the panel to meet the requirements of the Chief Electrical Inspector of Government (CEIG). All live terminals and bus bars shall be shrouded. The outgoing terminals shall be suitable to receive suitable runs and size of cables required for the Inverter/ Transformer rating.

iii. The degree of protection for following equipment shall be:

- Indoor Junction box : IP 21
- Outdoor Junction Box: IP 65

iv. All junction/ combiner boxes including the module junction box, string junction box, array junction box and main junction box should be equipped with

appropriate functionality, safety (including fuses, grounding, etc.), string monitoring capabilities, and protection.

v. The terminals will be connected to copper bus-bar arrangement of proper sizes to be provided. The junction boxes will 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-bars for easy identification and cable ferrules will be fitted at the cable termination points for identification.

Each Array Junction Box shall have suitable Reverse Blocking Diodes / Fuses of maximum DC blocking voltage of 1000 V with suitable arrangement for its connecting. The Array Junction Box shall also have suitable surge protection device. In addition, over voltage protection shall be provided between positive and negative conductor and earth ground such as Surge Protection Device (SPD) or on-load DC disconnectors with shoes. All incoming & outgoing cables must be terminated with Brass Gland for Cu Cables & Steel Gland for Al Cables. All Glands must be of Double Compression type for Outdoor duty & Single Compression type for Indoor duty. The rating of the Junction Boxes shall be suitable with adequate safety factor to inter connect the Solar PV array.

The DC cables from the modules to junction box can be directly connected to junction using MC4 connectors

vi. The Junction Boxes shall have suitable arrangement for the followings

vii. Combine groups of modules into independent charging sub-arrays that will be wired into the controller.

viii. Provide arrangement for disconnection for each of the groups.

ix. Provide a test point for each sub-group for quick fault location.

x. To provide group array isolation

xi. The rating of the Junction Boxes shall be suitable with adequate safety factor to inter connect the Solar PV array.

xii. The junction boxes shall be dust, vermin, and waterproof and made of thermoplastic/ metallic in compliance with IEC 62208, which should be sunlight/ UV resistive as well as fire retardant & must have minimum protection to IP 65(Outdoor)/ IP 21(indoor) and Protection Class II.

xiii. The terminals will be connected to copper bus-bar arrangement of proper sizes to be provided. The junction boxes will have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and outgoing cables.

xiv. The current carrying rating of the Junction Boxes shall be rated with standard safety factor to interconnect the Solar PV array.

xv. Suitable markings shall be provided on the bus-bars for easy identification and cable ferrules will be fitted at the cable termination points for identification.

xvi. Adequate capacity solar DC fuses & isolating miniature circuit breakers / MCCB should be provided if required. The Junction Box must have space for the maintenance and 10% Spare Install Capacity for future integration.

xvii. Detailed junction box specifications and data sheet shall be provided in the Technical Bid document.

xviii. Other Sub systems and components used in the SPV power plants (Cables, connectors, Junction Boxes, Surge Protection devices, etc.) must also confirm to

the relevant international /national standards for electrical safety besides that for quality required for ensuring expected service life and weather resistance. It is recommended that the interim, the cables of 600-1800 Volts Dc for outdoor installations should comply with the draft EN 50618 (other equivalent standards are also acceptable as per technical requirements) for service life expectancy of 25 years.

### 5.2.3 Inverter and Power Conditioning Unit (PCU)

i. Only those PCUs/ Inverters which are commissioned for more than 5 MW capacity in other solar PV projects till date shall be considered for this project. **The Contractor has to provide sufficient information to the satisfaction of HPGCL before placing the final order for PCUs/Inverters**. Power Conditioning Unit (PCU) shall consist of an electronic inverter with latest technology available in the market along with associated control, protection and data logging devices and must be fully communicable to SCADA with OPEN Communication Protocol. If any software required for the communication & SCADA, the same to be made available within the EPC package by the Contractor.

i. All PCUs should consist of associated control, protection and data logging devices and remote monitoring hardware, software for string level monitoring. All strings must be monitored with SCADA and that can be organized with SCADA network. Other equivalent technical option for string level monitoring is also acceptable.

ii. Dimension and weight of the PCU shall be indicated by the Bidder in the Bid. Bidder(s) are allowed to submit maximum three (03) inverter manufacturers of same technical platform to have flexibility to meet the timelines of the Project. Bidder(s) will use only one make in the project.

iv. Capacity of single unit of inverter shall be min. 500 kW. This plant shall be divided into 10-20 identical Solar PV arrays “sections”, wherein the capacity of each section varies depending upon supplier’s product capacity.

v. No. of inverters to be supplied shall be worked out by Supplier based on DC rating of inverter, Pnom ratio (Pnominal array / Pnominal inverter ≤ 1.1) and limit on overloading capacity (i.e. overload losses ≤ 0.2%)

vi. The Bidder shall guarantee average annual power loss due to non-threshold condition to be less than 0.1% and shall support the claim with necessary document / data / graphs in the Bid. Maximum overload of inverter must not increase 10% with specific limit of power losses.

vii. **Example Calculation for the Selection of Inverter Capacity**:

If nine (9) no. of 500 kW inverter (DC rated power) is allowed to cater to a 5000 kW array (cumulative DC power of solar array at module level under Standard Test Conditions “STC” of 1000 W/m2, AM of 1.5, 25 OC). This corresponds to $P_{nom}$ ratio ≤1.1. In this case, each inverter is serving to 555 kW of DC power of array, which is much lower than allowed maximum $P_{nom}$ ratio of 1.1. This is because if in place of 9 numbers, if 8 numbers of inverters of 500 kW capacity are used, each inverter will cater to 625 kW of DC power that means $P_{nom}$ ratio will be 1.25, may result into higher overload losses. Hence, 9

numbers of 500 kW inverters are preferred. Supplier shall extend the same analogy for other capacity of inverters.

Alternatively, the Contractor may supply 9 (nine) numbers of grid-tied photovoltaic inverters, each of capacity 500 kW or 7 numbers of 650 kW inverters or 5 numbers of 1 MW inverters or 4 numbers of 1.2 MW inverters. For inverter capacity below 1 MW, two inverters aggregating to a capacity of > 1 MW shall be treated as a 'set' and shall be installed in physical proximity in the same inverter room connecting with one transformer i.e. two units of 500 kW inverter shall be connected with a single 33 kV transformer unit of capacity > 1.25 MVA (Assuming peak hour operation at max 80% load). For number of inverters with odd quantities, the unpaired inverter can have dedicated inverter transformer to step up voltage at 33 kV step up transformer of appropriate capacity (assuming working of transformer at 80% of its rated capacity). **The Bidder has to indicate the selected parameters in the Bid.**

viii. DC input terminals must be in enough numbers so as each terminal is connected to dedicated single input. Two DC inputs cannot be connected on the single input DC terminal of the inverter. If adequate number of input are not available in the selected inverter by the Contractor then a DC junction box with protection devices such as fuse DC disconnects may be incorporated in to design. **The Bidder has to indicate the selected parameters in the Bid.**

ix. The minimum European efficiency of the inverter shall be not less than 98% above measured at 100% load as per IEC 61683 standards for measuring efficiency. The Bidder shall specify the conversion efficiency of different loads i.e. 25%, 50%, 75% and 100% in the Bid. **The Bidder should specify the overload inverter capacity in the Bid.**

x. The PCU shall be tropicalized and design shall be compatible with conditions prevailing at site. Provision of exhaust fan with proper ducting for cooling of PCU's should be incorporated in the PCU's, keeping in mind the extreme climatic condition of the site.

xi. The inverters shall have minimum protection to IP 65(Outdoor)/ IP 21(indoor) and Protection Class II.

xii. Nuts & bolts and the PCU enclosure shall have to be adequately protected taking into consideration the atmosphere and weather prevailing in the area.

xiii. (Grid Connectivity) Relevant CERC/HERC regulations and grid code as amended and revised from time to time shall be complied. The system shall incorporate a uni- directional inverter and should be designed to supply the AC power to the grid at load end. The power-conditioning unit shall adjust the voltage & frequency levels to suit the Grid.

xiv. All three phases shall be supervised with respect to rise/fall in programmable threshold values of frequency.

xv. The inverter output shall always follow the grid in terms of voltage and frequency. This shall be achieved by sensing the grid voltage and phase and feeding this information to the feedback loop of the inverter. Thus control variable then controls the output voltage and frequency of the inverter, so that inverter is always synchronized with the grid. The inverter shall be self-commutated with Pulse width modulation technology.

xvi. This should be capable of synchronize maximum within 1 Minutes.

xvii. The PCU shall be capable of controlling power factor dynamically.

xviii. Maximum power point tracker (MPPT) shall be integrated in the power conditioner unit to maximize energy drawn from the Solar PV array. The MPPT should be microprocessor based to minimize power losses. **The details of working mechanism and make of MPPT shall be mentioned by the Bidder in the Bid**. The MPPT must have provision for constant voltage operation. The MPPT unit shall confirm to IEC 62093 for design qualification.

xix. The system shall automatically "wake up" in the morning and begin to export power provided there is sufficient solar energy and the grid voltage and frequency is in range.

xx. Sleep Mode: Automatic sleep mode shall be provided so that unnecessary losses are minimized at night. The power conditioner must also automatically re-enter standby mode when threshold of standby mode reached.

xxi. Stand – By Mode: The control system shall continuously monitor the output of the solar power plant until pre-set value is exceeded & that value to be indicated.

xxii. Basic System Operation (Full Auto Mode): The control system shall continuously monitor the output of the solar power plant until pre-set value is exceeded & that value to be indicated.

xxiii. The PCU shall include appropriate self-protective and self-diagnostic feature to protect itself and the PV array from damage in the event of PCU component failure or from parameters beyond the PCU's safe operating range due to internal or external causes. The self-protective features shall not allow signals from the PCU front panel to cause the PCU to be operated in a manner which may be unsafe or damaging. Faults due to malfunctioning within the PCU, including commutation failure, shall be cleared by the PCU protective devices. In addition, it shall have following minimum protection against various possible faults

a. Earth Leakage Faults: The PCU shall have the required protection arrangements against earth leakage faults and –Ve DC directional protection.

b. Over Voltage & Current: In addition, over voltage protection shall be provided between positive and negative conductor and earth ground such as Surge Protection Devices (SPD).

c. PCU shall have arrangement for adjusting DC input current and should trip against sustainable fault downstream and shall not start till the fault is rectified.

d. Galvanic Isolation: The PCU inverter shall have provision for galvanic isolation. Each solid state electronic device shall have to be protected to ensure long life of the inverter as well as smooth functioning of the inverter.

e. Anti-islanding (Protection against Islanding of grid): The PCU shall have anti islanding protection. (IEEE 1547/UL 1741/ equivalent BIS standard).

f. Unequal Phases: The system shall tend to balance unequal phase voltage.

g. Heat Transfer / Cooling / Built in Ventilation Systems must be provided with 20% Spare capacity. **Bidders to Submit Heat Rejection / Transfer calculation for Air Conditioning of Inverter Room.**

h. Inverter must be provided with –Ve earthing for protection of PV modules against possible “Potential Induced Degradation”.

xxiv. Reactive Power: The output power factor of the PCU should be of suitable range to supply or sink reactive power. The PCU shall have internal protection arrangement against any sustained fault in the feeder line and against lightning in the feeder line.

xxv. Isolation: The PCU shall have provision for input & output isolation. Each solid-state electronic device shall have to be protected to ensure long life as well as smooth functioning of the PCU.

xxvi. All inverters/ PCUs shall be three phase using static solid state components. DC lines shall have suitably rated isolators to allow safe start up and shut down of the system. Circuit breakers used in the DC lines must be rated suitably.

a. Sinusoidal current modulation with excellent dynamic response.

b. Compact and weather proof housing.

c. Direct use in the outdoors with outdoor housing.

d. Comprehensive network management functions (including the LVRT and capability to inject reactive power to the grid).

e. No load loss < 1% of rated power and maximum loss in sleep mode shall be less than 0.05%.

f. Unit wise & integrated Data logging

g. Dedicated Prefab compartment required for Ethernet for networking.

h. PCU shall have protection against over current, sync loss, over temperature, DC bus over voltage, cooling fan failure (if provided), short circuit, lightening, earth fault, surge voltage induced at output due to external source, power regulation in the event of thermal overloading,

xxvi. It shall have bus communication via interface for integration, remote control via telephone model or mini web server, integrated protection in the DC and three phase system, insulation monitoring of PV array with sequential fault location.

xxvii. Ground fault detector which is essential for large PV generators in view of appreciable discharge current with respect to ground.

xxix. The power conditioner must be entirely self-managing and stable in operation. A self- diagnostic system check should occur on start up. Functions should include a test of key parameters on start up.

xxx. Over voltage protection against atmospheric lightning discharge to the PV array is required.

xxxi. The power conditioner must be entirely self-managing and stable in operation. A self- diagnostic system check should occur on start up. Functions should include a test of key parameters on start up.

xxxii. **Standards and Compliances:**

The Bidder also has to confirm the PCU specifications in the Bid.

**Table 5-2 Detailed Specifications of PCU**

| Sr. | Particulars | Details |
|---|---|---|
| **1** | PCU Mounting | As per the design |
| **2** | Nominal AC Output Power | ≥ 1000KW |
| **3** | Nominal AC Output Voltage | 415 Volts +15%/-10% AC / 270 V / As per design (Other equivalent technical option is also acceptable). |
| **4** | Maximum Input Voltage | 800 V DC Extendable up to 1000 V or1500V |
| **5** | Wave Form | Pure Sine wave |
| **6** | DC voltage range, MPPT | 450 to 800 volts DC (Other equivalent technical option is also acceptable). |
| **7** | Minimum Efficiency at 100% load<br>The rated European efficiency (Euro Eta Efficiency) and peak efficiency | > 98% as IEC- 61683(Efficiency)<br>> 98%, measured as per IEC 61683 standard for measuring efficiency.<br>* Inverter No Load / Full Load Loss Calculation must be submitted by the Bidder. |
| **8** | Output frequency | 50 Hz +3% to - 5% Hz |
| **9** | Power Factor | 0.8 lag- 0.8 lead |
| **10** | Max. THD at rated power | Less than 3 % |
| **11** | Ambient dry bulb temperature range | 0 to 50˚ deg C |
| **12** | Humidity | 15% to 95 % non- condensing |
| **13** | Enclosure | IP 4X / IP 65 (Indoor/ Outdoor rated) IEC-60068-2 (environmental) |
| **14** | Protection rating (as per IEC-60721-3-3) | Classification of chemically active substances: 3C2<br>Classification of chemically active substances: 3S2 |
| **15** | Grid Specifications | IEC 61727, VDE 0126 (Consider IEC Code for Central Inverter) |
| **16** | Nominal Voltage & Frequency | 415 Volts & 50 Hz |
| **17** | Voltage Tolerance | + 10% and -10% |

a. PCU shall confirm to IEC 60068-2 standards for Environmental Testing.

b. All inverters shall be IEC 61000 compliant for electromagnetic compatibility, harmonics, etc.

c. All inverters shall be safety rated as per IEC 62109 (1 &2), EN 50178 or equivalent DIN or UL standard.

d. Each PCU shall be compliant with IEEE standard 929 – 200 or equivalent. The **Bidder should select the Central inverter as per its own system design so as to optimize the power output.**

xxiii. Display

a. The PCU shall have local LCD (Liquid crystal display) and keypad for system control, monitoring instantaneous system data, event logs, data logs and changing set points. Control and read-out should be provided on an indicating panel integral to the Inverter. Display should be simple and self-explanatory. Display to show all the relevant parameter relating to PCU operational data and fault condition in form of front panel meters/ LEDs or two line LCD Display.

b. PCU front panel shall be provided with display (LCD or equivalent) to monitor the following

- Instantaneous DC power input
- DC input voltage
- DC Current
- Instantaneous active AC power output
- Instantaneous reactive AC power output
- AC voltage ( all the 3 phases and line)
- AC current ( all the 3 phases and line)
- Power Factor
- kWh Produced during entire day
- Total kWh produced during its life time
- Thermal loading (percentage)

PCU must be provided with display and also the same has to be made available at the SCADA monitoring & controlling desk installed in Main Control Room through Universal Open Protocol of Communication.

xxiv. Documentary Requirements & Inspection.

a. The bill of materials associated with PCUs should be clearly indicated while delivering the equipment.

b. The Contractor shall provide to HPGCL data sheet containing detailed technical specifications of all the inverters and PCUs. Operation & Maintenance manual should be furnished by the Bidder before dispatch of PCUs.

**<u>Note:</u> The HPGCL or its authorized representative reserves the right to inspect the PCUs/ Inverters at the manufacturer's site prior to dispatch.**

5.2.4 Cables and Wires

i. All cables and connectors for use for installation of solar field must be of solar grade which can withstand harsh environment conditions for 25 years and voltages as per latest IEC standards. (Note: IEC standards for DC cables for PV systems is under development, the cables of 600- 1800 volts DC for outdoor installations should comply with the draft EN 50618 for service life expectancy of 25 years. Other equivalent standards are also acceptable).

ii. Wires with sufficient ampacity and parameters shall be designed and used so that maximum voltage-drop at full power from the PV modules to inverter should be less than 1.5% (including diode voltage drop). PV Modules should be connected with USE-2/RHW-2 cables array to junction box conductors and junction box to photovoltaic disconnector with the THHN/THWN-2 sunlight resistant with 90ºC wet rated insulation cable (Other equivalent standards are

also acceptable). Due consideration shall be made for the de-rating of the cables with respect to the laying pattern in buried trenches / on cable trays, while sizing the cables. The Contractor shall provide voltage drop calculations in excel sheet.

iii. All cables shall be supplied in the single largest length to restrict the straight-through joints to the minimum number. Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted. All wires used on the LT side shall conform to IS and should be of appropriate voltage grade. Only copper conductor wires of reputed make shall be used. Straight joint is only applicable on 33 kV step up transformer to control room breaker connectivity.

iv. All wires used for connecting the modules and array should conform to the NEC standards. Modules should be connected with USE-2/RHW-2 cables array to junction box conductors and junction box to photovoltaic disconnector with the THHN/THWN-2 sunlight resistant with 90ºC wet rated insulation cable (Other equivalent standards are also acceptable).

v. All high voltage cables connecting the main junction box/string inverters to the transformers should be PVC insulated grade conforming to IS 1554 and cables shall also conform to IEC 60189 for test and measuring the methods.

vi. Irrespective of utilization voltage and current rating all type of power cables shall be minimum of 1100 V grade PVC insulated conforming to IS 1554 / IS 694 for working voltage less than 150 V control cable shall be of minimum 500 V grade, the control and power cable has to be laid separately. All LT XLPE cables shall confirm to IS: 7098 Part I & II. All HT XLPE Cables (33kV) Shall confirm IS: 7098 PART-3 & IEC-60287, IEC-60332 and the Contractor to submit technical data sheet, Voltage drop calculation, Power Loss Calculation and type test report for the approval of client / consultants.

vii. The cables shall be adequately insulated for the voltage required and shall be suitably color coded for the required service. Bending radius for cables shall be as per manufacturer's recommendations and IS: 1255.

**Table 5-3 Relevant Codes & Standards for Cable**

| Sr. | Item | Relevant IS | Relevant IEC |
|---|---|---|---|
| **1** | Conductors of Insulated Cables | IS: 8130 - 1984 | **IEC: 228** |
| **2** | Impulse tests on cables and their accessories | | **IEC: 230** |
| **3** | Extruded solid dielectric-insulated power cables for rated voltage from 1 KV upto 30 KV. | | **IEC: 502** |
| **4** | Test methods for insulations and sheaths of electric cables and chords. | | **IEC: 540** |
| **5** | Test on cable over a sheath which has special protective functions and are applied by extrusion. | | **IEC: 229** |
| **6** | Calculations of continuous current rating of cables (100% load factor). | | **IEC: 287** |

| | | |
|---|---|---|
| **7** | Cross-linked polyethylene insulated PVC sheathed cable for voltage from 3.3 KV upto 33 KV. | IS: 7098 (Part II) |
| **8** | PVC insulation & sheath of electrical cables. | IS: 5831 - 1984 |
| **9** | Mild steel wires, formed wires and tapes for armouring of cables. | IS: 3975 |
| **10** | Electrical test methods for electric cables partial discharge test. | **IEC: 885(2) - 1987 (Part II)** |
| **11** | Methods of test for cables. | IS: 10810 |
| **12** | Common test methods for insulating and sheathing materials of electric cables. | **IEC: 811** |
| **13** | Impulse test on cables & other accessories | **IEC: 230** |
| **14** | Cable termination for gas insulated switchgear. | **IEC: 859** |

5.2.5 TECHNICAL SPECIFICATION OF LT XLPE CABLES

**General Constructional Features**

The medium voltage cables shall be supplied, laid, connected, tested and commissioned in accordance with the drawings, specifications, relevant Indian Standards specifications, manufacturer's instructions. The cables shall be delivered at site in original drums with manufacturer's name, size, and type, clearly written on the drums.

**A. Material**:

Medium voltage cable shall be XLPE insulated. PVC sheathed, aluminium or copper conductor, armoured conforming to IS: 7098 Part I.

**B. Type:**

The cables shall be circular, multi core, annealed copper or aluminium conductor, XLPE insulated and PVC sheathed, armoured.

**C. Conductor:**

Uncoated, annealed copper, of high conductivity upto 4 mm² size, the conductor shall be solid and above 4 mm², conductors shall be concentrically stranded as per IEC:228.

**D. Insulation:**

XLPE rated 70° c. extruded insulation.

**E. Core Identification:**

| | | |
|---|---|---|
| Two core | : | Red and Black |
| Three core | : | Red, Yellow and Blue |
| Four core | : | Red, Yellow, Blue and Black |
| Single core | : | Green cable with Yellow strips for earthing |

Black shall always be used for neutral.

**F. Assembly**:

Two, three or four insulated conductors shall be laid up, filled with non-hygroscopic

material and covered with an additional layer of thermoplastic material.

**G. Armour:**

Galvanised steel flat strip / round wires applied helically in single layers complete with covering the assembly of cores.

- For cable size upto 25 Sq. mm. : Armour of 1.4 mm dia G.I. round wire
- For cable size above 25 Sq. mm. Armour of 4 mm wide 0.8 mm thick G.I strip

**H. Sheath:**

The cable shall be rated extruded for XLPE 90 deg.c. Inner sheath shall be extruded type and shall be compatible with the insulation provided for the cables.

Outer sheath shall be of an extruded type layer of suitable PVC material compatible with the specified ambient temp 50 deg. C and operating temperature of cables. The sheath shall be resistant to water, ultraviolet radiation, fungus, termite and rodent attacks. The colour of outer sheath shall be black. Sequential length marking required at every 1.0 meter interval on outer sheath shall be available. The contractor has to furnish resistance / reactance / capacitances of the cable in the technical datasheet.

**I. Rating:**

Up to and including 1100 Volts.

5.2.6 TECHNICAL SPECIFICATION OF HT XLPE CABLES

**General Constructional Features**

**A. Conductors:**

The conductor shall be of circular stranded Aluminium confirming to IS: 8130 & IEC:228. It shall be clean, reasonably uniform in size & shape smooth & free from harmful defects. Any other form of conductor may also be accepted if in line with modern trends.

**B. Semi-Conductor Barrier Tape/Tapes:**

The semi-conducting barrier tape/tapes shall be provided over the conductors.

**C. Conductor Screen:**

The conductor screen shall consist of an extruded layer of thermosetting semi-conducting compound which shall be extruded simultaneously with the core insulation.

**D. Insulation:**

The insulation shall be super clean XLPE compound applied by extrusion and vulcanized to form a compact homogenous body

**E. Insulation Screen:**

a. Each insulation have an insulation screen in two parts consisting of:

b. A water barrier tape/ Non-metallic semi-conducting swellable tape part and a metallic screen part.

c. The non-metallic part shall be directly applied upon the insulation of each core and may consist of an impregnated but nylon/PVC tape or a similar approved material or, an extruded semi-conducting material extruded simultaneously with the conductor screen and insulation (triple extrusion).

d. The semi-conductor shall be readily strippable and must not be bonded in such a manner that it has to be shaved or scraped to remove.

e. The metallic part shall consist of a copper tape helical applied with a 30% overlap over the water barrier tape/blocking tape. A binder tape of copper shall be applied over the copper wire metallic screen.

**F. Laying Up:**

a. The cores shall be identified on the non-metallic part of the insulation screen by legible printing on the length of each conductor or, by the inclusion of a marker tape.

b. The cores shall be laid up with a right hand direction of lay.

c. Binder tape/Moisture barrier:

During layup, a suitable open spiral binder may be applied, at the manufacturer's discretion, before the application of an extruded inner covering.

**G. Fillers:**

Fillers shall be polypropylene.

**H. Inner Covering/Sheath:**

The inner covering shall be extruded over the laid up cores to form compact and circular bedding for the metallic layer.

**I. Metallic Layer:**

The metallic layer shall be galvanised steel wire.

**J. Outer Sheath:**

The tough outer sheath, black coloured best resisting PVC polyethylene compound type ST-2 as per IS: 5831 for the operating temperature of the cable shall be provided over the armour as specified in relevant standards by extrusion process.

**K. Cable Marking:**

a. <u>Embossing on outer sheath:</u>

The following particulars shall be properly legible embossed on the cable sheath at the intervals of not exceeding one meter throughout the length of the cable. The cables with poor and illegible embossing shall be liable for rejection.

- Voltage grade
- Year of manufacture
- Manufactures name
- Successive Length
- Size of cable
- ISI mark

viii. Packing and marking shall be as per clause No. 18 of IS 7098 (part I)/1988 amended up to date.

ix. Cables inside the control room and in the switchyard shall be laid in Galvanized Cable Trays mounted on mild steel supports duly painted, in constructed trenches with RCC raft and brick sidewalls and provided with removable RCC covers.

x. Cable terminations shall be made with suitable cable lugs & sockets etc, crimped properly and passed through brass compression type cable glands at the entry & exit point of the cubicles.

xi. All cable/wires shall be provided with Punched Aluminium tags only. The marking on tags shall be done with good quality letter and number ferrules of proper sizes so that the cables can be identified easily.

xii. The wiring for modules interconnection shall be in the GI pipe /HD Pipe of approved make.

xiii. Data sheets of individual cable sizes (HT & LT) shall be submitted for approval by the Company. Drum numbers and drum length details shall be submitted with each consignment.

xiv. Cable end terminations and joint kits shall comply with the latest version of the relevant IS standard.

xv. The cable ends shall be terminated with adequate size copper lugs and sockets etc, single/double compression cable glands. Cable glands shall be of robust construction capable of clamping cable and cable armor (for armored cables) firmly without injury to insulation. The metallic glands shall be earthed at two locations. Suitable lock type crimping lugs shall be used for cable end terminations. Where cables are raising from ground, suitable PVC pipe guarding shall be provided for cable raising with sealing of the guarding PVC pipe including a suitable clamp.

xvi. HT cable termination kits and straight through joints shall be selected as per the cable specifications. Installation shall be as per the instructions given in the manufacturer's manual. Heat shrinkable type kits only shall be used for HT and LT cables.

xvii. **Data sheets of the joints and kits shall be submitted for approval by HPGCL**.

5.2.7 Clamps and Connectors

i. The bus-support clamps, spacers, T-connectors and various equipment connectors shall be supplied as per the enclosed drawings. The material to be used for these items shall be generally as per the Table 5-4.

i. The materials shall be of the best workmanship, and all the sharp edges and corners shall be rounded off. The thickness of tinning, wherever applicable, shall be not less than 10 microns. The minimum thickness of pads made of copper shall be 10 mm and those made out of Aluminium/Aluminium Alloy, shall be 12 mm, unless otherwise indicated in the specifications.

ii. All the clamps and connectors shall be designed to carry a continuous current not less than 125% of the rated current of the conductor (twin/single as the case may be)/equipment terminal to which these are to be connected. Temperature rise of the connector under the above condition shall not be more than 50% of the temperature of the main conductor/equipment terminal.

**Table 5-4 Clamps & Connectors**

| Sr. | Application | Material |
|---|---|---|
| 1. | Bolted type connection | |
| • | For connection to ACSR/AAAC/ Aluminum terminal | Aluminum Alloy conforming to designate A6 as per IS 617 |

| | | |
|---|---|---|
| • | For connection to copper terminals, with crimping facility to connect ACSR/AAAC jumper | Electrolytic grade copper, forged and tinned |
| 2. | Crimping type connection | |
| • | For connection to ACSR/AAAC jumper | Electrolytic grade aluminum |

iv. All the fasteners (i.e. nut-bolts, washers, check-nuts, etc.) used in the clamps and connectors shall be of non-magnetic stainless steel. The straight bolts shall be fully threaded, and the U-bolts shall be threaded up to 30 mm from the ends. For connectors made out of Aluminium/Aluminium Alloy, the bolts shall be of 12 mm diameter, and for copper connectors the bolts shall be of 10 mm diameter.

v. The clamps and connectors meant for ACSR and AAAC (525 sq.mm) shall have the same crimping dimensions. It shall be possible to use the same clamp/connector for ACSR or AAAC, as would be required, without any modification/change at site.

vi. The length of bolt shall be chosen such that after fully tightening the nut and check- nut, minimum 5 (five) threads of the bolt shall project outside the nut/check-nut.

vii. As an alternative to the various types of clamps and connectors detailed under 2.0 above, the Contractors may offer connectors of Power Fired Wedge Pressure Technology (PFWPT). However, the same needs to be specified in the Bid.

viii. Connectors of PFWPT type shall meet the general requirements for various connections/joints as indicated in the relevant drawings.

ix. PFWPT type connectors shall comprise of:

a. Tapered `C' - shaped spring member

b. Wedge for connecting solid/stranded conductor, along with handle, suitable for connection between:

- Aluminium & Aluminium
- Copper & Copper
- Aluminium & Copper
- Aluminium & Al. Alloy
- Copper & Al. Alloy
- Al. Alloy & Al. Alloy

i. Components of the PFWPT type connectors shall be made of Aluminium Alloy suitably heat-treated to ensure that the required Mechanical & Electrical parameters are in line with ANS 1 specification no. C 119.4-1991. The connectors shall have `self-cleaning' capability during application. The connector shall ensure stable and low contact resistance under varying load conditions and the thermal cycling effects.

ii. The special tools and tackles required for installation of the PFWPT type connectors shall be identified in the offer. One set of these bolts and tackles shall be included in the scope of supply.

iii. The Contractor shall furnish the following information in their bill of material:

a. Availability of the PGWT connectors indigenously.

b. Unit rate of each item

c. Not-withstanding anything stated above, the final decision regarding acceptance of the type of clamps and connectors (conventional/PFWPT type) shall rest with HPGCL

5.2.8 Lightening Protection for PV Array

i. The source of over voltage can be lightning or other atmospheric disturbance. Main aim of over voltage protection is to reduce the over voltage to a tolerable level before it reaches the PV or other sub-system components as per IS: 2309 – 1989 (Reaffirmed – 2005), Edition 3.1 (2006-01).

i. Necessary foundation / anchoring for holding the lightning conductor in position to be made after giving due consideration to shadow on PV array, maximum wind speed and maintenance requirement at site in future.

ii. The lightning conductor shall be earthed through flats and connected to the earth mats as per applicable Indian Standards with earth pits. Two earth pits shall be provided for each lightening arrestor. Each lightning conductor shall be fitted with individual earth pit as per required Standards including accessories, and providing masonry enclosure with cast iron cover plate having locking arrangement, watering pipe using charcoal or coke and salt as required as per provisions of IS & Earth Resistance of Lightening System must be less than one (1) Ohm.

a. If necessary more numbers of lightning conductors may be provided. The Contractor is also free to provide franklin rod / Early Streamer type of lightning arrestors on the MMS structure designed in such a way not to cast shadow on the next raw of solar PV modules. The Contractor to submit necessary calculations based upon rolling sphere method for the Lightening protection system.

iv. The Contractor shall submit the drawings and detailed specifications of the PV array lightning protection equipment to HPGCL for approval before installation of system.

5.2.9 AC Network

i. AC converted by the inverter is transmitted through the appropriate cables from the Inverter (1 no. of 1.25 MVA each) to appropriately sized power transformer and from transformer to RMU of the next inverter unit in the loop. (Selection of Transformer above 1.25 MVA is acceptable if the same technically approved and not incurring any extra losses.) RMU panel should consist of adequate size indoor AC bus/ cable, which can handle the current and the voltage safely as per the relevant, IS standards. RMU panel should be equipped with adequate protection relays, fuses, annunciations and remote operating and controlling facility from the Main Control Room. Relevant national & international codes to be follows :-

**Table 5-5 Relevant National & International Code**

| Sr. | Item | Relevant IS | Relevant IEC |
|---|---|---|---|
| **1** | Power transformer | IS 2026 | **IEC 76** |
| **2** | Fittings & Accessories | IS 3639 | |
| **3** | Climate Proofing | IS 3202 | **IEC 354** |
| **4** | Loading of Transformer | IS 6600 | **IEC 296** |
| **5** | Oil | IS 335 | **IEC 137** |
| **6** | Bushings | IS 20650 | **IEC 144** |
| **7** | Degree of Protection | IS 2147 | **IEC 76** |
| **8** | Testing, Tolerances on guaranteed Particulars | IS 2026 | **IEC 76** |
| **9** | Buchholz Relay | IS 3637 | |
| **10** | Electrical Insulation | IS 1271 | **IEC 85** |

i. RMU panel shall be provided in Inverter room. It shall have circuit breaker of suitable rating for connection and disconnection of PCU from grid. The busbar shall connect the AC distribution board to the transformer. It shall have provision to measure bus voltage, current and power of the transformer.

ii. Bus-bars shall be of high conductivity Aluminium alloy or Copper of adequate size. The bus-bars shall be adequately supported by non-hygroscopic, non-combustible track resistant and high strength type polyester fibre glass moulded insulators. Separate supports shall be provided for each phase and neutral busbar. The bus-bars joints shall be provided with high tensile steel bolts, bellevelle washers and nuts, so as to ensure good contacts at the joints. The bus-bars shall be colour coded as per IS 375.

iv. **The Bidder shall submit the detailed specifications of the AC bus and panel in the Bid.**

v. The RMU panel with thermal over current and earth fault releases. The incomer shall be selected one size higher than the required rating as per Type 2 selection chart.

vi. Removable gland plates with gaskets shall be provided in the cable alleys for glanding the power and control cables. The distance between the gland plate and the incomer terminals shall not be less than 450 mm.

vii. The Contractor should submit theoretical design calculations and detailed explanations along with drawings shall be provided and approved by the Company.

5.2.10 Step-Up Transformer

i. The Contractor shall provide the complete turnkey design, supply, erection, testing and commissioning of transformers and transformer substation to first step-up the output of the inverter to 33 kV at the location of the inverter; the solar plant shall be connected to control room. The capacity of the solar plant with provision of rated 33kV Vacuum Circuit Breaker panel with single outgoing connected. Provision of ABT meter will be connected with 33kV VCB panel. Appropriate size for the 10 MW solar photovoltaic power plant. However, design is open for selection of any configuration for the PV Plant.

i. 3 phase, Oil Filled, 33 kV/, 50 Hz, Power Transformers with min power rating 1.25 times of the selected inverter rating and associated Switchgear of approved make should be utilized. 33 KV transformers can be off-load tap change type. The transformers shall be suitable for outdoor installation with 3 phase 50 Hz 33 KV system in which the neutral is effectively earthed and they should be suitable for service under fluctuations in supply voltage up to plus 10% to minus 15%. (Also 10% overloading criteria recommended as per IS is acceptable. For example, if 1000KW inverter is planned then suitable rating of transformer with 0.9 PF & 90% loading will becoming 1234.57 KVA which is near to 1.25 times).

**General Specifications:**

ii. Cumulative loss shall be as per IGBC guidelines. All electrical equipment and installation shall confirm to the latest Indian Electricity Rules as regards safety, earthing and other essential provisions specified for installation and operation of electrical plants.

iv. Relevant national and international standards in this connection are mentioned in Table 5-6 General Standards for Transformers.

v. All working parts, insofar as possible, are to be arranged for convenience of operation, inspection, lubrication and ease of replacement with minimum downtime. All parts of equipment or of duplicate equipment offered shall be interchangeable.

vi. The quality of materials of construction and the workmanship of the finished products/ components shall be in accordance with the highest standard and practices adopted for the equipment covered by the specification.

**Table 5-6 General Standards for Transformers**

| IS: 2026 (Part 1 to 4) | Specifications for Power Transformer |
|---|---|
| IS: 2099 | Bushings for alternating voltage above 1000 V |
| IS: 3639 | Fittings and accessories for power transformer |
| IEC: 60076 (Part 1 to 5) | Specifications for Power Transformer |

| | |
|---|---|
| IS: 9921 Part 1 to 5 | Alternating currents disconnectors (isolators) and earthing switches rating, design, construction, tests etc. |
| IS: 2705 Part 1 to 4 & IEC: 185 | Current transformer |
| IS: 3156 Part 1 to 4 | Voltage Transformer |
| IS: 3070 part 1 to 3 | Lightning arrestors |
| IS: 2544 | Porcelain insulators for system above 1000 V |
| IS: 5350 | Part III – post insulator units for systems greater than1000 V |
| IS: 5621 | Hollow Insulators for use in electrical equipment |
| IS: 5556 | Serrated lock washers – specification |
| IEC: 186 | Voltage transformer |

vi. All items of equipment and materials shall be thoroughly cleaned and painted in accordance with relevant Indian Standards. The finish paint shall be done with two coats of epoxy based final paint of colour Shade RAL 7032 of IS:5 for indoor equipment.

vii. Any fitting or accessories which may not have been specifically mentioned in the specification but which are usual or necessary in the equipment of similar plant or for efficient working of the plant shall be deemed to be included in the contract and shall be provided by the Contractor without extra charges. All plant and apparatus shall be complete in all details whether such details are mentioned in the specifications or not.

ix. All equipment shall be designed for operation in tropical humid climate at the required capacity in an ambient air temperature of 50°C. Equipment shall be suitable for an ambient temperature of 50°C. Maximum relative humidity of 100% shall also be taken into consideration for design of equipment.

x. The reference ambient temperatures for which the transformers are to be designed are as mentioned in Table 5-7.

xi. The rating and electrical characteristics of the MV 33 kV/66kV Outdoor type transformer (typical) shall be as mentioned in Table 5-8.

**Table 5-7 Reference Weather Conditions for Transformer Design**

| Sr. | Particulars | Specifications |
|---|---|---|
| 1. | Maximum ambient temperature | 50 degree C |
| 2. | Maximum daily average ambient temp | 40 degree C |
| 3. | Maximum yearly weighted average ambient temp | 40 degree C |
| 4. | Minimum ambient air temperature: (Cooling medium shall be Air) | Minus 5 degree C |

| | | |
|---|---|---|
| 5. | CLIMATIC CONDITIONS : | |
| 5.1 | Maximum relative humidity | 51.6% |
| 5.2 | Yearly average number of thunder storms | Varies from 30 to 50 |
| 5.3 | Average no. of rainy days per annum | 60 days |
| 5.4 | Fog | The atmosphere is subject to fog for two month in winter |
| 5.5 | Number of months during which tropical monsoon conditions prevail | 3 months |
| 5.6 | Dust storms | occur at frequent intervals |
| 5.7 | Average annual rainfall | 60 cms |
| 5.8 | Maximum wind speed | 180 kmph |

**Table 5-8 Rating and electrical characteristics of 33kV Power Transformer**

| Sr. | Particulars | Details |
|---|---|---|
| 1 | Continuous kVA ratings | 1.25 times the rated power output of Inverter MVA |
| 2 | Type | Oil immersed |
| 3 | Frequency | 50 Hz |
| 4 | Type of cooling | ONAN |
| 5 | No. of phases | Three |
| 6 | Rating voltage H.V. side | 33 kV |
| 7 | Highest System voltage on H.V. side | 36 kVr.m.s. |
| 8 | Rated voltage on L.V. side | LV (Output of the Inverter) kV r.m.s. |
| 9 | Vector Group | Dy5/Dy11 |
| 10 | Connections<br>a) H.V. Winding<br>b) L.V. winding | <br>Delta<br>Star |
| 11 | On / Off Load taps on H.V. Side (for H.V.Variation) | + 10 to – 15.0 % (in steps of 1.25%) |
| 12 | Impedance voltage (%)as per IS 2026 | 5-6% |
| 13 | Minimum Creepage distance at 32 mm/kV | 400 phase to earth |
| 14 | Transformer connections | LV side – Bus Duct with weather proof enclosure, HV Side –Bushing with enclosure. Bidders can also use LT XLPE aluminum cable instead of bus duct. |

5.2.11 Instrument Transformer

i. The instrument transformers i.e. current and voltage transformers shall be single

phase transformer units and shall be supplied with a common marshaling box for a set of three single phase units. The tank as well as top metallics shall be hot dip galvanized or painted Grey color as per RAL 9002.

i. The instrument transformers shall be oil filled hermetically sealed units. The instrument transformers shall be provided with filling and drain plugs.

ii. Polarity marks shall indelibly be marked on each instrument transformer and at the lead terminals at the associated terminal block. The insulators shall have cantilever strength of more than 500 kg.

5.2.12 Current Transformer

i. Current transformers may be either of the bushing type or wound type. The bushing types are normally accommodated within the transformer bushings and the wound types are invariably separately mounted. The location of the current transformer with respect to associated circuit breaker has an important bearing upon the protection scheme as well as layout of, substation. Current transformer class and ratio is determined by electrical protection, metering consideration.

i. Technical specifications – Current ratings, design, Temperature rise and testing etc. should be in accordance with IS: 2705 (part I to IV)

**Type and Rating**

a. The current transformer should be of outdoor/ indoor type, single phase, oil immersed, self-cooled and suitable for operation in 3 phase solidly grounded system.
b. Each current transformer should have the following particulars under the site conditions for the system under design (typical values for 33 kV systems are given).
c. General Parameters: 33kV/66KV CT.
d. Each current transformer should have the following particulars under the site conditions for the system under design (typical values for 33kV/66KV system are given).

**Table 5-9 General parameters for 33 kV CT**

| Sr. | Particulars | Details |
|---|---|---|
| 1 | Highest system Voltage (Um) | 36 kV rms |
| 2 | Rated frequency | 50 Hz |
| 3 | System Neutral Earthing | Effective earthed |
| 4 | Installation | Outdoor/indoor(IP 65) |
| 5 | Rated short time thermal current | 25 kA for 1 sec or appropriate thermal current as per design calculations |
| 6 | Rated dynamic current | 63 kA (Peak) appropriate dynamic current as per design calculations |
| 7 | Rated min power frequency withstand voltage (rms value) | 70 kV |
| 8 | Rated lightning impulse withstand voltage (peak value) | 170 kV |
| 9 | | |

| | | |
|---|---|---|
| 10 | Minimum Creepage distance at 32 mm/kV | 900 phase to earth |
| 11 | Temperature rise | As per -IS 2705/1992 |
| 12 | Type of insulation | Class A |
| 13 | Number of cores | Two (2) with One (1) protection core and one (1) metering core of accuracy 0.5 class |
| 14 | CT secondary current | Protection cores – 1 Amp.<br>Metering Core – 1 Amp<br>(With Highest Accuracy Class) |
| 15 | Number of terminals in marshalling box | All terminals of control circuits wired up to marshalling box plus 20 terminals spare |
| 16 | CT ratio & Rated VA Burden, short time thermal rating ,class of accuracy | Minimum burden required :<br>1. Metering core – 40 VA<br>2. Protection core – 10 VA |

### 5.2.13 General Parameters of 33 kV VT

The Bidder has to furnish the specifications of 33kV VT with the Bid.

**Table 5-10 General parameters for 33 kV VT**

| Sr. | Particulars | Details |
|---|---|---|
| 1 | Highest system voltage (Um) | 36 kV |
| 2 | System neutral earthing | effective earthed |
| 3 | Installation | Outdoor (IP 65) |
| 4 | System fault level | Appropriate |
| 5 | Rated min power frequency withstand voltage (rms value) | 70 kV |
| 6 | Rated lightning impulse withstand voltage (peak value) | 170 kV |
| 7 | Standard reference range of frequencies for which the accuracy are valid | 96% to 102% for protection and 99% to 101% for measurement |
| 8 | Rated voltage factor | 1.2 continuous & 1.9 for 30 sec |
| 9 | Class of Accuracy | 0.5 / 3P, IS3156/1992 |
| 10 | Minimum Creepage distance at 32 mm/kV | 900 phase to earth |
| 11 | Stray capacitance and stray conductance of LV terminal over entire carrier frequency range | As per IEC:358 |
| 12 | One Minute Power frequency Withstand voltage for secondary winding | 3 kV rms |
| 13 | Temp. rise over an ambient temp. of 50 deg. C | As per IS 3156/1992 |
| 14 | Number of terminals in control spare. | All terminals of control circuits wired Cabinet up to marshalling box plus 10 terminals |
| 15 | Rated total thermal burden | 350 VA |

| | | |
|---|---|---|
| 16 | Number of cores | 2 (two) – 1 for protection and one for metering with 0.5 class accuracy. |
| 17 | Rated Output, insulation level, transformation ratio, rated voltage factor | Should be provided by the Contractor. |

5.2.14 Circuit Breaker

i. The circuit breakers shall be capable of rapid and smooth interruption of currents under all conditions completely suppressing all undesirable phenomena even under the most severe and persistent short circuit conditions or when interrupting small currents or leading or lagging reactive currents. The circuit breakers shall be 'Restrike-Free' under all operating conditions. The details of any device incorporated to limit or control the rate of rise of restriking voltage across, the circuit breaker contacts shall be stated. The over voltage across, the circuit breaker contacts shall be stated. The over voltage caused by circuit breaker while switching inductive or capacitive loads shall not exceed 2.5 times the highest phase to neutral voltage. The actual make and break times for the circuit breakers throughout the ranges of their operating duties shall be stated in the offer and guaranteed.

i. The arc quenching chambers shall have devices to ensure almost uniform distribution of voltage across the interrupters.

ii. Appropriate & adequate Capacity 415V AC indoor air Circuit Breaker as per the IEC 60898 / IEC 62271 – 100 or equivalent Indian Standards along with control circuit and protection relay circuit, fuses, annunciations and remote operating and controlling facility from the Main Control Room.

iv. Circuit breaker shall be C2/Ml class under all duty conditions and shall be capable of performing their duties without opening resistor. The circuit breaker shall meet the duty requirement of any type of fault or fault location and shall be suitable for line charging and dropping when used on 6 kV effectively grounded or ungrounded systems and perform make and break operations as per the stipulated duty cycles satisfactorily.

v. The circuit breaker shall be capable for breaking the steady & transient magnetizing current corresponding to 33 kV transformers. It shall also be capable of breaking line charging currents as per IEC- 62271-100 with a voltage factor of 1.4.

vi. The rated transient recovery voltage for terminal fault and short line faults shall be as per IEC: 62271-100.

vii. The Bidder shall indicate in the Bid, the noise level of breaker at distance of 50 to 150 m from base of the breaker.

viii. The Bidder may note that total break time of the breaker shall not be exceeded

under any duty conditions specified such as with the combined variation of the trip coil voltage, pneumatic pressure etc. While furnishing the proof of the total break time of complete circuit breaker, the Bidder may specifically bring out the effect of non- simultaneity between same pole and poles and show how it is covered in the guaranteed total break time

ix. While furnishing particulars regarding the D.C. component of the circuit breaker, the Bidder shall note that IEC-62271-100 requires that this value should correspond to the guaranteed minimum opening time under any condition of operation.

x. The critical current which gives the longest arc duration at lock out pressure of extinguishing medium and the duration shall be indicated.

xi. All the duty requirements specified above shall be provided with the support of adequate test reports.

xii. Circuit breaker shall be SF6 / Vacuum type with electrically spring charged mechanism. The operating mechanism shall be anti-pumping and trip free (as per IEC definition) electrically under every method of closing. The mechanism of the breaker shall be such that the position of the breaker is maintained even after the leakage of operating media and / or gas. The circuit breaker shall be able to perform the duty cycle without any interruption.

xiii. Electrical tripping shall be performed by shunt trip coil. Provision shall also be made for local electrical control. 'Local / remote' selector switch and close & trip push buttons shall be provided in the breaker central control cabinet. Remote located push buttons and indicating lamps shall also be provided. The SF6 / VCB coil DC supply through appropriately rated battery bank and charger to be supplied by the Contractor.

xiv. Operating mechanism and all accessories shall be in local control cabinet. A central control cabinet for the three poles of the breaker shall be provided along with supply of necessary tubing, cables, etc.

xv. Mounting and supporting structure for Circuit Breaker. The circuit breakers should be self-supporting type. However, if necessary for the purpose of minimum ground clearance the circuit breakers should be mounted on raised steel structures which should be included in the scope of supply of circuit breaker.

xvi. Following information and data for design of foundations from the supplier of the circuit breaker be obtained.

a. Dead weight per pole for complete circuit breaker.
b. Static bending moments above the feet of each pole and for complete circuit breaker.
c. Static shear force at the foot of each pole and for complete circuit

breaker.

d. Maximum height of the steel supporting structure.

e. Maximum diameter of the pole.

f. Maximum horizontal force acting at upper terminal of each pole due to impact of closing/opening of the circuit breaker.

g. Max. Impact loading in terms of equivalent static load both compression and upward due to opening/closing of the breakers. It shall be clearly stated whether these forces shall act simultaneously or at different timing.

h. No. of steel supporting columns provided for mounting the equipment.

i. The above data should represent static reactions for the worst windage or operation conditions. Circuit breakers whether of self-supporting type or on raised steel structure should ensure minimum sectional clearance (say 3500 mm for 33 kV).

j. Necessary connecting materials such as clamps, bolts, nuts, washers etc. and fixing bolts for mounting the equipment on the supporting structures wherever required should be obtained from the circuit breaker supplier.

xvi. **Applicable Standards:** The materials shall conform in all respects to the relevant Indian Standard Specifications/ IEC Standards, with latest amendments indicated below in Table 5-11.

**Table 5-11 Applicable Standards for Circuit Breakers**

| Indian Standard | Title | International & Internationally recognized standard |
|---|---|---|
| ISS-13118/1991 | General requirements for Circuit breakers for voltage above 1000 V | IEC 62271-100-1/2001 |
| ISS-2705/1992 | Current Transformers | |
| ISS-2099/1986 | Bushings for alternating voltages above 1000 V | |
| ISS-2633/1964 | Methods of testing uniformity of coating of zinc coated articles | |
| ISS-3231/1986 | Electrical relays for power system protection | |
| ISS-1248/1983 | Specification for Ammeters & Voltmeters | |
| ISS-335/1983 | New insulating oils Electrical Clearances | IEC 71 (For oils in CTs) |
| ISS-2147/1962 | Degree of protection provided by enclosures for low voltage switchgear & control gear | |

xvii. **General Parameters of Circuit Breaker:** General parameters: Outdoor/ Indoor Vacuum type Circuit Breaker.

**Table 5-12 General Parameters for 33KV Vacuum Type Circuit Breakers**

| Sr. | Particulars | Details |
|---|---|---|
| 1 | Type of circuit breaker | Vacuum type |
| 2 | Highest System Voltage | 36 kV |

| | | |
|---|---|---|
| 3 | Rated operating voltage | 33 kV |
| 4 | Rated frequency | 50 Hz (+3% to -5%) |
| 5 | Number of poles | Three (3) |
| 6 | Rated/minimum power frequency Withstand voltage | 70 kV |
| 7 | Rated lightning impulse Withstand voltage | 170 kV |
| 8 | Minimum Creepage distance at 32 mm/kV | 900 phase to earth |
| 9 | Rated operating duty cycle | 0 - 0.3 sec. - CO – 3 min. – CO |
| 10 | Rated line charging breaking | As per IEC |
| 11 | Reclosing | Single and three phase high speed auto reclosing |
| 12 | Maximum fault level | 25 kA (rms) for 1 sec. |
| 13 | Auxiliary contacts | As required plus 6NO and 6NC contacts per pole as spare. |
| 14 | Noise level | Maximum 140dB at 50m distance from base of circuit breaker |
| 15 | Seismic acceleration | g horizontal |

**General Parameters for 11KV Vacuum Type Circuit Breakers**

| Sr. | Particulars | Details |
|---|---|---|
| 1 | Type of circuit breaker | Vacuum type |
| 2 | Highest System Voltage | 11 kV |
| 3 | Rated operating voltage | 12 kV |
| 4 | Rated frequency | 50 Hz (+3% to -5%) |
| 5 | Number of poles | Three (3) |
| | *Other technical parameters will be offered | /indicated by the bidder. |

xix. General Parameters of SF6 Insulated Ring Main Unit (RMU):

**Table 5-13 General Parameters for 33KV SF6 Type RMU**

| Sr. | Particulars | Details |
|---|---|---|
| 1 | Type of Ring Main Unit | Metal enclosed, compact module, panel type, IEC 62271-200 |
| 2 | Highest System Voltage | 36 kV |
| 3 | Rated operating voltage | 33kV |
| 4 | Rated frequency | 50 Hz (+3% to -5%) |
| 5 | Number of poles | Three (3) |
| 6 | Rated/minimum power frequency Withstand voltage | 70 kV |
| 7 | Rated lightning impulse Withstand voltage | 170 kV |
| 8 | Rated Current Busbar | 630A |
| 9. | Insulation Gas | $SF_6$ |
| 10 | Minimum Creepage distance at 32 mm/kV | 900 phase to earth |
| 11 | Rated operating duty cycle | 0 - 0.3 sec. - CO – 3 min. – CO |

| | | |
|---|---|---|
| 12 | Rated line charging breaking | As per IEC |
| 13 | Reclosing | Single and three phase high speed auto reclosing |
| 14 | Maximum fault level | 21 kA (rms) for 1 sec. Or appropriate as per design |
| 15 | Rated Making Capacity | 52 kA |
| 16 | Rated Breaking Capacity | 21 kA |
| 17 | Auxiliary contacts | As required plus 6NO and 6NC contacts per pole as spare. |
| 18 | Noise level | Maximum 140dB at 50m distance from base of circuit breaker |

xx. Co-ordination of rated voltages, short circuit breaking current and rated normal current for guidance as per IS 13118 for rated voltage 33 kV and above as commonly used are as given in Table 5-14

**Table 5-14 Circuit Breaker Co-ordination parameters**

| Rated Voltage (kV) | Rated Short Circuit Breaking Current (kA) | Rated Normal Current (A) | | | | |
|---|---|---|---|---|---|---|
| **36** | 8 | 630 | 1250 | 1600 | 2500 | 4000 |
| | 16 | 630 | 1250 | 1600 | | |
| | 40 | | | | | |

xxi. Circuit Breaker protection against

- Over Current
- Earth fault
- Under voltage & over voltage protection
- Under frequency & over frequency
- SF6 gas pressure low (where applicable)
- DC supply failure

5.2.15 Protective Relays

i. The Solar PV system and the associated power evacuation system interconnections should be protected as per IEC 61727 Ed.2, norms. Over current relays, reverse power relays, differential protection relays (For 6 MVA And Above Transformer Rating) and earth fault relays have to be essentially provided as per technical requirements. All relay should be numerical type & should be remote operating and controlling facility from the control room.

i. The numerical relays shall have RS 485 port for communication.

ii. The operating voltage of the relays shall be 110 V DC/220 V DC as per battery bank rating.

iv. Detailed Design calculations shall be provided on fault power computations and the philosophy of protective relaying with respect to short circuit kA calculations. Design, drawing and model of protection relay shall be approved by the Company/Electricity Authority.

5.2.16 Earthing for PV Array

i. The photovoltaic modules, BOS and other components of power plant requires adequate earthing for protecting against any serious faults as guided by IEC 60364.

i. The earthing system shall be designed with consideration of the earth resistivity of the project area. The earth resistivity values shall be measured prior to designing the earthing system. Unless otherwise specified, earthing system shall be in accordance with IS: 3043 and IEEE 80, Indian Electricity Rules, Codes of practice and regulations existing in the location where the system is being installed.

ii. The permissible system fault power level at 33 kV also shall be kept in consideration while designing the earthing system. Each array structure of the PV yard, LT power system, earthing grid for switchyard ,all electrical equipment ,control room ,PCU, All junction boxes, ACDB& DCDB ,all motors and pumps etc .shall be grounded properly as per IS 3043 - 1987. All metal casing / shielding of the plant shall be thoroughly grounded in accordance with Indian electricity act / IE Rules.

iv. The earthing for array and LT power system shall be made of 3.0 m long 40 mm diameter perforated Cu/GI/ chemical compound filled, double walled earthing electrodes including accessories, and providing masonry enclosure with cast iron cover plate having pad-locking arrangement, chemical compound mix as required as per provisions of IS: 3043.

v. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.

vi. Each string/ array and MMS of the plant shall be grounded properly. The array structures are to be connected to earth pits as per IS standards. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.

vii. The complete earthing system shall be mechanically & electrically connected to provide independent return to earth.

viii. For each earth pit, a necessary test point shall be provided.

ix. In compliance to Rule 11 and 61 of Indian Electricity Rules, 1956 (as amended

up to date), all non-current carrying metal parts shall be earthed with two separate and distinct earth continuity conductors to an efficient earth electrode.

x. The Contractor should submit the earthing system design calculations along with the system layout for the Company's approval prior to the installation of the system

xi. Unless otherwise specified, the earthing system primary and secondary grid conductors, equipment connections shall be constructed with galvanized iron flat. However the earthing of transformer neutrals, plc and inverter terminals and electronic earthing shall be provided using copper earthing conductor only.

xii. Earthing Mesh is to prepared and installed in entire power plant.

5.2.17 Lightening Protection for PV Plant & Earthing

i. The source of over voltage can be lightning or other atmospheric disturbance. Main aim of over voltage protection is to reduce the over voltage to a tolerable level before it reaches the PV or other sub-system components as per IEC 60099 / IS: 2309 – 1989 (Reaffirmed – 2005), Edition 3.1 (2006-01). Lightening Protection System required for Solar PV Plant, Inverter Room, and Substation Structure & Control Room within the EPC scope of work. The intent of specification can be conventional as per IS : 2309 or can be Early Streamer Emission Type depending upon Area, Protected Equipment & Technical feasibility. Necessary concrete foundation for holding the lightning conductor in position to be made after giving due consideration to shadow on PV array, maximum wind speed and maintenance requirement at site in future. We recommended going with Early Stream Emission Air Terminal Technology as per NFC 17-102 / IEC 62305-2. Level of Protection must be defining as per Rolling Sphere Method LPL-I, LPL-II, LPL-III & LPL-IV where the radius shall be of 20mtr, 30mtr, 45mtr & 60mtr respectively.

ii. Rp(h) : Protection radius at a given height (h) Rp(h) = √ 2rh - h2 + Δ(2r + Δ) (for h ≥ 5 m) For h < 5 m, refer to the table below h : Height of the OPR tip above the surface(s) to be protected r(m) : Standardized striking distance Δ(m) = 106 .ΔT (OPR efficiency)

OPR radius of protection

| Protection level | I (r = 20 m) | | | II (r = 30 m) | | | III (r = 45 m) | | | IV (r = 60 m) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPR | OPR 30 | OPR 45 | OPR 60 | OPR 30 | OPR 45 | OPR 60 | OPR 30 | OPR 45 | OPR 60 | OPR 30 | OPR 45 | OPR 60 |
| h (m) | Radius of protection Rp (m) | | | | | | | | | | | |
| 2 | 19 | 25 | 31 | 22 | 28 | 35 | 25 | 32 | 39 | 28 | 36 | 43 |
| 3 | 29 | 38 | 47 | 33 | 42 | 52 | 38 | 48 | 58 | 43 | 57 | 64 |
| 4 | 38 | 51 | 63 | 44 | 57 | 69 | 51 | 65 | 78 | 57 | 72 | 85 |
| **5** | **48** | **63** | **79** | **55** | **71** | **86** | **63** | **81** | **97** | **71** | **89** | **107** |
| 6 | 48 | 63 | 79 | 55 | 71 | 87 | 64 | 81 | 97 | 72 | 90 | 107 |
| 8 | 49 | 64 | 79 | 56 | 72 | 87 | 65 | 82 | 98 | 73 | 91 | 108 |
| 10 | 49 | 64 | 79 | 57 | 72 | 88 | 66 | 83 | 99 | 75 | 92 | 109 |
| 15 | 50 | 65 | 80 | 58 | 73 | 89 | 69 | 85 | 101 | 78 | 95 | 111 |
| 20 | 50 | 65 | 80 | 59 | 74 | 89 | 71 | 86 | 102 | 81 | 97 | 113 |
| 45 | 43 | 65 | 76 | 58 | 75 | 89 | 75 | 90 | 105 | 89 | 104 | 119 |
| 50 | 40 | 65 | 74 | 57 | 75 | 88 | 75 | 90 | 105 | 89 | 104 | 120 |
| 55 | 36 | 65 | 72 | 55 | 75 | 86 | 74 | 90 | 105 | 90 | 105 | 120 |
| 60 | 30 | 65 | 69 | 52 | 75 | 85 | 73 | 90 | 104 | 90 | 105 | 120 |

iii. The lightning conductor shall be earthed through flats and connected to the earth mats as per applicable Indian Standards with earth pits. Each lightning conductor shall be fitted with individual earth pit as per required Standards including accessories, and providing masonry enclosure with cast iron cover plate having locking arrangement, chemical compound as per provisions of IS.

iii. If necessary more numbers of lightning conductors may be provided as per design calculation

iv. The Contractor shall submit the drawings and detailed specifications of the PV array lightning protection equipment.

v. The design, manufacture, inspection, testing and performance of Lightning Arrester shall comply with all currently applicable statutes, safety codes, provision of latest Indian Electricity Act, Indian Electricity Rules and Regulations of Statutory Authorities.

vi. Contractor shall provide dedicated two earth pits for Lightening Arrestor as per relevant IS standard.

5.2.18 Isolators cum Earthing Switches, Contacts, Insulators, Busbars

i. This specification covers design, manufacture, testing and supply of. Manually operated 33 KV, 800 Amps Upright mounting type with manually operated with earth switch Isolators. The Isolators and Isolator-cum-Earthing Switched shall comply with the requirements of the IS: 9921 and IEC: 129 (latest edition) except specified herein. The Insulators shall comply with the requirements of IS : 2544 and IEC : 168-1988 (latest edition) for 33 kV pole mounted structure wherever required. 33kV pole mounted structure would be supplied, installed and commissioned by the Contractor wherever required.

i. The isolator shall be of the manual operated type with earthing switches and shall complete with all parts and accessories including insulator operating rods, mounting attachments, necessary for their efficient operation. The equipment shall confirm in all respect to high standards of engineering Equipment shall capable of performing in continuous commercial operation up to the suppliers guarantee in a manner acceptable to the client, The equipment offered shall be complete with all components necessary for its effective and trouble free operation along with associated equipments, interlock, protection schemes, etc. Such components shall be deemed to be within the scope of the Contractor's supply irrespective of whether those are specifically brought out in this specification or not. All similar parts particularly removable ones shall be interchangeable.

ii. Each pole shall have three Pedestal type of Insulator’s stacks. Necessary arrangements shall be provided for proper alignment of the contacts. Gange operated links shall be so designed that all phases shall make and break simultaneously. The design of Isolators and Isolator-cum-Earthing Switches shall be provided for positive control of blades in all positions with minimum mechanical stress on the Insulators. Fixed guides shall be so provided that proper setting of contacts shall be obtained, when a blade is out of alignment even by 25mm in either direction. All movable parts which may be in current path shall be shunted by flexible copper conductor of adequate cross-section and capacity, which shall be furnished under bill of material.

**Service Condition:**

The 33 kV/66KV triple pole air break isolators are intended to be used primarily for sectionalizing 33 kV/66kV UG cable portion of the line with 33 kV/66kV overhead portion of the line.

Isolator shall confirm IS: 9921(Part 1 to 4) & IEC 600 - 129 "alternating current disconnects (Isolators) and earthing switches", and IS 9921 (Part-I to IV) "Specification for alternating current disconnects (isolators) and earthing switches for voltages above 1000V"

a. The moving & fixed contacts shall be made of hard drawn electrolytic grade copper strips and shall be heavy duty self- aligning & high pressure type preferably which applies pressure to the contact surfaces after the blades are fully closed and release the pressure before they start to open. High pressure type contacts shall wipe the contact surfaces, while opening and closing. The contacts shall be so designed that wiping, action shall not cause securing or abrasion on the contact surfaces. The wiping action shall be sufficient to remove oxide film, formed during the operation of the switches. The pressure shall be developed by rotation of the entire blade.

b. The temperature rise of contacts due to the flow of rated short circuit current for a period of 3 seconds shall not cause any annealing or welding of contacts.

c. The moving contacts, if provided, shall close first and open last so that no damage is caused due to arcing whatever to the main contacts. **The Successful Bidder shall give full details of such contacts with necessary drawings.**

d. The arcing contacts, if provided shall close first and open last so that no damage is caused due to arcing whatever to the main contacts. The Contractor shall give full details of such contacts with necessary drawings.

e. The female contact and its tensioning by spring shall be such that there will, always, be a positive contact with adequate pressure to give enough contact surface for the passing of current. The springs provided should not go out of alignment or get entangled with the male contact during operation. The details of springs shall be furnished on the G.A. drawing.

**INSULATORS**: The isolator shall be provided with solid core insulators.

i. These shall be of stacking type to be used. The dimensions and other parameters unless otherwise specified shall generally conform to IS - 5350-Part-11 & IEC 273.

ii. The cylindrical type post insulators shall be of solid core type. Insulators of similar type shall be interchangeable. The mechanical strength class for outdoor cylindrical post insulators shall be of strength class 6, corresponding mechanical strength in tension, compression and torsional shall be as per IS : 53550 Part - II. When operated at maximum system voltage, there shall be no electrical discharge. Shielding rings, if necessary shall be provided.

iii. The parameters of the insulators required shall conform to IS : 0350 - Part - II - 1973 or IEC 273.

iv. The cylindrical post insulators shall consist of single unit only.

v. The insulator shall be provided with a completely galvanized steel base designed for mounting on the support. The base and mounting arrangement shall be such that the insulator shall be rigid and self-supporting and no guying or cross bracing between phase shall be necessary.

vi. **Porcelain of the insulator**:

a. The porcelain used for the manufacture of the insulators shall be homogenous, free from laminations and other flaws or imperfections that might effect the mechanical or dielectric quality and shall be thorough vitrified, tough and impervious to moisture. The glazing of the porcelain shall be uniform brown colour, with a smooth surface arranged to shade away rain water and free from blisters, burns and other similar defects. Insulators shall be inter-changeable.

b. The porcelain and metal parts shall be assembled in such a manner and with such materials that any differential thermal expansion between the metal and porcelain parts throughout the operating temperature range will not loosen the parts or electrical strength or rigidity. The assembly shall not have excessive concentration of electrical stress in any section or across leakage surfaces. The cement used shall not give rise to chemical reaction with metal fittings. The insulator shall be suitable for water washing by rains or artificial means in service conditions. Further the insulators to be supplied shall be of high- quality and should not result in mismatch and misalignment of stacks during erection and operation.

c. Each cap shall be of a high grade cast iron or malleable steel casting or steel forging. Cap and base insulators shall be interchangeable with each other. The insulator shall conform to the requirement of the latest edition of IS: 2544,or any other equivalent standard. The Bidder should furnish the characteristics of insulators in the Bid.

**Busbars**

i. The outdoor bus-bars and equipment connections shall be with ACSR conductor (Panther / suitable size as per design).

ii. The bus-bars and the connection jumpers shall be supported on post insulators wherever required.

iii. The ACSR bus bars are an underground system of wires strung between two supporting structures and supported by strain type insulators. The stringing tension may be limited to 500-900 kg. depending upon the size of the conductor used. These types of bus bars are suitable for earthquake prone areas.

iv. Bus bar Material – The materials in common use for bus bars and connections of the strain type are ACSR conductor.

v. Since aluminum oxides rapidly great care is necessary in making connections. In the case of long spans expansion joints should be provided to avoid strain on the supporting

insulators due to thermal expansion or contraction of pipe.

vi. The bus bar sizes should meet the electrical and mechanical requirements of the specific application for which they are chosen.

vii. The isolator shall be provided with padlocking device to permit locking of the isolator in both fully open and fully closed positions.

5.2.19 Control & Relay Panel Specifications

i. The control & relay panel shall be free standing, simplex type, floor mounting type, fabricated from 2 mm thick MS sheet for main enclosure and 1.6 mm thick MS sheet for internals and partitions. The main enclosure shall be mounted on a base frame fabricated out of 100x50 ISMC mild steel section.

ii. The enclosure external finish color shade shall be decided by the Company, The internal surface shall have a glossy white finish all over.

iii. The control & relay panel shall contain the following metering and protection devices:

- Metering, Indications & Controls
- Ammeter – 0 ..... A
- Ammeter selector switch
- Voltmeter – 0 – 12/36/66 kV
- Voltmeter selector switch
- Load manager to display the following parameters : MW, MVA, MVArh, MVAr Cos Ø, Hz,
- Indication lamps for R, Y, B phases, Breaker 'ON' (R), Breaker 'OFF' (G), Breaker 'TRIP' (A), Spring charged (W), Trip Circuit Healthy (B)
- TNC switch, spring return to neutral position shall be provided for circuit breaker operation.
- Local / Remote selection switch for circuit breaker operation
- Semaphore indicators (LED type) for CB and Isolator 'Open' & 'Close' positions
- Mimic diagram for the 33/66 kV systems with aluminum strips and 'ON' 'OFF' indications for isolators

5.2.20 Low Voltage Switchgear

i. This specification is for the 415V TP&N Power Control Centre (PCC).

ii. The PCC shall be rated for the maximum output of the supply transformer feeding the system.

iii. The short circuit withstand rating (1 sec) at rated voltage of the switchgear shall be minimum of 20 kA (rms) and corresponding dynamic rating shall be 50 kA (peak).

iv. The configuration of the PCCs shall be as per the Single Line Diagram of the system.

5.2.21 Execution

i. Single front / compartmentalized, modular design, degree of protection IP52 with provision of extension on both sides.

i. Incomer feeders: mains incomer - Electrically operated draw out type Air Circuit Breakers (ACBs).
ii. Outgoing feeders : Electrically operated draw out type Air Circuit Breakers (ACBs) / Moulded Case Circuit Breakers (MCCBs)
iv. The color finish shade of switchgear enclosure for interior shall be glossy white & for exterior it shall be light grey, semi glossy shade 631 of IS: 5. If a different exterior shade is desired by the PURCHASER, the same shall be intimated to the supplier.
v. The PCC shall be fabricated out of CRGO sheet steel; 2 mm thick for the outer shall all-round. The internal walls and separators shall be of 1.6 mm thick CRGO sheet steel.
vi. The gland plates shall be 3 mm thick.

5.2.22 Control & Relay Panel Specifications for 415 V TP&N Power Control Centre (PCC)

i. This specification is for the 415V TP&N Power Control Centre (PCC).
ii. The PCC shall be rated for the maximum output of the supply transformer feeding the system. The short circuit withstand rating (1 sec) at rated voltage of the switchgear shall be minimum of 20 kA (rms) and corresponding dynamic rating shall be 50 kA (peak)
iii. The configuration of the PCCs shall be as per the Single Line Diagram of the system.

Execution

Power Control Centres (Construction)

a. Single front / compartmentalized, modular design, degree of protection IP52 with provision of extension on both sides.
b. Incomer feeders: mains incomer - Electrically operated draw out type Air Circuit Breakers (ACBs).
c. Outgoing feeders : Electrically operated draw out type Air Circuit Breakers (ACBs) / Moulded Case Circuit Breakers (MCCBs)
d. The colour finish shade of switchgear enclosure for interior shall be glossy white & for exterior it shall be light grey, RAL 7032 of IS: 5. If a different exterior shade is desired by the PURCHASER, the same shall be intimated to the supplier.
e. The PCC shall be fabricated out of CRGO sheet steel; 2 mm thick for the outer shall all-round. The internal walls and separators shall be of 1.6 mm thick CRGO sheet steel
f. The gland plates shall be 3 mm thick.

Control Circuit

a. Control supply for breaker closing / tripping - 110V DC
b. Air Circuit Breaker spring charge motor – 240 V AC, 1 phase
c. Moulded Case Circuit Breakers – 240 V AC, 1 phase
d. Indications, annunciation – 110V DC
e. Space heater, sockets, etc. – 240 V AC, 1 phase

Busbar and Cable Cavity

a. The material for main bus bars and tap off bus bars shall be electrolytic grade aluminum with HR PVC sleeved insulation
b. Bus bars shall be suitable for short circuit rating and current suitable for all connected load.
c. Bottom cable entry for incoming and outgoing cables
d. A suitable gland plate shall be supplied for termination of power, control and instrumentation cables.
e. Whenever feeders are housed in multi-tier configuration, these tiers shall be segregated by sheet metal barriers

5.2.23 Control Room Electrical Wiring

i. Electrification of building shall be carried out as per IS 732-1989, IS 46481968 and other relevant standards. Suitable AC Distribution Board should be designed to Supply AC power in Control room.
ii. Control room AC distribution Board theoretical design, calculations and detailed explanations along with drawing shall be provided and approved by HPGCL.

5.2.24 Auxiliary Power Supply

i. The Contractor shall install a separate 33 kV / 415 V step down transformer to supply power for internal equipment such as power for control equipment, area lighting, water pumps, conference room fixtures, control room lighting and air-condition, etc.
ii. This auxiliary power should be utilized from the internal connection before the metering point of Solar PV Plant. A separate meter can be installed for auxiliary consumption just for internal accounting purpose.

The Contractor/ bidder has to quote/ achieve the NEEGG at metering point considering that auxiliary power consumption is met from the internal connection of PV Plant. At metering point, there should be net metering with import and export power accounting, for determining “Actual Delivered Energy” against the NEEGG.

5.2.25 DC Battery & Charger

i. Adequate capacity DC battery Bank should be provided for emergency control supply of inverters, control / protection system & emergency lighting. A appropriate capacity battery charger with relevant IS/IEC standards & protection and automatic change over system should be provided to charge the battery bank along with relay circuit, fuses, annunciations and remote operating and controlling facility from the Main Control Room.
ii. A DC power supply Distribution panel/board should be supplied along with the Charger as per relevant IS standards. Control room DC Battery Bank & DC supply system theoretical design, calculations and detailed explanations along with drawing shall be provided and approved by HPGCL.
iii. DC Batteries the batteries shall have the following specifications:

a. Type : Nickel Cadmium Stationary, sealed type, storage battery

b. Rating : 110 V D.C., Minimum 80 Ah at 8 Hour rate of discharge

c. Standard : IS 1651 – 1979 ; performance as per IS 8702

d. Container : Plastic Resin, ABS or PP

e. Terminal Post : Designed suitably to accommodate external bolted connections

iv. The battery shall be provided with epoxy paint coated exhaust fan for removal of gasses released from the battery cells.

v. The data sheet for the battery shall be submitted along with the Bid for evaluation.

5.2.26 Earthing

i. Earthing bus bar shall be terminated at both ends of the switchgear to suit the connections to outside earthing conductor. All components inside the module are required to be earthed individually and are to be looped and connected to the horizontal earth bus.

**Terminals**

a. CT circuit - Isolating link type terminals with shorting facility

b. PT circuit – clip on type terminals

c. Spare contacts shall be wired up to terminal block. 10% spare terminals shall be provided for each module

Specific Requirements

1. All ACBs shall be 4 pole, electrically operated, draw-out type, with closing coil, spring charge motor, trip coil, TNC switch for close and trip, manual closing and tripping push buttons, door I/L, test and service position micro switches, emergency P.B., safety shutters, etc. The circuit breaker shall be provided with anti-pumping feature.
2. ACBs shall be complete with microprocessor release and shall be provided with over current, short circuit and earth fault protections.
3. Minimum10% spare feeders of each rating shall be provided in the switchgear.
4. All current transformers shall have 5/1A secondary and all meters shall be suitable for 5/1 A operation.
5. All indicating lamps shall be of LED cluster type. ACB feeders shall be provided with ON, OFF, AUTOTRIP, SPRING CHARGED, TEST, SERVICE, TRIP CIRCUIT HEALTHY indications
6. All indicating instruments shall be flush mounting, Digital, 96 sq.mm size.
7. Window annunciator with hooter and accept, test, reset button shall be provided. Necessary auxiliary relays for contact multiplication shall be provided in the panel.
8. The maximum temperature of the bus bars, droppers and contacts at continuous

current rating under site reference ambient temperature of 50º C shall not exceed 105º C.

Instrumentation: Switchgear instrumentation shall be provided as follows:

a. Mains Incomer – Voltmeter with selector switch
b. Ammeter with selector switch
c. Power Factor meter
d. Frequency meter
e. TVM + MD meter
f. Potential indicating lamps
g. Outgoing Feeders
h. Ammeter with selector switch on all feeders

5.2.27 General Technical Specifications of Control Panel

i. The panel shall be self-supporting, free standing, floor mounted, modular type with construction having degree of protection of IP 54 as per IS 2147.
ii. The panel shall be fabricated from 14 SWG CRCA sheet steel for frame & load bearing surfaces. Partitions may be fabricated from 16 SWG CRCA if no components are mounted on them.
iii. The panel shall be painted with 2 coats of primer after pre-treatment and 2 coats of Polyurethane / epoxy paint with shade as decided by the Company.
iv. Stiffeners shall be provided at corners & between modules to make panel rugged. The stiffeners will necessarily be required for relay compartments or doors where heavy components are mounted.
v. The openable covers shall be provided with lift off type hinges, quarter turn door locks and flexible copper wire for earth connection.
vi. The panel shall be dust and vermin proof. Synthetic or neoprene gaskets shall be provided at all openings.
vii. The panel shall be of dead front construction suitable for front operated and back maintained functioning.
viii. Panel shall be provided with fl. lamp of 20 w capacity operated by door operated limit switch. Panel shall also have space heaters and thermostat arrangement.
ix. Panel shall be provided with 3 pin switch socket combined unit of 5 Amp capacity.
x. Lifting hooks shall be provided at the top of the panel.
xi. The hardware components used in the panel shall be hot dipped galvanized.
xii. The control components shall be fixed on mounting plate by drilling & tapping.
xiii. Aluminum anodized legend plates shall be provided for all the components. For components mounted on front face, legend plate from inside shall also be provided.
xiv. Pretreatment by 7 tank process shall be done before painting / powder coating the panel.
xv. Panel shall have provision of drawing pocket.
xvi. The panel shall be designed to ensure maximum safety during operation inspection, connection of cables and maintenance. Inside panel, checking and removal of components shall be possible without disturbing other units.
xvii. Cable entries will be from bottom. The opening of cable entry shall be covered by

3 mm thick gland plates.

xviii. The panel shall be provided with all necessary components / devices and instruments as per the enclosed schematic diagram and functional requirements.

xix. The components such as protective relays, auxiliary relays, push buttons, switches, instruments shall be flush mounted on the front side of a panel.

xx. The control wiring shall be done with PVC insulated flexible copper wire. For CT secondary circuits 2.5 sq.mm. wire shall be used. For control wiring 1.5 sq.mm. wire shall be used.

xxi. Earthing busbar of suitable cross section shall be provided throughout the length of panel.

xxii. The panel shall be fully wired all the terminals shall be brought out for cable connections. 10% spare terminals shall be provided on each terminal block. Separate terminal block shall be provided for different voltages. All wire shall have P.V.C. ferrules as per wiring diagram.

xxiii. Proper shrouding to incoming and outgoing terminals shall be provided to ensure safety during operation, inspection and maintenance.

xxiv. Indicating lamps shall be with multiple LEDs & shall be suitable for the voltage specified.

xxv. All the components in the panel shall be properly labeled. The labels shall be made of non-rusting metal or engraved PVC material properly fixed by screws.

xxvi. The panel layout shall be made in such a way that it will always facilitate easy removal and reconnection of control cables without disturbing other wiring.

xxvii. Centre lines of control switches, push buttons and indicating lamps shall be matched so as to give neat appearance. Similarly top lines of indicating instruments and relays shall also be matched.

xxviii. The panel shall be provided with electrolytic grade aluminum busbar of suitable cross section so as to maintain max current density of 0.8 AMP/ Sq.mm.

xxix. Bus bars shall be provided with color coded heat shrinkable sleeves.

xxx. Bus bars shall be supported by high quality epoxy insulators provided at specified distances so as to withstand to the given fault level.

xxxi. The busbar chambers shall be provided with suitable ventilation arrangements so as to limit the maximum temperature of 85°C while carrying rated current.

xxxii. Proper clearance of minimum 25 mm shall be maintained between phase bus bars and between bus bars.

xxxiii. The panel shall be inspected at manufactures works before dispatch to site at the discretion of HPGCL/.

xxxiv. All routine tests shall be carried out on the panel in presence of the Company / its representative. These tests shall include following:

a. Verification of components ratings and operation.
b. High voltage measurement test.
c. Insulation Resistance measurement.

xxxv. Control testing.

xxxvi. Approval on following drawings shall be obtained before manufacturing the panels

a. General arrangement drawing.

b. Wiring Diagram.

xxxvi. Detail bill of material.

xxxvii. 33 kV Transmission Line

The Contractor shall provide 33 kV transmission with bay and metering on Turnkey basis as per client's requirement. Bidder shall confirm the same in the Bid. Connection upto DISCOMs interconnection point is under the Contractor's scope.

5.2.28 Metering System

i. ABT energy meter shall be provided as approved by DISCOM to measure the delivered quantum of energy to the grid for sale. The responsibility of arranging for the meter, its inspection/calibration/testing charges etc. rests with the Contractor. All charges incurred on Meter testing, shall be borne by the Contractor. ABT energy metering system is to be approved by DISCOM.

i. Meter must be provided with the necessary data cables.

ii. Separate metering system has to be provided for L.T. (incoming) and H.T. (outgoing) supply. The meter should be Load Manager/ Multifunction Meter with SCADA interface.

iv. The Bidder shall provide ABT compliant meters at the interface points. Interface metering shall conform to the Central Electricity Authority (Installation and Operation Meters) Regulation 2006 and amendment thereof Commercial settlement of solar Photovoltaic Grid Interactive based power project shall be in accordance with the HPGCL order.

v. Meter shall be suitable for interfacing for synchronizing the built-in clock of the meter by GPS time synchronization equipment existing at the station either through a synchronization pulse received from the time synchronization equipment or through a remote PC synchronized to GPS clock shall also be in the scope of Bidder.

vi. All charges for testing and passing of the meter with relevant government agency shall be borne by Bidder, HPGCL will assist Bidder for necessary document as and when required.

vii. ABT compliant Energy Meters shall have technical specification as given below (not limited to specified requirement, Bidder can provide Meter with latest facilities):

viii. Shall be microprocessor-based conforming to IEC 60687 / IEC 6205211/ IEC 62053- 22 / IS 14697

ix. Shall carry out measurement of active energy (both import and export) and reactive energy (import) by 3-phase, 4 wire principle suitable for balanced/ unbalanced 3 phase load.

x. Shall have an accuracy of energy measurement of at least Class 0.2 for active energy and at least Class 0.5 for reactive energy according to IEC 60687, and shall be connected to Class 0.2 CT cores and Class 0.2 VT windings.

xi. The active and reactive energy shall be directly computed in CT & VT primary ratings.

xii. Shall compute the net MWh and MVARh during each successive 15-minute block metering interval along with a plus/minus sign, instantaneous net MWh, instantaneous net MVARh, average frequency of each 15 minutes, net active

energy at midnight, net reactive energy for voltage low and high conditions at each midnight.

xiii. Each energy meter shall have a display unit with a seven digit display unit. It shall display the net MWh and MVARh with a plus/minus sign and average frequency during the previous metering interval; peak MW demand since the last demand reset; accumulated total (instantaneous) MWh and MVARh with a plus/minus sign, date and time; and instantaneous current and voltage on each phases.

xiv. All the registers shall be stored in a non-volatile memory. Meter registers for each metering interval, as well as accumulated totals, shall be downloadable. All the net active/reactive energy values displayed or stored shall be with a plus /minus sign for export/import.

xv. At least the following data shall be stored before being over-written for the following parameters:

**Table 5-15 Circuit Breaker Co-ordination parameters**

| Sr. | Parameters | Details | Min No of Days. |
|---|---|---|---|
| **1** | Net MWh | 15 min Block | 90 days in meter |
| **2** | Average Frequency | 15 min Block | 90 days in meter |
| **3** | Net MVARh for > 103 % | 15 min Block | 90 days in meter |
| **4** | Cumulative Net MWh | At every Mid-night | 30 days in meter / 90 days in PC |
| **5** | Cumulative Net MVARh for v > 103 % | At every Mid-night | 30 days in meter / 90 days in PC |
| **6** | Date and time blocks of VT failure on any phase | | |

i. Shall have a built in clock and calendar with an accuracy of less than 15 seconds per month drift without assistance of external time synchronizing pulse.

ii. Date/time shall be displayed on demand. The clock shall be synchronized by GPS time synchronization equipment existing at the station provided by Bidder.

iii. The meter shall be suitable to operate with power drawn from the VT supplies. The burden of the meters shall be less than maximum 2 VA.

iv. The power supply to the meter shall be healthy even with a single-phase VT supply. An automatic backup, in the event of non-availability of voltage in all the phases, shall be provided by a built in long life battery and shall not need replacement for at least 10 years with a continuous VT interruption of at least 2 years. Date and time of VT interruption and restoration shall be automatically stored in a non-volatile memory.

v. Even under the absence of VT input, energy meter display shall be available and it shall be possible to download data from the energy meters.

vi. Shall have an optical port on the front of the meter for data collection from either a hand held meter reading instrument (MRI) having a display for energy readings or from a notebook computer with suitable software.

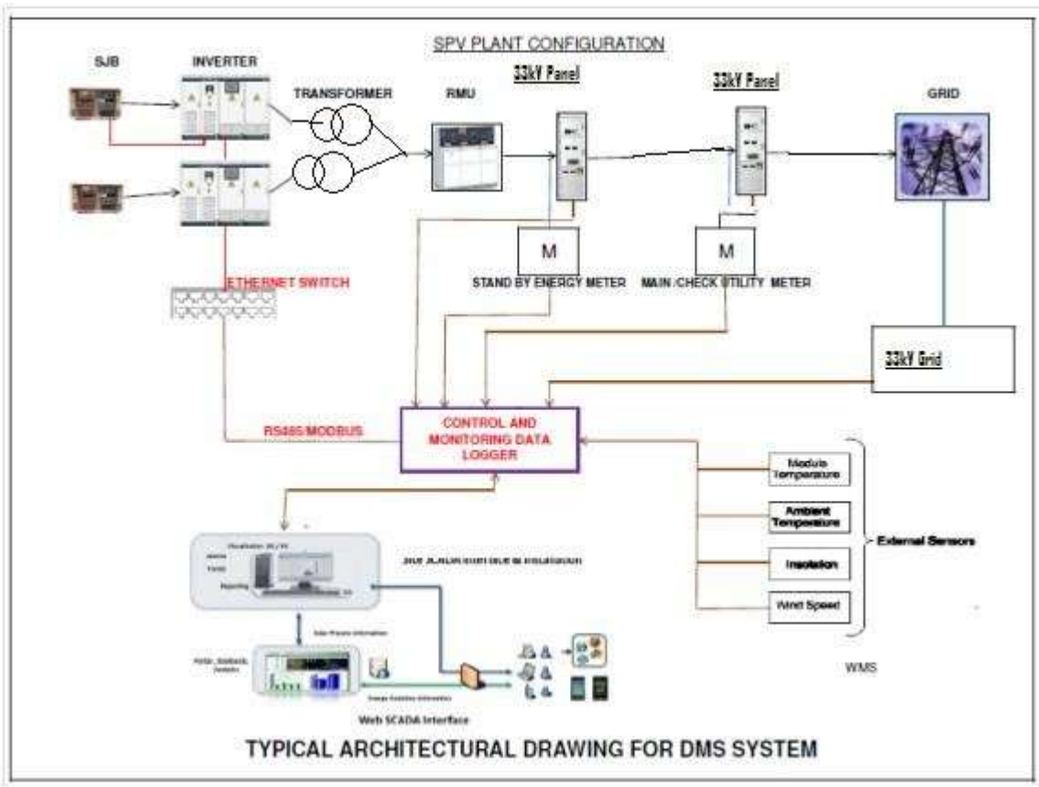
vii. The meter shall have means to test MWh and MVARh accuracy and calibration at site in-situ and test terminal blocks shall be provided for the same.

viii. The meter shall have a unique identification code provided by the Company and shall be permanently marked on the front of the meter and stored in the non-volatile memory of the meter.

ix. The Company shall have the right to carry out surprise inspections of the Metering Systems from time to time to check their accuracy.

5.2.29 SCADA and Remote Monitoring System

i. The plant shall be automatically operated and shall be controlled by microprocessor based control system SCADA. There shall be simultaneous data logging, recording and display system for continuous monitoring of data for different parameters of different sub systems, power supply of the power plant at DC side and AC side.




i. An integrated SCADA shall be supplied which should be capable of communicating with all inverters and provide information of the entire Solar PV Grid interactive power plant.

ii. Computer-aided data acquisition unit shall be a separate & individual system comprising of different transducers to read the different variable parameters, A/D converter, multiplexer, de multiplexer, interfacing hardware & software, which will be robust & rugged suitable to operate in the control room Environment.

iv. Reliable sensors for solar insolation, temperature, and other weather and electrical parameters are to be supplied with the data logger unit.

v. The data acquisition system shall measure and continuously record electrical parameters at inverter output, 33 kV ABT meter at evacuation point, ambient

temperature near array field, control room temperature, AC and DC side electrical parameters of each inverter, power characteristics of the HT side. Data acquisition of ABT Meter is under control of DISCOMs but the Contractor to provide TVM for the internal record.

vi. All data shall be recorded chronologically date wise. The data file should be MS Excel compatible. The data logger shall have internal reliable battery backup and data storage capacity to record all sorts of data simultaneously round the clock. All data shall be stored in a common work sheet chronologically and representation of monitored data shall be in graphics mode or in tabulation form. All instantaneous data can be shown in the Computer Screen. Provision should be available for Remote Monitoring.

vii. The Bill of Materials associated with the equipment must clearly indicate especially the details about the PC and Printers, etc.

viii. The Data Acquisition System should be housed in a desk made of steel sheet.

ix. SCADA shall provide following data at a 5-15 minute interval.

a. Power at 33 kV ABT meter at switchyard
b. Ambient temperature near array field.
c. Wind Speed
d. AC and DC side Power of each inverter
e. Solar irradiation/isolation
f. Voltage of the HT Side

x. Any other parameter considered necessary by supplier based on current prudent practice

xi. SCADA shall provide 15 minute daily, monthly and annual average of following parameters:

- Exported Energy to grid at 33 kV
- Energy of each inverter
- Solar Radiation
- Temperature

xii. The SCADA server PC shall be of Industrial type, rugged & robust in nature to operate in a hostile environment. The PC shall have minimum Intel Core i7 processor having 2 X 500 GB HDD with 4 GB RAM. The PC shall also have 42" TFT Color monitor, DVD Drive with Writer, Floppy Drive, USB drive, Scroll Mouse and UPS for 4 hours Power back up.

xiii. The printer shall be of industrial type, rugged & robust in nature and of reputed make. The printer shall be equipped for printing, scanning, copying and fax.

xiv. String Monitoring System: String Monitoring System designed exclusively for parallel connection of the photovoltaic field strings, allowing for protection in the case of breakdown & monitoring the entire photovoltaic field, by means of the following checks.

- Reading the string currents (10 channels available)
- Reading the total voltage of the field
- Checking the fuses positioned in the system, to protect the photovoltaic panels.
- Checking the state of the internal protection against over-voltages.

- Should be very low power consumption.

a. Monitoring of various parameters at string level should be made possible in the main control room at site by installing the suitable string monitoring system any fault at string level could be recognizable by that system.
b. A provision should be present for remote monitoring of the power plant at string detail over the web.
c. The Contractor shall provide to HPGCL the detailed specifications, and all administrative rights/ privileges/ passwords to the string monitoring system.

xv. Weather Station and Data logger

a. Contractor shall provide the data over remote web-server with rights to control or modify the same through appropriate arrangements.
b. Contractor shall provide necessary licensed software and hardware solution to offer monitoring of electrical parameters of grid and solar generator monitored at individual string level over remote web server. The Contractor shall provide all necessary accessories like power supply, connection cords, sensors, active SIM card with appropriate data plan etc. so as to make the system complete in all respect.
c. The cost of data plan during the project and O&M shall be borne by the Contractor. At the end of the O&M, the same shall be transferred to HPGCL at no extra cost.
d. It shall also have local data logging and communication through Bluetooth / Wi Fi and Ethernet port. Hardwire connection with Ethernet Port is also acceptable.
e. The Remote Monitoring System shall be capable of sustaining maximum – minimum temperature, rainfall, wind gusts and UV radiation. The enclosure shall be IP65 for outdoor installation / IP21 for indoor installation.
f. The Remote Monitoring System shall have capability to log and send data from weather sensors.
g. The data shall be available for every minimum 15 minutes interval.
h. The system shall have sufficient internal memory storage to retain data for one complete year and shall have provision of expanding memory through external memory card / USB drive.
i. The system shall be able to communicate wirelessly in a close proximity
j. The Contractor shall provide to the Company the detailed specifications, and all administrative rights/ privileges / passwords to the string monitoring system.
k. The Contractor shall provide following measuring instruments with all necessary software & hardware compatible with the Data logging and web based monitoring system.
    i. **Pyrometer**: The Contractor shall provide two no. of pyranometers for measuring incident global solar radiation, one each on the horizontal surface and in the same orientation (inclination and azimuth) as the photovoltaic modules. The pyranometers shall have following specifications mentioned in Table 5-16.

**Table 5-16 Specification of Pyranometers**

| Sr. | Particulars | Specification |
|---|---|---|
| 1 | Class | II |
| 2 | Spectral Response | 0.31 to 2.8 micron |
| 3 | Sensitivity | Approx. 9 micro - volt/w/m2 |

| | | |
|---|---|---|
| 4 | Time response (95%) | Max 15 sec. |
| 5 | Non linearity | ±0.5% |
| 6 | Temperature Response | ±2% |
| 7 | Temperature Response | Max ±2% |
| 8 | Tilt error | ±0.5%. |
| 9 | Zero offset thermal radiation | ±7 w/m2 |
| 10 | Zero offset temperature change | ±2 w/m2 |
| 11 | Operating temperature range | - 40 deg. to +80 deg. |
| 12 | Uncertainty(95% confidence Level) | Hourly- Max-3% |
| 13 | Daily- | Max -2% |
| 14 | Non stability | Max ±0.8% |
| 15 | Resolution | Min + / - 1 W/m2 |
| 16 | Input Power for Instrument & Peripherals | 230 VAC (If required) |
| 17 | Output Signal | Analogue form which is compatible with the data |

ii. Temperature Sensor: The Contractor shall provide suitable nos. of RTD type temperature sensors with required weather shield as per Indian Standards, so as to individually and simultaneously measure both, ambient temperature, and module temperature. To measure module temperature, the temperature sensors shall be located on the back of representative modules and on front glass surface. Care must be taken to ensure that the temperature of the cell in front of the sensor is not substantially altered due to the presence of the sensor. Instrument shall have a range of -5°C to 60°C.

iii. Anemometer and Wind Vane: The Contractor shall provide double cup anemometer on tubular type made up of hot dipped Galvanized Iron. Velocity range upto 65 m/s, accuracy limit of 0.1 m/s. the anemometer shall have valid calibration certificates which should be produced during one month of the installation.

iv. 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.

v. The data acquisition system shall measure, continuously record power at PV module ambient temperature near array field, cell temperature, wind velocity, AC and DC (string level) side power of each inverter, power characteristics of the HT side, fault messages, alarms etc. in Indian Standard Time.

vi. All data shall be recorded chronologically date wise. The data file should be MS Excel compatible. The data logger shall have internal reliable battery backup and data storage capacity to record all sorts of data simultaneously round the clock. All data shall be stored in a common work sheet chronologically. Representation of monitored data in graphics mode or in tabulation form. All instantaneous data can be shown in the

Computer Screen.

vii. Provision should be available for Remote Monitoring and Data Retrieval over web server. Moreover, Successful Bidder shall also provide one no. of PC with required hardware and licensed copies of software to make it fully functional for normal operation and data logging through Bluetooth / Wi Fi / RS port from the site. Internet connection can be in the name of HPGCL. However, all the charges to be paid by the Contractor during the O&M period including initial one-time cost.

viii. The Bill of Materials associated with the equipment must clearly indicate especially the details about the PC and other accessories.

ix. The Data Acquisition System should be housed in appropriate enclosure to sustain outdoor environment as per generation design guidelines laid for enclosures. The same shall have provision of locking the same to prevent unauthorized operation. Remote Monitoring System (RMS) shall provide following data at a 15 minute interval.

- Power, Current and Voltage at individual solar PV strings (Instantaneous)
- Ambient temperature near array field, cell temperature measured at module front and back surface
- Wind Speed
- Cumulative AC and DC side Power of each inverter
- Cumulative AC and DC energy of each inverter

a. Solar irradiation/isolation over horizontal and in-plane of the module
b. Voltage, frequency and other important electrical parameters etc. in the local grid.
c. Any other parameter considered necessary by supplier based on current prudent practice
d. All data shall be recorded chronologically date wise. The data file should be MS Excel compatible. The data logger shall have internal reliable battery backup and data storage capacity to record all sorts of data simultaneously round the clock. All data shall be stored in a common work sheet chronologically. Representation of monitored data should be in graphics mode or in tabulation form. All instantaneous data should be shown in the Computer Screen.

e. RMS shall have feature to be integrated with the local system as well remotely via the web using either a standard modem or a GSM/WIFI modem. The Bidder shall provide compatible software and hardware so that data can be transmitted via Standard modem.

f. RMS shall be provided with independent solar PV based power supply along with maintenance free battery having 3 days autonomy.

g. The RMS shall be compatible to the requirements for measuring and reporting the performance-ratio of the power plant.

h. The contractor shall provide all administrative rights/ privileges/ passwords of the RMS system to HPGCL.

i. The Bidder shall submit the data sheet with technical specifications of the RMS system in the Bid.

5.2.30 Testing Instruments for Electrical & Electronic:

The Contractor shall also provide required set of onsite testing instruments/equipment viz. earth resistance tester, rheostats, insulation tester, millimetres, clamp meters, CRO, Function Generator, Transformer oil BDV kit, Relay testing kit, infra-red thermal imaging hand held temperature meter, inverter testing kit etc.

5.2.31 Electronic LED Display Board:

The Contractor shall provide an electronic LED Display board that can display the Solar PV plant parameters like total generation till date, daily generation, instantaneous generation, instantneous frequency, etc. The LED display board has to be erected at a height of 8 feet above ground level and should be large enough to be read from a distance. The LED display board is to be placed between the Control Room and the main gate, the exact location of which will be provided by the Company/ Consultant after award of the project.

## 5.3 DETAILED CIVIL AND OTHER NON-ELECTRICAL WORK

All material, installations, fixtures, accessories etc. to be provided shall be as per the relevant IS specifications. These shall be of best quality and of standard manufacturer as approved by the Engineer-In- Charge (EIC) on site, when there are no standard specifications.

The fresh OPC cement (Ultratech /Ambuja /Binani /JK Lakshmi) and TMT steel reinforcement bars Fe 415 (TATA /Jindal /RINL /SAIL /Electrotherm) shall be used confirming to relevant IS specifications. In case the material make is not specified, the Contractor has to refer list of the approved manufacturers of the Company. In case there non availability of approved manufactures, Company's/ Consutlant's approval/consent needs to be taken.

The Contractor has to prepare bar bending schedule and cement consumption for the total project in advance and has to submit to the Company and Consultant in hard copy and soft copy. The Contractor has to keep the fullproof records of purchase and consumption along with original purchase bills of Cement and Steel as per the Company procedures and rules. The Contractor has to provide best workmanship with skilled manpower for all the civil items as per the standard specifications/ best practice as approved by the Engineer In Charge (EIC) on site. The booklet Standard Specifications for Civil Works will be applicable wherever there is dispute in the items of civil works. The Company will not supply any material for this work.

5.3.1 Topographical Survey:

The Contractor shall do topographical survey of the proposed site at not more than 25 m interval with the help of Total Station or any other suitable standard method of survey. All necessary Reduced Levels (RL) as entered in the Field Book have to be submitted along with pre contour layout of the total site. The formation levels of the proposed power plant have to be fixed with reference to High Flood Level of the proposed site. The ground level and plinth level of structures shall be fixed taking into consideration the highest flood level and surrounding ground profiles.

5.3.2 Soil Test:

i. For Soil test, refer **Annexure-2** and Contractor shall treat it accordingly. Contractor is advised to and is solely responsible to carry out detailed Geotechnical investigation to ascertain soil parameters of the proposed site for the planning / designing / construction / providing guarantee / warranty of all civil work including but not limited to foundations / piling for module mounting structures, HT lines, 33/66 kV switchgear equipment etc. The Contractor shall carry out soil investigation through Government approved / NABL certified soil consultant. These reports shall be furnished to the Company and Consultant prior to commencing work. All RCC works shall be provided of required grade of concrete as per relevant IS specifications as well as based on soil data considering appropriate earthquake seismic zone, wind velocity, whether effect, soil characteristics etc.

ii. The scope of soil investigation covers execution of complete soil exploration including boring, drilling, collection of undisturbed soil sample where possible, otherwise disturbed soil samples, conducting laboratory test of samples to find out the various parameters mainly related to load bearing capacity, ground water level, settlement, and soil condition and submission of detail reports along with recommendation regarding suitable type of foundations for each bore hole along with recommendation for soil improvement where necessary. The Contractor shall provide certificate of foundation design and Module Mounting Structure (MMS) design from competent chartered structural engineer in support of the foundation and MMS design proposed by him.

5.3.3 Foundations:

The foundations should be designed considering the weight and distribution of the structure and assembly, and a maximum wind speed of 170 km per hour. Seismic factors for the site also have to be considered while making the design of the foundation. Epoxy paint/ Bituminous paint to be applied to all foundations below ground level that come in contact with excavated soil. All enclosed areas below plinth level have to be aback-filled with sand/ murram that has to be compacted so as to achieve proctor density of 95%. Excavated soil cannot be used for back-filling without being approved for use after testing in Government/ NABL accredited laboratory.

5.3.4 Designing of components:

i. The Contractor shall carry out Shadow Analysis at the site and accordingly design strings and arrays layout considering optimal use of space, material and man-power and submit all the details / design to Company for its review/ suggestions / approval.

ii. The Contractor shall obtain and study earthquake and wind velocity data for design of module mounting structure, and considering all parameters related to the weathers conditions like Temperature, humidity, flood, rainfall, ambient air etc.

iii. RCC structures for control room, Pre-fabricated inverter rooms, Watchman's cabin shall be strictly as per relevant IS standards.

5.3.5 Storage, Construction Power and Water:

The Contractor shall also plan for transport and storage of materials at site and shall arrange for its own construction power and water. However the contractor can avail construction power connection from DISCOM by applying for temporary connection for which he has to bear the cost. The Company will help with supporting documents. The Contractor can avail construction water by drilling a borehole and extracting required water. All expenses for the same shall be borne by the Contractor.

### 5.3.6 Land Development and Cleaning:

The proposed site may be undulated or flat. However, the Contractor shall visit the site and do the topographical survey to ensure land development work such that land is perfectly flat. Also, the Contractor shall take reasonable care to ensure that the plant is aesthetically designed.

### 5.3.7 Storm Water Drainage System:

The Contractor has to design, submit and take approval from the Company /Consultant for disposal of storm water of the plant. It shall be designed in a manner such that rain water and water required for module cleaning can be easily drained off by providing sufficient slope to the drain. Storm water drain shall be of Trapezoidal section. The sides of peripheral drain shall be of brick masonry in C.M 1:5, which is backed up by cement mortar bed and all joints to be are filled up with cement mortar. Plastering in CM 1:4 is required. All other internal drains,i.e. on both sides of central roads, pathways to Inverter rooms, etc. are to be done by simply excavating the drain of required size with complete dressing and with required trapezoidal section in which no brick pitching is required. Also RCC hume pipe with concrete encasement is to be provided at crossing of road and drains and at required locations. Further, Drains can be of either Brick Lining type or precast type but in case of precast, the scoring velocity of water needs to be considered appropriately by the bidder during the design stage.

### 5.3.8 Watchmen / Security Cabin:

The Contractor shall provide one (1) number of pre-fabricated watchman’s portable cabin near plant gate. The minimum size of watchman’s cabin shall be of 1.2 metre x 1.8 metre and height of 2.4 metre with appropriate roof at the top. The Bidder shall provide detailed civil, electrical, plumbing, etc. drawings and equipment specifications for the security cabin in “(B) Technical Offer” of the Bid document. Location of the watchman’s Cabin (Security Cabin) will be as directed by the Company.

### 5.3.9 Area Lighting:

i. Area lighting arrangement shall be made to illuminate the entire site at an appropriate lux level for night hours or bad light hours. Area lighting arrangement shall have adequate numbers of lights poles (50 mm diameter with 3 mm thick at 25 metre spacing) on the sides of peripheral roads, etc).
ii. The connector box shall be made of stainless steel, Dust & Vermin Proof, which is to be recessed at the base of each Yard Lighting system. The connector box shall have suitable brass or copper made connector terminal.
iii. The lighting fixtures with control gear shall be mounted on tubular poles of approved height and mounting arrangement.
iv. All the yard lighting towers and lighting fixtures shall be effectively grounded using

adequate size of GI earthing wires / GI earthing strips.

v. The lighting poles shall be concreted with 600 mm coping above ground level for pole protection with sufficient reinforced concrete foundation below ground.

vi. Solar Bollard lighting only on internal roads with height of 1 metre on both the sides of the roads with sufficient foundation to be provided at a distance of 15 metre from each other.

vii. The control gear box (non-integral type) shall be encased in the coping.

viii. Loop in – Loop out power cables shall be brought up to the control gear box through of adequate size for cable protection.

ix. The cables shall be properly glanded to the control gear box gland plate.

x. XLPE / PVC insulated armored Cu/Al cables of adequate size shall be used for interconnection and supply of power to Yard lighting systems.

xi. Cable terminations shall be made with suitable cable lugs & sockets etc, crimped properly and passed through brass compression type cable glands at the entry & exit point of the connector box and at the entry point to MCB distribution Box for controlling the yard lighting system.

xii. The height of the area lighting fixtures should be at least 2.75 metres from ground.

xiii. Lighting fixtures shall be installed close to fencing.

### 5.3.10 Fencing:

Chain link fencing shall be provided to protect the plant. The minimum height of the fencing shall be 1.5m. The chain link of 50mm x 50mm diamond mesh of 10 gauge galvanized steel wire with 12 gauge barbed wires at top (02 numbers) is to be provided. The Contractor's scope shall be supplying, fabricating and fixing aligning vertical post of 75mm x 75mm x 6mm with cross bracing both side of ISA 45mm x 45mm x 5mm and both bracing shall be fixed by nut bolt assembly at intersecting point. Also line wire at top and bottom of chain link mesh of 8 gauge is to be provided. Chain link fencing shall be fixed in ground by the minimum reinforced foundation.

### 5.3.11 Main Entrance Gate:

An all-weather main gate with width of at least 6 metre and 2 metre height with sliding roller at bottom shall be erected at the entrance of the plant site. The gate shall be designed such that it should have aesthetic view by creating Arch type structure above the gate in which the Company's name shall be embossed. Adjacent to main gate there should be small pedestrian gate of 1.2 metre x 2 metre size.

### 5.3.12 Roads:

All internal roads shall be of Asphalt type. The Contractor has to design as per relevant IS, submit and take approval from the Company / Consultant for Asphalt Road. Asphalt Road shall connect Control Room, Switchyard, all Invertor rooms and main gate. Asphalt road shall also be provided at periphery of the entire plant area. An asphalt road shall have sufficient courses like a subgrade, subbase, base courses, and surface course as per IS specifications. The width of asphalt road shall be of 4 metres and with sufficient thickness for access of heavy equipment like transformers/ Inveters/ Switchyard equipment during construction as well as subsequent maintenance.

5.3.13 Landscaping and Sun Dial (Solar clock):

Landscaping of one (1) meter width on both sides of the road after shoulder from main gate till the Control Room is to be provided by the Contractor. It is recommended to use aesthetically pleasing plants and shrubs suitable to the local soil and climatic conditions. A Sun Dial (Solar Clock) of maximum 2 metres diameter showing hour markings is to be provided in front of RCC Control Room cum Conference Room for 10 MW, 6MW and 20MW plant Solar PV Plant.

5.3.14 Underground RCC / Sintex water tank:

The Contractor shall design the tank as per relevant IS codes, submit and take approval from HPGCL. The Contractor shall plan for one wash of all solar PV modules on weekly basis. For this, the Contractor shall construct and operate 1 Lakh litre capacity RCC/Sintex water storage tank. The contractor shall provide sufficient valves, plumbing fixtures and cleaning arrangement for tank from inside. If RCC tank is preferred then, design of RCC water tank shall be such that it shall resist Earth pressure and Water pressure and satisfy all IS codes.

5.3.15 Water supply:

The contractor shall have to drill two (2) numbers of bore holes for water supply, pipeline for carrying water from bore hole to storage tank, 2 numbers of Electric panel for bore holes and total water cleaning system. The cleaning system shall consist of:

a. New Tanker with pump and water jet and pipeline. Tanker with pump and water jet and pipeline shall be handed over to the Company after completion of the O & M period. All sort expenditure related to this shall be borne by the Contractor
b. Pipe line network with valves. All necessary arrangement for cleaning of the solar panels shall be in the scope of the Contractor.

5.3.16 Prefabricated Inverter Room and RCC Control Room cum Conference Room:

i. All prefabricated structures shall strictly adhere to relevant IS standards towards construction, design, workmanship, materials and ergonomics. At the same time, it shall take into account the convenience and user needs.
ii. The Contractor shall provide to the Company detailed civil, electrical, plumbing, etc. drawings and equipment specifications for the inverter/ control room and take approval from the Company/ Consultant. The drawings of panels with the make of components should be approved from the Company.
iii. Pre-fabricated/ Reinforced Cement Concrete (RCC) Invertor Rooms: The Contractor has the option to construct either Pre-fabricated or RCC based Inverter Rooms. The details of each are as below:

Pre-fab Inverter Room shall be of adequate size and of be of standard manufacturer with sufficient lighting points and RCC cable trenches with oil painted edge angle and checker plate covers and shall have exhaust chimney and also sufficient ventilation. All prefab inverter room shall be laid on RCC plinth with sufficient foundation and reinforced grade slab with finished Kotah /Vitrified /Ceramic tile flooring and 100 mm skirting of same tiles. The plinth shall be minimum 450 mm high from formation level of the plant. Plinth protection shall be given throughout perimeter of width 1.2m with rough kotah on its top for Inverter rooms and Control cum Conference Room. Sufficient steps at the entry of the room with finished Kotah on its top and ramp shall be provided for shifting

the equipment in the rooms for all Inverter rooms, and Control cum Conference Room. Rooms shall be designed such that structural components shall not be visible from inside or outside after wall cladding work is completed. Rainwater pipe at various locations with gutter at the top shall be provided to discharge rainwater.

iv. RCC frame structure for Inverter Rooms shall have adequate size of footing, pedestal columns, plinth beam, grade slab with reinforcement as per relevant IS specifications considering seismic zone, wind and soil detail etc. The RCC Inverter Rooms shall have RCC cable trenches with oil painted edge angle and checker plate covers and shall have exhaust chimney and also sufficient ventilation. Flooring of Inverter Rooms shall be provided with finished Kotah /Vitrified /Ceramic tile flooring and 100 mm skirting of same tiles. Interior part of walls shall be applied with 12mm plaster above which two (2) coats of putty and distemper paint have to be applied. The exterior part of walls of Inverter Rooms shall be provided with 20mm plaster above which three (3) layers of weatherproof paint shall be applied. The plinth of the Inverter rooms shall be minimum 450mm high from the formation level of the plant. Plinth protection shall be given throughout the perimeter of width 1.2 m with rough kotah on its top. Also, Termite proofing is required before preparation of grade slab. Terrace water proofing treatment with china mosaic/bitumen layer is to be provided. The Inverter Rooms should have a terrace that is accessible through proper painted MS ladders.

v. RCC Control Room cum Conference Room: It shall be of adequate size for fixing the panels, battery banks etc. with a) Conference room; b) SCADA Room with Work station with Desktop and Chairs; c) Store Room with Wardrobes; d) Pantry unit of sufficient size with sandwich type of platform with plumbing fixture and exhaust fan;
e) Toilet unit for Gents and Ladies; f) RCC cable trenches with covers and cable trays and all openings of cable entry shall have vemin proofing; g) False ceiling shall be provided in conference room, SCADA room, Store room and Passage etc.; h) Furniture like conference table, chair and sofa etc.; i) Lighting points and fixtures; and
j) Plumbing fixtures. This Control Room cum Conference Room should have a terrace that is accessible through proper RCC stairs.

vi. Control Room should have appropriate area for fixing necessary panels and battery banks, RCC cable trench with necessary trays with cover at top, necessary lighting points and should having sufficient height and ventilation. Conference Room also have adequate size SCADA cabin with necessary 2 numbers of work station with drowers of Godrej/ Durian/ Zuari make, 2 numbers Computer and 1 number of LED TV of 48 inch of Sony/ Phillips / Samsung make, 4 numbers of chairs for workstation and split A.C of 1 Ton of Voltas/ Hitachi/ Samsung/LG make for operating staff for work station. Conference Room shall also be equipped with conference table of 15 persons with Power Sockets with 15 chairs of Godrej/ Durian/ Zuari/ Usha/ Lexus and sofas. In conference cum control room, except control room (where panels are fixed) all other rooms like SCADA cabin, conference room, store, pantry and passage shall have false ceiling of Gypsum board tiles with Armstrong suspended channel system. False ceiling shall be fixed such that at no place suspended ceiling system should be visible. Conference room shall be equipped with printer with scanner, landline phone, refrigerator (150 litre), projector and screen of 2m x 2m. All material, installations,

accessories to be provided shall be of best quality and of standard manufacturer as approved by the EIC/ the Company. All units of the Control cum Conference Room shall have marked signage of SS sheet of 1mm along with engraving words and filled with black color.

vii. Flooring and skirting for Control cum Conference room: Best quality vitrified tile flooring having min size of 600 mm x 600 mm x 8-10. mm thickness with 100 mm skirting of same tile of standard manufacturers as approved by EIC or as per approved make of the Company.

viii. RCC frame structure shall have adequate size of footing, pedestal columns, plinth beam, grade slab with reinforcement as per relevant IS specifications considering seismic zone, wind and soil detail etc. The exterior walls of Control cum Conference Room shall be provided with an exterior cladding of Aluminum Composite Panels (ACP). The plinth of the RCC Control room cum conference room shall be minimum 450 mm high from the formation level of the plant. Plinth protection shall be given throughout the perimeter of width 1.2 m with rough kotah on its top. Also. Termite proofing is required before preparation of grade slab. Terrace water proofing treatment with china mosaic/bitumen layer is to be provided.

ix. Prefab Inverter Rooms and RCC Control Cum Conference Room shall have sufficient number of lighting points /ACDB /MCB board along with fans, exhaust fans and lights of standard makes. All lighting points along with Fans, Lights shall be installed properly of standard makes.

x. Air Conditioner for Control Room cum Conference Room:

The control room shall be equipped with appropriate numbers of fans of Bajaj, Khaitan,Usha make for effective heat dissipation. The SCADA cabin shall have one (1) number split type air conditioning units of 1-ton capacity. Conference room shall have minimum 2 numbers of 1.5-ton capacity of split type of air conditioning unit. Make of the split type air conditioning units shall be of Samsung/ Voltas/ Videocon or Hitachi make.

xi. Conference room: Conference room shall have

i. Pantry unit of required size with platform and sink with proper plumbing fixture.
ii. False ceiling shall consist of 15mm thick mineral fibre having 600mm x 600mm tile size resting on silhouette grid. It shall be of Armstrong or equivalent make.
iii. Conference table: Conference table designed for 15 persons with 15 revolving chair of Godrej or equivalent make. It shall have electrical sockets at suitable intervals.

xii. RCC Store Room: Store room shall be of adequate size for storing the spares, equipments, T&P etc. It should have proper ventilation and having shelf arrangement for placing the spares, one table with three chairs and one almirah to store any expensive and delicate items ie. Control Cards & circuit boards etc.

xiii. RCC Office Room: Office room shall be of adequate size with all the amenities such as one no. AC, one table, one executive chair and three visitor chairs, two almirahs equipped with one no. PC of current configuration with table, printer with scanner and landline phone.

5.3.17 Toilets:

Two Toilet units, one for ladies and one for gents in Control Room cum Conference Room shall be constructed with following finish:

a. Floor : Vitrified tiles/ ceramic tiles
b. Dado: dado tiles shall be provided in Toilet units.
c. Door window: made out of aluminum sections, 6mm wired and float glass.
d. Ventilators: Mechanical exhaust facility with exhaust fans above it.
e. Plumbing fixtures : Jaquar/ DEE ESS/ Cera/ Perryware/ Kohler
f. Sanitary ware: Hindware/ Cera or equivalent make.
g. EWC: 390 mm high with health facet, toilet paper rolls holder and all fittings. (for ladies and gents separately).
h. Two (2) numbers of Urinals (430 x 260 x 350 mm size) with all fittings of Cera/ Hindware make.
i. Wash basins: 02 Nos. (550 x 400 mm) with all fittings of Cera, Hindware make.
j. Bathroom mirrors (600 x 450 x 6 mm thick) hard board backing of Saint Gobain/ Godrej make in each bathroom.
k. CP brass towel rail (600 x 20 mm) with C.P. brass brackets for each bathroom.
l. Soap holder and liquid soap dispensers for each bathroom.
m. Water Supply for Pantry & Toilets: GI pipes (B class) Tata/ Jindal or make approved by the Company. Overhead water tank shall be of Sintex or equivalent make of 1,000-litre capacity with proper resting facility.
n. Drainage for Toilets: Drainage pipes shall be of PVC (6 kg/cm2) Supreme, Prince or equivalent make. Gully trap, inspection chambers, septic tank for 15 person separate for control cum conference room and also soak well to be constructed for above mentioned requirement.

5.3.18 Doors and Windows for Inverter rooms, Control room and Security Cabin:

Doors and windows shall be made of aluminum sections. All sections shall be 20 microns anodized. Sections of door-frames and window frame shall be of 1.2mm thick of Jindal, Tata or make approved by client. Door shutters shall be made of aluminum sections and combination of compact sheet and clear float/ wired glass. The control room shall require a sufficient number of windows/ louvers to provide ventilation/ fresh air circulations. All fixtures like door closure, handles, locks, stoppers for doors and windows shall be of Dorma/ Kich /Godrej make. All windows of conference room shall be covered by roller blind curtains.

5.3.19 Electrical Panel for Prefabricated Control Room cum Operator Room:

Electrical panels shall have electrical panel adequate inputs to take in from the centralized Push Button Switching Unit having suitable mimic with power flow indicator & status indicator of different PCU's. The Panel shall be floor-mounted type.

i. All the measuring instruments such as feeder voltmeter, ammeter, frequency meter, Electronic Energy Meter (for measuring the deliverable units (kWh) for sale), selector

switches, Mimic etc. shall be in the front panel.

ii. All the Power cables shall be taken through backside of the Panel via sufficient /concrete cable trench and cable trays with cover at top.

iii. The Panel shall be fitted with suitable rating & size, HRC fuses/circuit breaker/isolators, indicators for all incomer and outgoing terminals, voltmeter & ammeter with suitable selector switches to monitor & measure the power to be evacuated.

iv. Nuts & bolts including metallic cubicle shall have to be adequately protected against atmosphere and weather prevailing in the area.

v. The dimension, weight, sheet thickness, painting etc. should be indicated by the Contractor. The bill of material associated with the equipment should be clearly indicated while delivering the equipment.

vi. Pre-fab Invertor Room shall be of adequate size and of standard manufacturer with sufficient lighting points and RCC cable trenches with covers and shall have exhaust chimney and also sufficient ventilation.

vii. All prefab invertor room/control room/conference room shall be layed on RCC plinth with sufficient foundation and Grad Slab. The plinth shall minimum 450 mm high from formation level of the plant.

viii. The Contractor shall provide to the Company detailed civil, electrical, plumbing, etc. drawings and equipment specifications for the inverter/ control room and take approval from client/consultant.

ix. The drawings of Panels with the make of components should be approved from the Company. All the design & drawing related to switch yard / interconnection with grid should be as per requirement of state electricity rules as approved by competent authority. Pre-fab structure shall have sufficient number of lighting point/ACDB/MCB boar.

x. The Contractor shall provide to the Company detailed civil, electrical, plumbing, etc. drawings and equipment specifications for the inverter/ control room and take approval from the Company.

5.3.20 Module Mounting Structure (MMS):

i. The MMS should be designed for an optimum tilt angle (fixed / season / single axis tracking) so as to meet the offered NEEGG. The angle should be systematically optimized for maximum energy generation throughout the year based on location and local weather variables for each module technology.

ii. The MMS should be safe, and designed to allow easy replacement of any module and easy access to the O&M staff. It should be designed for simple mechanical and electrical installation, should support Solar PV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly and there should be no requirement of welding or complex machinery at site.

iii. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from Solar PV panels at the same time it will withstand severe cyclonic storm with wind speed up to maximum 170 kmph.

iv. The structure shall be designed for simple mechanical and electrical installation. It shall support Solar PV modules at a given orientation, absorb and transfer the mechanical

loads to the ground properly. There shall be no requirement of welding or complex machinery at site and is strictly not allowed.

v. Seismic factors for the site to be considered while making the design of the foundation/ramming etc. or any technology. The design of array structure shall be based on soil test report of the site and shall be approved from the Company/ Consultant.

vi. Modules shall be mounted on a non-corrosive support structures (EPDM rubber gasket is to be provided as separator) which is mandatory. The frames and leg assemblies of the array structures shall be made of hot dip Galvanized steel per ASTM A123.
All modules have to be appropriately grounded using continuous copper conductor as per appropriate IS but not less than cross section area of 6 sq. mtr.

vii. In case of galvanization of structures, specific requirement for thickness of galvanization should be at least minimum 80 microns at any point of the galvanized structure. Galvanization shall be measure with elcometer or the material can be sent for testing laboratory. No averaging is allowed for measuring the thickness of galvanization. Inner side galvanization with same specification of any hollow components of module mounting structure is mandatory.

viii. All fasteners shall be of Stainless steel - SS 304. Nut & bolts, supporting structures including the entire MMS shall have to be adequately protected against all climatic condition.

ix. Modules shall be clamped / bolted with the structure properly. The material of construction shall be Al / Steel. Clamps / bolts shall be designed in such a way so as not to cast any shadow on the active part of a module.

x. Modules shall be isolated electrically from the MMS through EPDM sheet of appropriate thickness and all the modules shall be separately earthed through proper earthling. Module to module earthling is mandatory. All modules have to be appropriately grounded using continuous copper conductor as per appropriate IS but not less than Cross section area of 6 sq. meter.

xi. Module mounting structures shall also be earthed through proper separate earthing.

xii. The material of construction, structural design and workmanship shall be appropriate with a factor of safety of not less than 1.5.

xiii. For multiple module mounting structures located in a single row, the alignment of all modules shall be within an error limit of 5 mm in vertical / horizontal line. However, total 10 mm tolerance allowed for mounting structures fixed in single row but shall not be allowed for modules fixed in a single mounting structure.

xiv. The Contractor shall provide to the Company the detailed design, specifications and calculations of the MMS and take approval from the Company/Consultant.

xv. The Contractor shall specify installation details of the Solar PV modules and the support structures with appropriate diagrams and drawings.

xvi. The Module Mounting Structure design shall be certified by a chartered structural engineer and it is mandatory.

xvii. The Contractor should design the structure height considering highest flood level at the site. The minimum clearance between the lower edge of the module and the ground shall be the higher of (i) above highest flood level at the site and (ii) minimum 500 mm.

xviii. The structures shall be designed for simple mechanical and electrical installation. It shall

support solar PV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly.

xix. String Cables should be passes from Pipes and Cable-ties shall be used to hold and guide the Pipes (cables/wires) from the modules to inverters or junction boxes.

xx. The Contractor shall provide to the Company the detailed design, specifications and calculations of the MMS.

xxi. The Contractor shall specify installation details of the Solar PV modules and the support structures with appropriate diagrams and drawings.

xxii. The Bidder shall be permitted ramming of the module mounting structure provided that they obtain consent of HPGCL. HPGCL shall provide such consent once it is convinced that such ramming shall not in any way deteriorate the strength of the structure and shall not reduce the structure's strength to enjoy a working life of more than 25 years.

xxiii. Civil foundation design for Module Mounting Structures (MMS) as well as control room, invertor room shall be made in accordance with the Indian Standard Codes and soil conditions, with the help of Chartered Structural Designer having substantial experience in similar work. The Successful Bidder shall submit the detailed structural design analysis along with calculations and bases/ standards in the Bid.

5.3.21 Structural Steel Work:

i. The structural steelwork required for termination incoming 33/66 kV line/ Cable, equipment supports, lighting masts and for shielding towers together with all foundation bolts shall be included by the Bidder in its scope of work. The steel work shall be fabricated from galvanized structural sections. Specific requirement for thickness of galvanization should be at least/ minimum 80 microns at any point on any component of module mounting structure when measured.

ii. The height of structures for incoming line shall be as per the design developed by the Bidder and drawings submitted.

iii. The incoming line gantry shall be designed on the basis of ACSR conductor/ Cable considered in the design and also considering that terminal tower will be located at a distance of not more than 100 meters from the incoming gantry at SPV power station switchyard. The Bidder shall take into account wind load, temperature variation etc. while designing the gantry structure. The column shall be provided with step bolts and anti-climbing devices.

iv. The entire structural steel work shall conform to IS: 802. The Bidder shall furnish design calculations for approval by the Company before procuring the material.

v. All structure pertaining to 33/66 kV switchyard have to be applied outdoor with white paint (lime wash).

5.3.22 Hardware

i. Metal fittings of specified material for string hardware meant for power conductor and earth wire shall have excellent mechanical properties such as strength, toughness and high corrosion resistance. The suspension and tension clamps shall be made from Aluminium alloy having high mechanical strength. Suspension and tension clamps offered shall be suitable for ACSR/ AAAC conductor as per design.

ii. All hooks, eyes, pins, bolts, suspension clamps and other fittings for attaching insulators

to the tower or to the power conductor shall be so designed as to reduce (to a minimum) the damage to the conductor, insulator or the fitting arising from conductor vibration.

iii. All drop-forged parts shall be free-from flaws, cracks, or other defects and shall be smooth, close-grained and of true forms and dimensions. All machined surfaces shall be true, smooth and well-finished.

iv. All ferrous parts of hardware shall be galvanized in accordance with IS 2629. The galvanization shall withstand four dips of 1-minute duration each in copper-sulphate solution as per the test procedure laid down in the relevant ISS.

v. The threads in nuts and tapped holes shall be cut after galvanizing, and shall be well-lubricated/greased. All other threads shall be cut before galvanizing.

vi. Both the suspension and the tension hardware shall be of ball and socket type, and shall be with `R' and `W' type security clip of stainless steel or phosphor Bronze conforming to IS 2486. The tension clamps of both compression type and bolted type as shown in the relevant drawings shall be offered. Arcing horns shall be provided on the line side for both the suspension type and compression type hardware.

### 5.3.23 Fire Extinguishers:

Liquefied CO2 fire extinguisher shall be upright type of capacity 10 kg having IS: 2171. 7 and IS: 10658 marked. The fire extinguisher shall be suitable for fighting fire of Oils, Solvents, Gases, Paints, Varnishes, Electrical Wiring, Live Machinery Fires, and All Flammable Liquid & Gas.

### 5.3.24 Sand Buckets:

Sand buckets should be wall mounted made from at least 24 SWG sheet with bracket fixing on wall conforming to IS 2546. Bucket stands with four buckets on each stand shall be provided in the Transformer Yard, Switchyard, Inverter Rooms, Control Cum Conference room, Security cabin and one (1) number each for the area covered by 1 MW for a plant.

### 5.3.25 Sign Boards:

The signboard for nomenclature of sufficient size which can visible from a distance containing brief description of various components of the power plant like switchyard, control room, invertor room etc. as well as the complete power plant in general shall be installed at appropriate locations of the power plant. Contractor shall also provide signage for fire and safety wherever required. The Signboard shall be made of steel plate of not less than 3 mm thick. Letters on the board shall be with appropriate illumination arrangements. The Contractor shall provide to the Company, detailed specifications of the signboards. The language of instructions shall be English/ Hindi as per HPGCL’s approval.

### 5.3.26 General Guideline:

Any civil or electrical work, which is not mentioned or included in this Tender Document but necessary for the plant shall be borne by the Bidder. Successful Bidder shall prepare all designs / drawings have based on the specifications given in the Tender and in light of relevant BIS standard. The Company reserves the right to modify the design at any stage, to meet local site conditions / project requirements. All work shall be carried out in accordance with the latest edition of the Indian Electricity Act and rules formed there under and as amended from time to time.

**Disclaimer:**

1. Any civil / electrical / other work, which is not mentioned or included in this Tender Document but necessary for the plant shall be borne by the Bidder. All specifications mentioned in this Tender indicates minimum technical requirement.
2. The Contractor may propose alternate specifications or design though the final acceptance of the same is subject to the Company's/Consultant's discretion.
3. Unless otherwise specified, all equipment and materials shall confirm to the latest applicable Indian Standards. Equipment complying with any other International Standards will also be considered if it ensures performance of equipment equal to a superior to Indian Standard.

Executive Engineer/Planning-I
for CE/DCRTPP (Planning Section, HQ)
HPGCL, Panchkula.

--- End of Section ---

# Chapter-6

## 6 General Terms and Conditions

### 6.1 Use of Contract Documents & Information

6.1.1 The Contractor shall not, without HPGCL'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 only.

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

6.1.3 Any document other than the Contract itself shall remain the property of HPGCL.

### 6.2 Patent Rights

6.2.1 The Contractor shall indemnify HPGCL against third party claims of infringement of patent, trademark or industrial design rights arising from use of goods/ design or any part thereof.

### 6.3 Materials and Workmanship

6.3.1 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 Bureau of Indian Standard (BIS) specification wherever Indian specifications apply or British Standard (BS) or International Electro-technical Commission (IEC) or internationally accepted standard.

6.3.2 The Contractor shall supply and deliver all equipment and materials for installation at site. The Contractor shall arrange for transportation, loading and unloading and safe storage of materials at project site at his own cost and risk.

6.3.3 If the Contractor offers equipment manufactured in accordance with other international well recognized standards, 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 as far as possible.

6.3.4 No deviation in foreign exchange rate shall be admissible at any point of time after submission of the Bid.

### 6.4 Inter-changeability

6.4.1 All the parts shall be made accurately to standard gauges and specifications so as to facilitate replacement and repairs. All corresponding parts of similar apparatus shall be inter-changeable.

**6.5 Packing and Marking**

6.5.1 The Contractor shall be responsible for securely protecting and packing the plant and 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 and weight shall take into consideration the remoteness of the goods' final destination and absence of heavy material handling facilities at all points in transit.

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

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

**6.6 Negligence**

6.6.1 If the Contractor neglects to manufacture or supply the plant and equipment with due diligence and with expeditiousness or refuses or neglects to comply with any reasonable order given to it in writing by HPGCL or contravenes any provisions of the Contract, HPGCL may give seven (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 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 HPGCL thinks fit, it shall be lawful for it to take the manufacture or supply of plant wholly or in part, out of the Contractor's hand and give it to another person on Contract at a reasonable price and HPGCL 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 of manufacture or supply of such plant as aforesaid.

6.6.2 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, HPGCL shall take action in the manner it may consider deem fit in terms of the Contract.

**6.7 Statutory Responsibility**

6.7.1 The Contractor shall comply with all applicable laws, by laws, rules, and regulations and shall procure and maintain their validity all necessary Municipal, Panchayat and Government permits & licenses etc. at its own cost.

**6.8 Insolvency and Breach of Contract**

6.8.1 HPGCL may at anytime by notice in writing summarily terminate the Contract without compensation to the Contractor in any of the following events:

a. If the Contractor at any time, is adjudged insolvent or 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. If the Contractor being a company is wound up voluntarily or by the order of a court 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.

## 6.9 Timeline

6.9.1 The Contractor shall provide full programme of the supply in detail and delivery schedule along with work schedule thereto. Strict adherence and guaranteed delivery schedule mentioned in terms and conditions shall be the essence of the Contract and delivery schedule must be maintained.

6.9.2 The work must be completed as per the Timeline below from the date of handing over of site.

| Sr. | Stage | Reference from Zero Date ("D") |
|---|---|---|
| 1. | Issue of Letter of Intent | D |
| 2. | Completion of site developmental work | D+40 |
| 3. | Approval of major drawings | D+70 |
| 4. | Completion of supply of major balance of system | D+100 |
| 5. | Completion of supply of PV modules | D+130 |
| 6. | Installation and interconnection of all major equipment | D+160 |
| 7. | Interconnection and testing of entire plant | D+180 |
| 8. | Commissioning of entire plant | D+190 |
| 9. | Operational Acceptance Test & Completion of Facilities (Tentative) | D+220 |
| 10. | Performance Guarantee Test-cum-Final Acceptance Test (Tentative) | D+585 |

6.9.3 The Contractor shall also provide a Bar/ PERT Chart indicating completion schedule for various items involved in the work within the stipulated completion period and the Contractor should strictly adhere to that schedule.

6.9.4 The issue of LoI shall be considered as the Zero Date

6.9.5 **The Bar/ PERT Chart provided by the Contractor shall submitted to HPGCL for approval prior to commencement of the execution of the Project**. All comments and

modifications provided by HPGCL shall be incorporated and adhered to by the Contractor in the Timeline, Bar/ PERT Chart, detailed execution plan, etc. for execution of the Project.

6.9.6 This schedule shall be prepared so as to ensure the commissioning of complete plant within 190 days from issue of LoI.

6.9.7 Partial commissioning of the solar PV plant shall not be considered.

**6.10 Delay in Execution or Failure to Supply**

6.10.1 Any delay in completion of the work shall attract liquidated damage/ penalty for late completion as per Liquidated Damage Clause 6.11 of this Tender.

6.10.2 If the Contractor fails to deliver the plant or fails to start the work within specified time frame after issue of LoI or leaves the work site after partial execution of the work, HPGCL shall have the right to get the work done through any other agency at the risk and cost of the Contractor. Further to this, HPGCL may, without prejudice to the right of the Contractor to recover damages for breach of trust of the Contract, may impose penalties.

**6.11 Liquidated Damages for Delay and Underperformance**

**A. <u>Delay in Commissioning</u>**

6.11.1 In case the Contractor fails to achieve successful Commissioning of plant by the due date indicated in Timeline Clause 6.9.2, then HPGCL shall levy the Liquidated Damages on the Contractor (wherein partial commissioning shall not be accepted).

6.11.2 The Liquidated Damages levied to the Contractor at half percent (0.5%) of EPC Contract Value (including taxes & duties) for delay of one (1) week or part thereof upto maximum of ten percent (10%) of EPC Contract Value.

6.11.3 The maximum time period allowed (with penalty) delay for Commissioning of the Project shall be ten (10) months from the date of issue of LoI. In case of delay for more than ten (10) months, HPGCL may terminate the Contract and get the Project complete by other suitable agency at the risk and cost of the Contractor.

6.11.4 For calculation of penalty, date of LoI shall be the reference date.

**B. Underperformance**

6.11.5 At the time of the Operational Acceptance Test, any shortfall in the Performance Ratio (PR) as determined through the Test Procedure in the Appendix 16: Procedure for Performance Testing will attract imposition of Liquidated Damages. For any shortfall in PR below 0.75 by the bidder, a penalty of 1% of the EPC Contract Value (including taxes & duties) shall be levied (i.e. 1% penalty will be imposed in case the Contractor fails to achieve minimum 75% performance ratio).

6.11.6 In case the PR tested as mentioned above remain below than 0.75, the Contractor shall make all necessary corrections in minimum possible time and again commence the

above test, within 7 days, so as to demonstrate the PR equal to or more than 0.75. Each time, the penalty at the rate specified above in Clause No.6.11.5 shall be levied on the Contractor. The penalty shall be deducted from the Bank Guarantee and pending payments (LD on underperformance shall be charged on the NEEGG considering the actual weather data received at the plant site. For quoted NEEGG weather data of NASA be provided by Bidders for the site location).

**C. Performance Guarantee Test / Final Acceptance Test**

6.11.7 If the "Actual Delivered Energy" at metering point is less than the base NEEGG (corresponding to NEEGG quoted for 1st year of O&M) based on the procedure mentioned in the Appendix 16, then the entire Performance Bank Guarantee shall be encashed by the Company and all the remaining payments yet to be made by the Company to the Contractor shall also be forfeited.

**6.12 Penalty for Loss of Generation during O&M**

6.12.1 For each Contract Year, the Contractor shall demonstrate "Actual Delivered Energy" at the Metering Point as compared to the '*Base NEEGG'* for the particular year (calculated as per the methodology given in **Appendix16**).

6.12.2 If for any Contract Year, it is found that the "Actual Delivered Energy" is less than 'Base NEEGG' for the particular year, the Contractor shall pay the compensation to HPGCL equivalent to Rs**. [Tariff as per HPGCL's PPA *1.05] per kWh** of under- generation. In addition, HPGCL will also recover from the Contractor, the full penalty (including the charges of Renewable Energy Certificate) imposed by the Company's Power Purchaser on the Company due to less generation, as per agreement between HPGCL and Power Purchaser. All penalties shall be recovered from payments yet to be made by HPGCL to the Contractor and/ or from .the Bank Guarantees available with HPGCL.

The tariff is not finalized as PPA is not yet signed with DISCOMs.

6.12.3 In case of any defect in the system after Commissioning, the Contractor shall repair it within forty eight (48) hours. After 48 hours, penalty shall be charged and the same shall be deducted from the Bank Guarantee submitted to HPGCL. A penalty at the rate of Rs. [**Tariff as per HPGCL's PPA*1.05**] per kWh shall be charged by the company for the loss of generation. The loss of generation shall be calculated with respect to the NEEGG of that particular year based on the actual radiation.

6.12.4 In case the Project fails to generate any power continuously for 6 months any time during the O&M period, it shall be considered as an "Event of Default".

6.12.5 Upon occurrence of any Event of Default mentioned in Clause 6.12.4 herein above, HPGCL shall have the right to encash the entire amount of O&M Bank Guarantee submitted by the Contractor and withheld any other pending payment.

6.12.6 HPGCL shall share the benefit, if any, received from Power Purchaser, with the Contractor in case of excess generation against the NEEGG by the Contractor. This is subject to the condition that the CUF achieved by the Project is equal to more than

**21.0%** during any O&M year. The revenue earned from the Power Purchaser shall be shared with the Contractor for excess quantum of Energy delivered to be calculated as under:

**Excess Quantum of Energy Delivered** = Actual Delivered Energy – Base NEEGG

Where,

$$\text{CUF (\%)} = \frac{\text{Actual Delivered Energy in MWh}}{(10\ \text{MW} \times 365 \times 24)} \times 100$$

The sharing of the revenue earned from the excess quantum of Energy Delivered shall be done in the ratio of 70% to HPGCL and 30% to the Contractor.

6.12.7 The Company reserves the right to perform random audits of weather monitoring system of the plant anytime during the entire O&M period. If any discrepancy is found between the measured parameters, the difference between the measured parameters by HPGCL from secondary sources and the weather monitoring system installed by the Contractor at the site will be factored in calculating the adjusted NEEGG during the entire year. However, HPGCL will have the final authority to decide on this matter.

### 6.13 Defect Liability

6.13.1 The Contractor must warrant that the facilities or any part thereof shall be free from defects in the design, engineering, materials and workmanship of the Plant and Equipment supplied and of the work executed.

6.13.2 If it shall appear to the authorized representative of the Company 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 Contract are unsound or otherwise not in accordance with the Contract, the Contractor shall on demand in writing inform the authorized representative of the Company specifying the item, materials or articles complained of, notwithstanding that the same may have been inadvertently or otherwise 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 authorized representative of the Company in its demand aforesaid, the Project Manager may on expiry of notice period rectify or remove and re-execute the time or remove and replace with others, the materials or articles complained of as the case may be at the risk and cost in all respects of the Contractor. The decisions of the authorized representative of the Company as to any question arising under this Clause shall be final and conclusive.

6.13.3 The Contractor shall be liable for the operation and maintenance of the Facility and consequently shall be required to rectify any defects that emerge during the operation of the Facilities for the entire term of this Contract. The Defect Liability Period shall be eighteen (18) months from the date of expiry or early termination of this Contract ("Defects Liability Period") including the operation and maintenance period.

6.13.4 If during the Defect Liability Period any defect 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 HPGCL 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.

6.13.5 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 operation or maintenance of the Facilities by the Contractor during operation and maintenance of the Facility; or
b. Operation of the Facilities violating specifications of the Facilities.

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

6.13.7 HPGCL shall provide the Contractor all necessary access to the Facilities and the Site to enable the Contractor to perform its obligations.

6.13.8 The Contractor may, with the consent of the Company, remove from the Site any Plant and Equipment or any part of the Facilities that are defective, 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.

6.13.9 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 Company 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.

6.13.10 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 HPGCL and the Contractor for the original equipment/part of the Facilities.

6.13.11 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 shallin no event be considered to be less than seven (7) days), the Company may, following notice to the Contractor, proceed to do such work, and the reasonable costs incurred by HPGCL in connection therewith shall be paid to HPGCL by the Contractor or may be deducted by the Company from any monies due to the Contractor or claimed under the Performance Guarantee, without prejudice to other rights, which HPGCL may have against the Contractor in respect of such defects.

6.13.12 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 Company 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 eighteen (18) months from such replacement.

6.13.13 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 Period specified under Clause 6.13.3.

**6.14 Termination for Default**

6.14.1 The Company 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 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 HPGCL 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.

6.14.2 In the event the Company terminates the Contract in whole or in part, pursuant to above, the Company 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 Company for any excess costs for such similar goods. However, the Contractor shall continue the performance of the Contract to the extent not terminated.

6.14.3 In case the Contractor is not able to demonstrate the “Actual Delivered Energy” as per the “Base NEEGG” based on the procedure mentioned in Appendix 16 during the Performance Guarantee Test and after the penalties levied as mentioned in Clause 6.12.; HPGCL reserves the right to terminate the Contract at its discretion if there are no efforts are made from the Contractor to correct the issues regarding plant performance.

6.14.4 In case termination of the Contract due to default, the Contractor may be blacklisted by HPGCL and its associate companies, etc. for future work.

**6.15 Breach and Cancellation of the Contract**

6.15.1 In case of non-performance in any form or change of the covenant and conditions of the Contract by the Contractor, the Company 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 Company in this regard shall be final and binding.

6.15.2 The Company may cancel the order or a portion thereof, and if so purchase or authorize purchase of the plant/equipment not so delivered or order Plant/ Equipment of similar description (opinion of the Company shall be final) at the risk and cost of the Contractor.

**6.16 Force Majeure**

6.16.1 In the event of either party being rendered unable by Force Majeure to perform any obligation required to be performed by them under this Contract, relative obligation of the party affected by such Force Majeure shall be treated as suspended during which the Force Majeure Clause lasts.

6.16.2 The term “Force Majeure” shall have herein mean riots (other than among the

Contractor's employee), Civil commotion, War (whether declared or not), invasion, act of foreign enemies hostilities, civil war, rebellion, revolution, insurrection, military coup, damage from aircraft, nuclear fission, embargoes, quarantines, acts of god such as earthquake (above 7.0 magnitude on Richter scales), lightning, unprecedented floods, fires not caused by the Contractors negligence and other causes which the Contractor has no control and accepted as such by HPGCL whose decision shall be final and binding. Normal rainy season and monsoons are not Force Majeure.

6.16.3 Upon occurrence of such causes and upon its termination, the party alleging that it has been rendered unable as aforesaid, thereby, shall notify the other party in writing by registered notice within 24 (twenty four) hours of the alleged beginning and ending thereof giving full particulars and satisfactory evidence in support of its claim.

6.16.4 Time for performance of the relative obligation suspended by the Force Majeure shall stand extended by the period for which such clause lasts.

6.16.5 If works are suspended by Force Majeure conditions lasting for more than two (2) months, HPGCL shall have the option of cancelling this Contract in whole or part thereof, at its discretion.

6.16.6 The Contractor shall not claim any compensation for Force Majeure conditions and shall take appropriate steps to insure men and materials utilized by it under the Contract well in advance.

### 6.17 Progress Report of Work

6.17.1 The Contractor shall submit a weekly progress report on execution of works conforming to bar/ PERT Chart and format provided by HPGCL. In case of any slippage(s) or delay in execution of work reasons for such delay along with details of hindrances will be submitted by the Contractor along with modified Bar/ PERT Chart mentioning the action plan being taken to keep the due date of completion of project unchanged. If required, the Contractor shall use additional manpower to keep the due date of completion of Project unchanged.

6.17.2 The authorized representative of the Contractor shall review the progress of the Project work every fortnight on a prefixed day at project site with HPGCL or its representative as per the network and record the minutes.

### 6.18 Insurance

6.18.1 During the construction period, i.e. before the Commissioning of the Project, all insurance related expenses shall be borne by the Contractor. The goods supplied under the Contract shall be fully insured against the loss or damage incidental to manufacture or acquisition, transportation, storage, delivery, theft, natural or other disaster, etc. in such a manner that the Company shall not incur any financial loss, as long as the construction of the Project continues to remain under the custody of the Contractor.

6.18.2 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.

6.18.3 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 insurance company shall be rested upon the Contractor.

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

6.18.5 The Contractor shall 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 Company shall not be responsible for any such loss or mishap.

6.18.6 Comprehensive insurance is to be arranged by the Contractor during the O&M period of the Contract.

6.18.7 At the end of the term of insurance undertaken by the Contractor, the Contractor shall provide all the necessary documents to the satisfaction of the Company in order to enable the Company to take up the insurance of the Plant.

### 6.19 Statutory Acts, Rules and Standards

6.19.1 The work shall be executed in conformity with the relevant standard of Bureau of Indian Specification (or equivalent International Standard), Electricity Rules, 2010 (as amended up to date), Indian Electricity Act, BARC/DAE rules, Explosive Act 1948, Petroleum Act 1934, National Building Code and relevant Rules in vogue at the time of execution including operation and maintenance period.

### 6.20 Tools and Tackles

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

### 6.21 Safety Measures

6.21.1 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 Company shall not be responsible for any such accidents.

### 6.22 Hazardous Material

6.22.1 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. The Contractor shall comply with the State Pollution Board regulation.

**6.23 Stoppage of Work**

6.23.1 The Company 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.

**6.24 Hindrance Register**

6.24.1 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 Project Manager or his authorized representative.

**6.25 Responsibility of the Contractor**

6.25.1 The Contractor shall provide guarantee and be entirely responsible for the execution of the Contract in accordance with this Tender including but not limited to its specification, schedules, and annexure. The Contractor shall further provide guarantee and be responsible for the quality and workmanship of all materials and completed works, correct designs and drawings, correct delivery of material, erection, testing and commissioning including operation and maintenance.

**6.26 Right of the Company to Make Change(s) in Design**

6.26.1 All designs shall be approved by HPGCL prior to the execution of such designs.

6.26.2 The Company shall have the right to make any change in the design, which may be necessary in the opinion of HPGCL to make the plant and materials conform to the provisions and contents of the specification without extra cost to HPGCL.

**6.27 Manuals**

6.27.1 The Contractor shall supply all necessary erection and commissioning manuals, O&M manuals etc. as and when required. Six sets of test results, manuals etc. shall be submitted by the Contractor on completion of the work in hard and soft copies.

**6.28 Governing Language**

6.28.1 The Contract shall be written in English Language. All correspondence and documents pertaining to the Contract, which are exchanged by the Company and Contractor, shall be written in English.

**6.29 Order Amendments**

6.29.1 No variation in or modification of the terms of the contract shall be made except by written amendments issued by the Company.

**6.30 Assignments or Subletting of Contract**

6.30.1 The Contractor shall not, without the prior consent in writing of the Company, 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.

**6.31 Subcontracts**

6.31.1 The Contractor shall notify the Company in writing of all subcontracts awarded under the Contract if not already specified in his Bid. Such notification in its original Bid or later shall not relieve the Contractor from any liability or obligation under the Contract.

6.31.2 Subcontracting a work shall not, under any circumstances, relieve the Contractor from its obligations towards the Project and the Company.

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

**6.32 Inspection and Testing**

6.32.1 The Company or its authorized representative including appointed Consultant for the project shall have, at all times, access to the Contractor's premises and also shall have the power 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 on behalf of HPGCL or its duly authorized representative.

6.32.2 HPGCL 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 Company at his liberty may reject all or any component of plant or workmanship connected with such work.

6.32.3 The Contractor shall issue request letter to HPGCL or his authorized representative for testing of any component of the plant, which is ready for testing at least fifteen (15) days in advance from the date of actual date of testing at the premises of the Contractor or elsewhere. When the inspection and the tests have been satisfactorily completed at the Contractor's works, HPGCL shall issue a certificate to that effect. However, the Company 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 HPGCL's presence, and it shall forthwith forward six (6) sets of duly certified copies of test results and certificates to the Company for approval of the Company. The Contractor, on receipt of written acceptance from HPGCL, may dispatch the equipment for erection and installation.

6.32.4 For all tests to be carried out, whether in the premises of the Contractor or any Subcontractor or the supplier, 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 HPGCL or its authorized representative to accomplish such testing.

6.32.5 The Company or his authorized representative shall have the right to carry out inward inspection of the items on delivery at the 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.

6.32.6 If the Company 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 Company. However, the Contractor shall render all necessary help to HPGCL whenever required free of charge.

6.32.7 The Contractor has to provide the necessary testing reports to HPGCL as and when required.

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

**6.33 Authorized Test Centres**

6.33.1 The PV modules, inverters, transformers, panels, wires, etc. deployed in the power plants shall have valid test certificates/ Type test certificates for their qualification as per above specified IEC/ BIS Standards by one of the NABL Accredited Test Centres in India. In case of module or other equipment for which such Test facilities may not exist in India, test certificates/ Type test certificates from reputed ILAC Member Labs abroad will be acceptable.

**6.34 Delivery of Equipment**

6.34.1 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 Company from time to time regarding the transit of the plant and material.

6.34.2 Notification of delivery or dispatch in regard to each and every consignment shall be made to the Company immediately after dispatch or delivery from the manufacturing works. The Contractor shall supply to the consignee Invoice in triplicate and packing account of all stores delivered or dispatched by him.

6.34.3 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 the Insurance company. It should take immediate steps to repair the damaged apparatus or replacement there to.

**6.35 Liabilities during Transit**

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

**6.36 Deduction from Contract Price**

6.36.1 All costs, claims, damages or expenses, which the Company may have paid for which

the Contractor is liable, will be deducted by the Company from deposited bank guarantees or from any money due or which become due to him under this Contract or any contract are being executed elsewhere with the Company.

6.36.2 Any sum of money due and payable to the Contractor, as per the Contract Agreement, may be appropriated by the Company and set off against any claim of the Company, for the payment of a sum of money arising out of or under any other contract made by the Contractor with the Company. It is an agreed term of the Contract that the sum of money, withheld or obtained under this clause by the Company, will be kept withhold or retained as such by the Company 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.

### 6.37 Terms of Payment

6.37.1 The Company shall pay the Contractor in the following manner for supply of material and at the following time for achieving the respective milestones:

| Sr. | Payment Milestones | Amount |
|---|---|---|
| 1. | Upon complete delivery of Module Mounting Structure at site | 10% of EPC Contract Price of supply |
| 2. | Upon complete delivery of inverters & junction boxes at site | 15% of EPC Contract Price of Supply |
| 3. | Upon delivery and acceptance of all PV modules at site | 30% of EPC Contract Price of Supply |
| 4. | Upon complete delivery of Balance of Systems including transformers, cables etc. at site | 10% of EPC Contract Price of Supply |
| 5. | Upon achieving Commissioning of the Plant | 10% of EPC Contract Price of Supply |
| 6. | Upon Completion of the Facilities and Successful Operational Acceptance Test | 15% of EPC Contract Price of Supply |
| 7. | Final Commissioning of the Facility pursuant to successful performance Guarantee Tests and demonstration of annual guaranteed NEEGG | 10% of EPC Contract Price of Supply |

- EPC Contract Value of Supply is equal to the price of Supply (supply of all equipment) portion of “EPC Contract Price” (including taxes) quoted by the Contractor in its Financial Proposal.
- All supply of equipment shall be considered for payment on a pro-rata basis of 5 MW.

6.37.2 The Company shall pay the Contractor in the following manner for all the erection,

testing and commissioning works and at the following time for achieving the respective milestones:

| Sr. | Payment Milestones | Amount |
|---|---|---|
| 1. | Upon complete erection of Module Mounting Structure at site | 10% of EPC Contract Value of Works |
| 2. | Upon complete erection of inverters & junction boxes at site | 15% of EPC Contract Value of Works |
| 3. | Upon erection and acceptance of installation of all PV modules on module mounting structures at site | 30% of EPC Contract Value of Works |
| 4. | Upon complete erection of Balance of Systems including transformers, cables etc. at site | 10% of EPC Contract Value of Works |
| 5. | Upon achieving Commissioning of the Plant | 10% of EPC Contract Value of Works |
| 6. | Upon Completion of the Facilities and Successful Operational Acceptance Test | 15% of EPC Contract Value of Works |
| 7. | Final Commissioning of the Facility pursuant to successful Performance Guarantee Tests and demonstration of annual guaranteed NEEGG | 10% of EPC Contract Value of Works |
| 8. | On successful Operation and Maintenance of the Solar Power Plant on quarterly basis for each year till 5 years plus 5 years | Year 1: OM-1<br>Year 2: OM-2<br>Year 3: OM-3<br>Year 4: OM-4<br>Year 5: OM-5<br>Year 6: OM-6<br>Year 7: OM-7<br>Year 8: OM-8<br>Year 9: OM-9<br>Year 10: OM-10 |

- EPC Contract Value of Works is equal to the price of Works (all the erection, testing and commissioning works) portion of “EPC Contract Price” (including taxes) quoted by the Contractor in its Financial Proposal.
- ‘OM’ indicates the each year “O&M Contract Price” quoted by the Contractor for each individual year in its Financial Proposal.

### 6.38 Payments

6.38.1 Subject to any deduction which the Company 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:

a. All payments shall be made in Indian Rupees, unless otherwise specified in the LoI/Contract Agreement. All payment shall be made on the basis of actual measurement for the quantified items as per schedule of works.

b. The Contractor shall submit the bill / invoice for the work executed showing separately GST and any other statutory levies in the bill / invoice.

- All taxes and deductions shall be applicable as per prevailing income tax and other statutory rules and provisions in force.

- Payment shall be released by the Sr. Accounts Officer/ Accounts Officer, HPGCL, Panchkula through RTGS/NEFT.

**6.39 Warranty/ Guarantee**

6.39.1 The Plant shall perform as per the Guaranteed Performance indicated by the Bidder in its Financial Proposal. The contractor shall consider the cost of warranty / guarantee for extended period as well.

6.39.2 PV modules used in grid connected solar power plants must be warranted for peak output power at Standard Testing Condition (STC), which shall not be less than 90% at the end of ten (10) years and not less than 80% at the end of twenty five (25) years.

6.39.3 The mechanical structures, electrical works, all plant equipment and components and overall workmanship of the grid solar power plants shall be warranted for a minimum of 5 years.

6.39.4 The Contractor shall 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.

6.39.5 The warranty / guarantee period shall be as follows:

a. Solar PV Modules: Modules shall be warranted for a minimum period of 25 years in the Bidder's detailed Warranty/ Guarantee certificate. Same shall be furnished with its Bid.

b. Inverters: Inverters shall be warranted for the guarantee period provided by the original equipment manufacturer. Same shall be furnished with its Bid.

c. Transformers, associated switchgear and others: Bidder shall furnish in detail its warranties/ guarantees for these items.

6.39.6 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 Subcontractors, 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.

6.39.7 At the end of Guarantee period, the Contractor's liability shall cease. In respect of goods not covered above, HPGCL shall be entitled to the benefit of such Guarantee given to the Contractor by the original Contractor or manufacturer of such goods.

6.39.8 During the Operation and Maintenance 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 HPGCL within a reasonable time as may be considered from the date of receipt of such intimation from HPGCL failing which HPGCL shall take up rectification work at the risk and cost of the Contractor.

6.39.9 Material Warranty:

Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than ten (10) years from the date of sale to the Solar Power Company:

- Defects and/or failures due to manufacturing defects and/or failures due to materials, including PID defect
- Non-conformity to specifications due to faulty manufacturing and/or inspection processes.

  If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at HPGCL's sole option.

(a) Performance Warranty:

The manufacturer should warrant the output of Solar Module(s) for at least 90% of its rated power at the end of 10 years and 80% of its rated power at the end of 25 years from the date of receipt of modules on Site.

If, Module(s) fail(s) to exhibit such power output in prescribed time span, the Contractor will either deliver additional PV Module(s) to replace the missing power output with no change in area of land used or repair or replace the PV Module(s) with no change in area of land used at HPGCL's sole option. Total land available from HPGCL is fixed and the bidder shall design the plant so that in this case he has enough space within this land to accommodate additional capacity.

6.39.10 Insurance

The PV module power output warranty as per technical specification shall be insured and backed up through an insurance policy by a reputed insurance company which will cover against the PV module power output warranty in case of insolvency or bankruptcy of the PV module manufacturer. The bidder shall submit to HPGCL a suitable insurance policy specifically for HPGCL Plant/ Plant under consideration with HPGCL as beneficiary in the policy, which will cover the entire life (25 years) of the project.

## 6.40 Arbitration

6.40.1 All matters, questions, disputes, differences and / or claims arising out of and / or concerning, and /or in connection with, and /or in consequence of, and /or relating to any contract, whether or not obligations of either or both the Certifying agency and the Corporation under that contract be subsisting at the time of such dispute and whether or not the contract has been terminated or purported to be terminated or completed, shall be referred to the sole arbitration of MD, HPGCL or an officer appointed by MD, HPGCL as his nominee. The award of the Arbitrator shall be final and binding on both the parties to the contract.

6.40.2 The objection that the Arbitrator has to deal with matters, to which the contract relates, in the course of his duties or, he has expressed his views on any or all of the matters in dispute or difference, shall not be considered as a valid objection.

6.40.3 The Arbitrator may, from time to time, with the consent of the parties to the contract enlarge the time for making the award. The venue of the arbitration shall be the place from which the acceptance of offer is issued or such other place as the Arbitrator, in his discretion, may determine.

**6.41 Court of Competent Jurisdiction**

6.41.1 The Courts of Panchkula for HPGCL shall have exclusive jurisdiction in all matters arising under the Contract.

**6.42 Law and Procedure**

6.42.1 The law which is to apply to the Contract and under which the Contract is to be construed shall be Indian Law.

**6.43 Construction of Contract**

6.43.1 The Contract shall in all respect be construed and operated, as a Contract as defined in the Indian Contracts Act, 1872, and all the payments there under shall be made in Indian Rupees unless otherwise specified.

**6.44 Notices**

6.44.1 For all purpose of the Contract, including arbitration there under, the address of the Contractor mentioned in the Bid shall be the address to which all communications addressed to the Contractor shall be sent, unless the Contractor has notified a change by a separate letter containing no other communication and sent by registered post with acknowledgement due to HPGCL. The Contractor shall be solely responsible for the consequence of an omission to notify change of address in the manner aforesaid.

6.44.2 Any communication or notice on behalf of the Company in relation to the Contract Agreement may be issued to the Contractor by the Company and all such communication and notice may be served on the Contractor either by registered post or under certificate of posting or by ordinary post or by hand delivery at the option of the officer.

6.44.3 Instructions or notices to the Contractor and notices from the Contractor to HPGCL recorded in a minute signed by the authorized representatives of both HPGCL and the Contractor. Such notice or instruction shall be valid notice of instruction for the purpose of the Contract.

**6.45 Final Bill**

6.45.1 The Final EPC Bill relating to the Contract shall be prepared only after the Performance Guaranteed Test of the plant has been observed as under **Appendix 16**: Procedure for Performance Testing and it will include the adjustments of all claims against the Contractor by the Company and awarded in its favour by the arbitrator up to the date of preparation of the final bill.

**6.46 Degradation of Solar Modules**

6.46.1 The Contractor should warrant for the output of each Solar Module(s) for at least 90% of

its actual rated capacity at Standard Testing Condition after initial 10 years and 80% of its rated capacity after 25 years upon commissioning of the Plant.

6.46.2 The derating of module should not be more than 1% in any year except for the first year of operation, which should be limited to 3.0%.

6.46.3 If, Module(s) fail(s) to exhibit such power output, the Contractor will either:

a. Deliver additional PV Module(s) to replace the loss of power output with no change in area of land used;

<or>

b. Repair or replace the existing PV Module(s) with no change in area of land used;

<or>

c. Compensate HPGCL with an amount equivalent to the loss of revenue from the date of audit to 25$^{th}$ years which shall be calculated based on Net Present Value of amount of loss of revenues from the date of audit to 25$^{th}$ years discounted at the rate of HPGCL's cost of capital.

6.46.4 The Company will specifically do the audit of solar PV module by third-party at any point of the operation period and in case the Contractor fails to demonstrate the value as per the maximum deration allowed then, the Contractor shall compensate as per the Clause no. 6.46.3.

**6.47 Risk Purchase**

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

**6.48 Confidential Information**

6.48.1 HPGCL 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 Subcontractor(s) such documents, data and other information it receives from HPGCL to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this Clause 6.48.

6.48.2 Notwithstanding the generality of the foregoing Clause 6.48.1, all maps, plans, drawings, specifications, schemes and the subject matter contained therein and all other information given to the Contractor, by the Company in connection with the performance of the Contract shall be held confidential by the Contractor and shall remain the property of the Company and shall not be used or disclosed to third parties by the Contractor for any purpose other than for which they have been supplied or prepared. The Contractor may disclose to third parties, upon execution of secrecy agreements satisfactory to the Company, such part of the drawings, specifications or information if such disclosure is

necessary for the performance of the Contract.

6.48.3 Maps, layouts and photographs of the unit/ integrated plant including its surrounding region's showing vital installation for national security shall not be published or disclosed to the third parties or taken out of the country without prior written approval of the Company and upon execution of secrecy agreements satisfactory to the Company with such third parties prior to disclosure.

6.48.4 Title to secret processes, if any, developed by the Contractor on an exclusive basis and employed in the design of the unit shall remain with the Contractor. The Company shall hold in confidence such process and shall not disclose such processes to the third parties without prior approval of the Contractor and execution by such third parties of secrecy agreements satisfactory to the Contractor prior to disclosure.

6.48.5 Technical specifications, drawings, flow sheets, norms, calculations, diagrams, interpretations of the test results, schematics, layouts and such other information which the Contractor has supplied to the Company under the Contract shall be passed on to the Company. The Company shall have the right to use these for construction erection, start-up, commissioning, operation, maintenance, modifications and/ or expansion of the unit including for the manufacture of spare parts.

6.48.6 The obligation of a party under this Clause 6.48, however, shall not apply to that information which:

a. now or hereafter enters the public domain through no fault of that Party,

b. 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, or

c. otherwise lawfully becomes available to that Party from a third party that has no obligation of Confidentiality.

6.48.7 The above provisions of this Clause 6.48 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.

6.48.8 The provisions of this Clause 6.48 shall survive Termination, for whatever reason, of the Contract.

Executive Engineer/Planning-I
for CE/DCRTPP (Planning Section, HQ)
HPGCL, Panchkula.

--- End of Section ---

# Chapter-7

## 7 Special Terms and Condition

### 7.1 Definition

7.1.1 The General Terms and Conditions as well as the Special Terms and Conditions of the Tender are complementary to each other, and wherever there is a conflict, the Special Terms and Conditions shall prevail.

### 7.2 Objective of the Project

7.2.1 The main objective of this project is “Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years extendable upto next Five (5) years of the following:-

(i). 10 MW Grid Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar)” on turnkey basis at Village Dhandlan (Jhajjar) in the state of Haryana for HPGCL.

### 7.3 Compliance with UHBVN/ DHBVN/ HPPC/ HVPNL Guidelines

7.3.1 The Bidders and Contractor shall make themselves fully aware of and comply with the norms and guidelines provided by UHBVN/ DHBVN/ HPPC/ HVPNL if any, towards the Project.

7.3.2 The Contractor shall ensure that the Project shall comply with all the norms and guidelines of UHBVN/ DHBVN/ HVNL/ HPPC if any, and subsequent clarifications or amendments issued from time to time. The Contractor is required to refer the compliance documents of UHBVN/ DHBVN/ HPPC if any, for necessary compliances of UHBVN/ /DHBVN/ HVNL/ HPPC requirements.

7.3.3 In case of any conflict between the compliance of UHBVN/ DHBVN/ HVNL/ HPPC and this Tender or any aspect of the Project, the Contractor shall immediately notify HPGCL for clarity.

7.3.4 Any changes in the Tender or the Contract including but not limited to the Scope of Work, Guarantees and Warranties to comply with the guidelines or provisions of the Scheme under which this project is being executed shall have no bearing on the EPC Contract Price & O&M Contract Price.

### 7.4 Project Site

7.4.1 Details of the Project Site will be as per the **Annexure 1**: Details of Plant Location and Site.

### 7.5 Scope of Service

7.5.1 The item of work to be performed on all equipment and accessories shall include but not limited to the following:

a. Transportation, unloading, receiving and storage at site.

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

c. Final check-up of equipment and commissioning and putting the system into successful operation, feeding power to the local internal grid.

**7.6 Training of HPGCL's Personnel**

7.6.1 The Bidder shall provide training on Plant operations and maintenance to three (3) teams of 5-10 personnel each (Engineers and Technician/ Operators) of HPGCL as and when requested by HPGCL.

**7.7 Mode of Execution**

7.7.1 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 be deemed to have been included in the scope of this work and the Contractor shall supply, install the same without any extra cost.

**7.8 Programme of Work**

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

**7.9 Starting of Work**

7.9.1 The Contractor shall be required to start the work within 15 (fifteen) days from the date of issue of Letter of Intent and shall thereof, report to HPGCL accordingly.

**7.10 Completion Schedule**

7.10.1 The time of completion and Commissioning of the Plant is One Hundred and Ninety Days (190) from the date of issue of Letter of Intent. The O&M Contract Period is initially for five (5) years, which can be extended for next five (5) years on sole discretion of HPGCL.

7.10.2 The Contractor shall inform HPGCL at least sixty five (65) days advanced preliminary written notice and at least thirty five (35) days advanced final written notice, of the date on which it intends to synchronize the Power Project to the Grid System.

7.10.3 The Contractor shall prepare the completion schedule accordingly and inconformity with provisions of technical specifications and carry out the work as per this schedule subject to "Force Majeure" conditions. The Contractor shall mobilize resources keeping in view, the above scheduled completion period.

7.10.4 The Contractor shall provide the power evacuation schedule as and when required or asked by any Central or State Government agency(s).

**7.11 Site Inspection & Basis of Bid**

7.11.1 The volume and quantity of work indicated in schedule of works may vary. The Contractor should visit the Site before quoting rate for civil works. After taking in to consideration all aspects of the site, condition of soil etc., the Contractor should quote for civil works. No extra claim will be entertained at post bidding stage. The foundation design of module structure and the building shall have to be approved by HPGCL. In case of any defects arising in the building during guarantee period, the Contractor shall have to rectify the same at its own cost.

The site visit alongwith the representative(s) of HPGCL is recommended for bidders before submission of bid. The prospective bidders may coordinate with the representative(s) of HPGCL well in advance for the site visit.

**7.12 Price Escalation**

7.12.1 The rate(s) quoted against the work shall remain firm during the entire Contract period.

**7.13 Taxes and Duties**

7.13.1 The price quoted shall be inclusive of all applicable taxes, duties, levies as applicable (as per the format of the Financial Proposal), which shall be paid on production of documentary evidences for the same.

7.13.2 Bidders shall quote the rates as well as taxes and duties based on the concessional exemption in the same that can be availed by the Bidder. HPGCL shall only provide documents (if requested) to facilitate the Contractor. However, all the exemptions for ED & CD or any other from MNRE has to be taken by the Contractor.

7.13.3 Statutory variations in the tax shall be permitted as under.

**(A) Statutory variations during original contractual completion period:**

(i) If any increase takes place in taxes and duties due to statutory variation, then HPGCL shall admit the same on production of documentary evidences.

(ii) If any decrease takes place in taxes and duties due to statutory variation, the same shall be passed on to HPGCL or HPGCL shall admit the decreased rate of taxes and duties while making the payment.

**(B) Statutory variations beyond original contractual completion period:**

(i) If reasons for extension of contractual completion period is attributable solely to HPGCL, the provisions of (A) (i) above shall apply.

(ii) If reasons for extension of contractual completion period is attributable to Bidder, then:

(a) If any increase takes place in taxes and duties due to statutory variation, then HPGCL shall not admit the same; however HPGCL shall admit the taxes and duties at the rate prevailing during payment of last invoice raised during original contract completion period.

(b) If any decrease takes place in taxes and duties due to statutory variation, the same shall be passed on to HPGCL or HPGCL shall admit the decreased rate of taxes and duties while making the payment.

7.13.4 Variation on account of exchange rate will not be payable. No statutory variation shall be payable by HPGCL on the input items. i.e. raw materials etc.

7.13.5 No statutory variation shall be admitted if the excise duty becomes payable because of exceeding of the prescribed limits for turnover of the Bidder.

**7.14 Procurement of Materials**

7.14.1 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 HPGCL for approval in respect of the materials procured by the Contractor.

**7.15 Samples**

7.15.1 Apart from adhering to special provision made in the specification regarding submission of samples, the Contractor shall within fifteen (15) days of its receipt of Letter of Intent, provide to HPGCL samples along with detailed literature of all materials it proposes to use irrespective of the fact that specific make/ material might have been stipulated. If certain items proposed to be used are of such nature that samples cannot be presented or prepared at Site, detailed literature / test certificate of the same shall be provided instead. HPGCL shall check the samples and give his comments and/or approval to the same.

**7.16 Notice of Operation**

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

**7.17 Rejection of Materials**

7.17.1 HPGCL'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 Project Manager or Engineer-in- Charge from the Site of work.

**7.18 Power and Water Supply during Construction**

7.18.1 The Contractor shall arrange for the temporary Power Supply at the site for construction purpose at its own cost.

7.18.2 Cost of water shall be as per prevailing rate and to be borne by the Contractor.

7.18.3 Cost of electricity required during construction shall be payable by the Contractor. For construction, temporary connection from Distribution Company shall be arranged by the Contractor as per applicable tariff.

7.18.4 HPGCL shall not provide facility for storage of material, and accommodation for labours at site. The Contractor shall make his own arrangement for the same. HPGCL has no objection for use of parcel of project land for temporary construction for Site Office, Store

etc during the construction phase. However, it is full responsibility of the Contractor to maintain hygienic condition for labour camp and accordingly the Contractor to construct necessary temporary blocks.

**7.19 Labour Engagement**

7.19.1 The Contractor shall be responsible to provide all wages and allied benefits to its labours engaged for execution of the project work and also to carry out Operation and Maintenance 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.

7.19.2 Strict adherence of various applicable labour laws like the Factories Act, Minimum Wages Act, ESI Act, Payment of Wages Act, the Workman‟s Compensation Act, EPF Act, Contractor labour (Regulation & Abolition) Act, 1970 and all other statutory requirements as amended from time to time to the entire satisfaction of Central/State Govt. Authorities, shall be the responsibility of the Contractor and he shall have to make good loss, if any, suffered by HPGCL on account of default in this regard by the Contractor.

7.19.3 The contractor is encouraged to use local manpower as per the local statutory (labour) requirement, if any.

**7.20 Handing Over –Taking Over**

7.20.1 The Project shall be taken over by HPGCL upon successful completion of all tasks to be performed at Site(s) on equipment supplied, installed, erected and Commissioned by the Contractor in accordance with provision of this Tender. During handing over complete Project work, the Contractor shall submit the following for considering final payment:

a. All as- Built Drawings;

b. Detailed Engineering Document with detailed specification, schematic drawing, circuit drawing and test results, manuals for all deliverable items, Operation, Maintenance & Safety Instruction Manual and other information about the project;

c. Bill of material; and

d. Inventory of spares at projects Site.

e. Copies of all warranties/guarantees.

7.20.2 Immediately after taking over of complete Plant, the same will be handed over to the Contractor for Operation & Maintenance for a period as mentioned in the Tender.

7.20.3 Handing over will be done only after Completion of Facilities and successful Operational Acceptance Test.

**7.21 Termination on the death of Contractor**

7.21.1 Without prejudice to any of the rights or remedies under this contract, if the Contractor dies, the Engineer-in-Charge on behalf of HPGCL shall have the option of terminating the Contract without compensation to the contractor.

**7.22 Retired Government servants taking to Contract**

7.22.1 No engineer of gazette rank or other gazette officer employed in engineering or administrative duties in the Engineering Department of the Company is allowed to work as contractor for a period of two years of his retirement from Company's service without the previous permission of the Company. This contract is liable to be cancelled if either the contractor or any of his employees is found at any time to be a person who had not obtained the permission of the Company as aforesaid before submission of the tender or engagement in the contractor's service as the case may be.

**7.23 EPF**

7.23.1 The contractor will deduct and deposit EPF of his labour staff/worker as applicable from time to time in his own EPF A/c code and then produce a photocopy of documentary evidence of EPF Challan with each R.A. Bill for the concerned period.

**7.24 Miscellaneous**

7.24.1 The project manager appointed by EPC contractor shall not be replaced without the prior written approval of HPGCL.

7.24.2 Any project manager or member of the Contractor at Site shall be replaced within a period of forty eight (48) hours of intimation by HPGCL without assigning any reason thereof.

7.24.3 The Contractor shall take care of all statutory, local clearance, approvals, etc.

7.24.4 All warranties on the equipment shall be in the name of HPGCL with reference to the Clause No. 6.39.

7.24.5 The Contractor shall be responsible for claiming and retaining any subsidy and shall quote only final price and responsibility of Project registration/ applications etc. shall lie with the Bidder only. In no case, HPGCL is responsible to provide any additional amount other than the EPC Contract Price & O&M Contract Price.

7.24.6 The Contractor shall provide arrangement for water drainage, which shall be appropriately arranged for dispersion/ evacuation as per the local statutory norms without causing any local inconvenience or hindrance.

7.24.7 The design philosophy and related specifications mentioned in this Tender are to be treated as baseline specifications. The Contractor may further improve the design of the Plant through minor modifications and execute the same contingent on HPGCL's approval of the new design or specification.

7.24.8 Based on reviewing the Project, if the progress is below expectation as judged based on HPGCL's discretion, then HPGCL shall reduce the Scope of the Contractor in part or full and assign the same to other contractor(s) at the risk and cost of the existing Contractor.

7.24.9 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 O&M

Contract period by the Contractor to HPGCL at the time of hand over at no extra cost to HPGCL for the rest of the life of the Plant.

7.24.10 The Contractor shall construct a dedicated site office including tables, chairs, functional power outlets, light, fan air conditioner, etc. for at least eight (8) people to host HPGCL's employees or authorized representatives at the time of construction of the Plant.

7.24.11 Provision for installing any additional monitoring equipment to facilitate on-line transfer of data shall be provided by the Contractor at the request of HPGCL.

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HPGCL, Panchkula.

--- End of Section ---

## Appendix 1: Instruction to Bidder on Electronic Tendering system

**Information Regarding Payment of Tender Document, eService & EMD.**

The Bidders can download the tender documents from the Portal https://etenders.hry.nic.in.

The Bidders shall have to pay for the Tender documents & eService Fee offline in shape of Demand Draft in favour of "Accounts Officer/ Cash, HPGCL payable at Panchkula".

The Payment for **EMD** should be submitted in the form of Bank guarantee.

NOTE: If the tenders are cancelled or recalled on any grounds, the tender document fees & e-service fee will not be refunded to the bidders.

1.1 **Conditions/Procedure for submission of tender:**

1.1.1 **Pre-requisites for online bidding:**

In order to bid online on the portal https://etenders.hry.nic.in, the user machine must be updated with the required version Java. The link for downloading latest java applet is available on the Home page of the e-tendering Portal.

1.1.2 **Online Viewing of Detailed Notice Inviting Tenders:**

The bidders can view the detailed N.I.T and the time schedule (Key Dates) for all the tenders floated through the single portal eProcurement system at https://etenders.hry.nic.in.

1.1.3 **Download of Tender Documents:**

The tender documents can be downloaded free of cost from the eProcurement portal https://etenders.hry.nic.in.

1.1.4 **Key Dates:**

The bidders are strictly advised to follow dates and times as indicated in the online Notice Inviting Tenders. The date and time shall be binding on all bidders. All online activities are time tracked and the system enforces time locks that ensure that no activity or transaction can take place outside the start and end dates and the time of the stage as defined in the online Notice Inviting Tenders.

1.1.5 **Bid Preparation (Technical & Financial) online Bids:**

i) The bidders shall upload their technical offer containing documents , qualifying criteria, technical specification, schedule of deliveries, and all other terms and conditions except the rates (price bid).**The bidders shall quote the prices in price bid format.**

ii) Submission of bids will be preceded by submission of the digitally signed& sealed bid (Hash) as stated in the time schedule (Key Dates) of the Tender.

**NOTE:-**

(A) **If bidder fails to complete the Online Bid Submission stage on the stipulated date and time. His/her bid will be considered as bid not submitted, as such bid will not appear during tender opening stage.**

(B) **Bidders participating in online tenders shall check the validity of his/her Digital Signature Certificate before participating in the online Tenders at the portal** https://etenders.hry.nic.in**.**

1.2 **Special Instructions to the Contractors/Bidders for the e-submission of the bids online through this eProcurement Portal.**

1.2.1 Bidder should do Online Enrolment in this Portal using the option Click Here to Enroll available in the Home Page. Then the Digital Signature enrollment has to be done with the e-token, after logging into the portal. The e-token may be obtained from one of the authorized Certifying Authorities such as eMudhraCA/GNFC/IDRBT/MtnlTrustline/SafeScrpt/TCS.

1.2.2 Bidder then logs into the portal giving user id / password chosen during enrollment.

1.2.3 The e-token that is registered should be used by the bidder and should not be misused by others.

1.2.4 DSC once mapped to an account cannot be remapped to any other account. It can only be Inactivated.

1.2.5 The Bidders can update well in advance, the documents such as certificates, purchase order details etc., under My Documents option and these can be selected as per tender requirements and then attached along with bid documents during bid submission. This will ensure lesser upload of bid documents.

1.2.6 After downloading / getting the tender schedules, the Bidder should go through them carefully and then submit the documents as per the tender document, otherwise, the bid will be rejected.

1.2.7 The BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant coulmns, else the bidder is liable to be rejected for that tender. Bidders are allowed to enter the Bidder Name and Values only.

1.2.8 If there are any clarifications, this may be obtained online through the eProcurement Portal, or through the contact details given in the tender document. Bidder should take into account of the corrigendum published before submitting the bids online.

1.2.9 Bidder, in advance, should prepare the bid documents to be submitted as indicated in the tender schedule and they should be in PDF/XLS/RAR/DWF formats. If there is more than one document, they can be clubbed together.

1.2.10 Bidder should arrange for the EMD as specified in the tender. The original should be posted/couriered/given in person to the Tender Inviting Authority, within the bid submission date and time for the tender.

1.2.11 The bidder reads the terms and conditions and accepts the same to proceed further to submit the bids

1.2.12 The bidder has to submit the tender document(s) online well in advance before the prescribed time to avoid any delay or problem during the bid submission process.

1.2.13 There is no limit on the size of the file uploaded at the server end. However, the upload is decided on the Memory available at the Client System as well as the Network bandwidth available at the client side at that point of time. In order to reduce the file size, bidders are suggested to scan the documents in 75-100 DPI so that the clarity is maintained and also the size of file also gets reduced. This will help in quick uploading even at very low bandwidth speeds.

1.2.14 It is important to note that, the bidder has to Click on the Freeze Bid Button, to ensure that he/she completes the Bid Submission Process. Bids Which are not Frozen are considered as Incomplete/Invalid bids and are not considered for evaluation purposes.

1.2.15 In case of Offline payments, the details of the Earnest Money Deposit(EMD) document submitted physically to the Department and the scanned copies furnished at the time of bid submission online should be the same otherwise the Tender will be summarily rejected

1.2.16 The Tender Inviting Authority (TIA) will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the bidders due to local issues.

1.2.17 The bidder may submit the bid documents online mode only, through this portal. Offline documents will not be handled through this system.

1.2.18 At the time of freezing the bid, the eProcurement system will give a successful bid updation message after uploading all the bid documents submitted and then a bid summary will be shown with the bid no, date & time of submission of the bid with all other relevant details. The documents submitted by the bidders will be digitally signed using the e-token of the bidder and then submitted.

1.2.19 After the bid submission, the bid summary has to be printed and kept as an acknowledgement as a token of the submission of the bid. The bid summary will act as a proof of bid submission for a tender floated and will also act as an entry point to participate in the bid opening event.

1.2.20 Successful bid submission from the system means, the bids as uploaded by the bidder is received and stored in the system. System does not certify for its correctness.

1.2.21 The bidder should see that the bid documents submitted should be free from virus and if the documents could not be opened, due to virus, during tender opening, the bid is liable to be rejected

1.2.22 The time that is displayed from the server clock at the top of the tender Portal, will be valid for all actions of requesting bid submission, bid opening etc., in the e-Procurement portal. The Time followed in this portal is as per Indian Standard Time (IST) which is GMT+5:30. The bidders should adhere to this time during bid submission.

1.2.23 All the data being entered by the bidders would be encrypted at the client end, and the software uses PKI encryption techniques to ensure the secrecy of the data. The data entered will not be viewable by unauthorized persons during bid submission and not viewable by any one until the time of bid opening. Overall, the submitted bid documents become readable only after the tender opening by the authorized individual.

1.2.24 During transmission of bid document, the confidentiality of the bids is maintained since the data is transferred over secured Socket Layer(SSL) with 256 bit encryption technology. Data encryption of sensitive fields is also done.

1.2.25 The bidders are requested to submit the bids through online eProcurement system to the TIA well before the bid submission end date and time (as per Server System Clock).

**Appendix 2: Format for Covering Letter**

To,

CE/DCRTPP (Planning Section, HQ)
Haryana Power Generation Corporation Limited,
C-7, Urja Bhawan, Sector-6,
Panchkula-134 109, Haryana

**Sub: Submission of the Tender Document e-NIT no. 23/CE/PLG/SPP-335 Dated: 17.02.2021.**

Dear Sir,

We, the undersigned, have considered and complied with the "Instructions to Bidders" and have accepted the terms stipulated in the Tender Document e-NIT no. **23/CE/PLG/SPP-335 Dated: 17.02.2021**.

The Scope of Work to be offered by us shall include but not be limited to Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance Five (5) Years Extendable for Five (5) Years for 10 MW Grid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar).

In full cognizance and compliance with these aforesaid conditions and the regulations of local government authorities, we the undersigned do hereby offer our Bid and agree for the following:

i. The work covered under the Bid shall be completed to the entire satisfaction of yourselves or your representative in conformity with the Tender Document at the prices accompanying this Bid.
ii. The Project shall be handed over installed, interconnected, tested, commissioned and modified and we shall achieve commissioning in not later than One Hundred and Ninety (190) days from the date of issue of LoI.
iii. I/We further certify that in regard to matters relating to security and integrity of the country, we or any of our Associates have not been charge-sheeted by any agency of the Government or convicted by a Court of Law.
iv. I/ We hereby irrevocably waive any right or remedy which we may have at any stage at law or howsoever otherwise arising to challenge or question any decision taken by HPGCL in connection with the selection of Applicants, selection of the Bidder, or in connection with the selection/ bidding process itself, in respect of the above mentioned Project and the terms and implementation thereof.
v. We agree to keep the bidding valid for acceptance for a period of 180 days from the opening the Price Bid and the Bid shall not be withdrawn on or after the opening of bidding till the expiry of this period or any extension thereof.
vi. We also acknowledge and accept that you shall not pay for any discontinuance or low performance rate resulting from malfunction of / or inadequacy of our equipment, instruments or personnel.
vii. We further represent that we have familiarized ourselves with all the terms and provisions of the various parts of the bidding documents and that in making our Bid, we do not rely upon any representation made by any agent or employee of yourselves in

respect of the terms of the bidding documents or the nature of the performance of the works.

Yours Sincerely,

Signature: _____

In the capacity of: _____

Duly authorized to sign Tenders for and on behalf of (Name & Address)

_____

_____

_____

Witness _____

**Appendix 3: Format of Details of Bidder**

1. (a) Name:

   (b) Country of incorporation:

   (c) Address of the corporate headquarters and its branch office(s), if any, in India:

   (d) Date of incorporation and/ or commencement of business:

2. Brief description of company including details of its main lines of business and proposed role and responsibilities in this Project:

3. Details of individual(s) who will serve as the point of contact/ communication for company:

   (a) Name:
   (b) Designation:
   (c) Company:
   (d) Address:
   (e) Telephone Number:
   (f) E-Mail Address:
   (g) Fax Number:

4. Particulars of the Authorised Signatory of the Bidder:

   (a) Name:

   (b) Designation:

   (c) Address:

   (d) Phone Number:

   (e) Fax Number:

**Appendix 4: Format of Details of Similar Technical Experience**

**INSTRUCTIONS:**

A. The Bidder shall indicate similar EPC experience of grid-connected solar photovoltaic projects herein.

B. The Bidder shall duly attach the Letter of Award (LOA) from the Client, Commissioning Certificate, and Certificate of Satisfactory Completion of Work from the Client.

C. Projects without sufficient documentary evidence of execution, commissioning and completion as per the discretion of HPGCL shall not be considered towards technical evaluation of the Bidder.

D. The Bidder may indicate more than five (5) projects.

| Sr. | Name of Client (with name and contact information of Contact Person) | PV Project AC/ DC Capacity (in MW) | For Official Use Only | | |
|---|---|---|---|---|---|
| | | | LOA attached? | Commissioning Certificate attached? | Certificate of Satisfactory Completion attached? |
| 1. | | | Yes/ No | Yes/ No | Yes/ No |
| 2. | | | Yes/ No | Yes/ No | Yes/ No |
| 3. | | | Yes/ No | Yes/ No | Yes/ No |
| 4. | | | Yes/ No | Yes/ No | Yes/ No |
| 5. | | | Yes/ No | Yes/ No | Yes/ No |

---

**Appendix 5: Format of Details of Qualified Technical Staff**

| Sr. No. | Name | Relevant Qualification | Additional Certifications | Total Years of Relevant Experience | Remarks |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | | | | |

***Note:*** *Kindly submit copies of resumes and appropriate certifications with this sheet. Additional sheets may be used to provide accurate information.*

**Appendix 6: Format of Disclosure of PV Technology Proposed**

| | | |
|---|---|---|
| **PV MODULE** | | |
| Type | : | Select One:<br>☐ Poly-crystalline Silicon<br>☐ Mono-crystalline Silicon<br>☐ Other variant of the above. Pleae specify .....|
| Manufacturer | : | |
| Model Number | : | |
| Module Capacity | : | ..... W |
| No. of Cells per Module | : | |
| No. of Modules | : | |
| **PV INVERTER** | | |
| Type | : | Select One:<br>☐ Central Inverter<br>☐ String Inverter (**NOT ALLOWED**)<br>☐ Micro Inverter (**NOT ALLOWED**)<br>☐ Other, Please specify (**NOT ALLOWED**) |
| Configuration | : | Select One:<br>☐ Independent Operation<br>☐ Master-Slave Operation<br>☐ Other, Please specify..... |
| Manufacturer | : | |
| Model Number | : | |
| Inverter Capacity | : | ..... kW |
| Number of Inverters | : | |
| **MODULE TRACKING** | | |
| Type | : | Select One:<br>☐ Fixed<br>☐ 1-Axis Manual Seasonal<br>☐ 1-Axis, Fixed Tilt, Automatic, Daily Tracking<br>☐ 1-Axis, Azimuth, Automatic, Daily Tracking<br>☐ 2-Axis, Automatic, Tracking<br>☐ Other, Please specify ..... |

## Appendix 7: Format of Project Execution Plan

### I. Division of Scope of Work

| Discipline/ Equipment | Basic Engineering | Design/ Detailed Engineering | Procurement | Supply | Project Management | Construction / Fabrication/ Installation | Commissioning |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |

**NOTES:**

1. Bidder shall clearly indicate the agency which will carry our each activity and the location of activity.
2. In case any activity is proposed with back-up consultant, Bidder shall clearly indicate role of back-up consultant
3. Bidder to identify major equipment / items and discipline

### II. DETAILED PROJECT SCHEDULE

| Sr. | Activity | Start Date | End Date |
|---|---|---|---|
| **1.** | Issue of LoI | Zero Date | |
| **2.** | | | |
| **3.** | | | |

**NOTES:**

1. The Bidder shall ensure that the entire work is completed within 190 days of issue of LoI.
2. All Start Dates and End Dates to be indicated with respect to the Zero Date, e.g. +3 Days.

**SIGNATURE OF BIDDER** ----------
**NAME** ----------
**DESIGNATION** ----------
**HPGCL SEAL** **DATE** ----------

**Appendix 8: Format of Declaration of Compliance**

**Date:**

To,

CE/DCRTPP (Planning Section, HQ)
Haryana Power Generation Corporation Limited (HPGCL), Ground Floor, C-7,
Urja Bhawan, Sector-6,
Panchkula-134 109, Haryana

**Sub: Declaration of Compliance for the Tender for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years of 10 MW Grid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar).**

Dear Sir,

This is to certify that I,_____, am the duly authorized signatory appointed on behalf of my organization to submit this Bid. The authorization letter is attached herewith. I agree to all the terms and conditions set forth in this Tender Document.

If awarded the job, the Scope of Work shall also conform to the terms and conditions, as well as specifications indicated in the Tender Document and as finally indicated by the Evaluation Committee.

I further certify that all the information provided in this document is accurate to the best of my knowledge.

Signature: _____ Designation:_____

Name: _____ Organization: _____

Address: _____ Email: _____

_____ Phone: _____

**Appendix 9: Format of No Deviation Certificate**

Date:

To

CE/DCRTPP (Planning Section, HQ)
Haryana Power Generation
Corporation Limited (HPGCL),
Ground Floor, C-7, Urja Bhawan,
Sector-6,
Panchkula-134 109, Haryana

**Sub: No Deviation Certificate regarding Tender for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years of 10 MWGrid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar).**

Dear Sir,

We, _____ (Bidder's name), confirm our acceptance to all terms and conditions mentioned in the Tender Document, and all subsequent clarifications, in totality and withdraw all deviations raised by us, if any.

_____

SEAL AND SIGNATURE OF BIDDER

Date: _____

**Appendix 10: Format of Declaration on Bidder's Relation to Directors**

Date:

To

CE/DCRTPP (Planning Section, HQ)
Haryana Power Generation Corporation Limited (HPGCL), Ground Floor, C-7,
Urja Bhawan, Sector-6,
Panchkula-134 109, Haryana

**Sub: Declaration of relationship with Directors/any other employee/associates**

Dear Sir,

This has reference to our proposed Bid regarding **Tender for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years of 10 MW Grid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar)** and for the purpose of Section 184/188 of the Companies Act 1956 or Companies Act, 2013, we certify that to the best of my/our knowledge:

i) I am not a relative of any Director of HPGCL or ;
ii) We are not a firm in which a Directors of HPGCL or its relative is a partner;
iii) I am not a partner in a firm in which a Directors of HPGCL or, or its relative is a partner;
iv) We are not a private company in which a Director of HPGCL or is a member or director;
v) We are not a company in which Directors of HPGCL hold more than 2% of the paid-up share capital of our company or vice-versa.

Authorised Signatory of the Contracting Party

**Appendix 11: Format of Power of Attorney as Authorized Signatory**

*(On a non-judicial stamp paper of appropriate value)*

Know all men by these presents, we, …… (name of the firm and address of the registered office) do hereby irrevocably constitute, nominate, appoint and authorise Mr. / Ms_____(Name)____, son/daughter/wife of_____and presently residing at _____, who is presently employed with us and holding the position of_____, as our true and lawful attorney (hereinafter referred to as the "Attorney") to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Bid for the **Tender for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years of 10 MW Grid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar),** pursuant to the Tender Document no. …… issued by HPGCL, including but not limited to signing and submission of all applications, Bids and other documents and writings, participate in Bidders' and other conferences and providing information/responses to HPGCL, representing us in all matters before HPGCL, signing and execution of all contracts including the Contract Agreement and undertakings consequent to acceptance of our Bid, and generally dealing with HPGCL in all matters in connection with or relating to or arising out of our Bid for the said Project and/or upon award thereof to us and/or till the entering into of the Contract Agreement with HPGCL.

AND we hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE,_____, THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS _____ DAY OF_____, 20_____

For……..

(Signature, name, designation and address)

Witnesses:

1.

2.

Accepted Notarised

(Signature, name, designation and address of the Attorney)

*Notes:*

1. *The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure*.

2. *Wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders resolution/ power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.*

3. *For a Power of Attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the Power of Attorney is being issued. However, the Power of Attorney provided by Bidders from countries that have signed the Hague Legislation Convention, 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Apostille certificate.*

**Appendix 12: Format of summary of Audited Financial Statements**

To

CE/DCRTPP (Planning Section, HQ)
Haryana Power Generation Corporation Limited (HPGCL), Ground Floor, C-7,
Urja Bhawan, Sector-6,
Panchkula-134 109, Haryana

**Sub: Summary of Financial Statement**

**Ref:** *Request for Proposal for Bid for Tender for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years of* 10 MW Grid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar).

Dear Sir,

This is to certify that .....*[Insert name of Bidder]* (the "Bidder") having its Registered Office at ..... *[Insert Registered Address of the Bidder]* with PAN No. ..... *[Insert PAN No. of the Bidder]* is in the business of ..... *[Insert briefly the nature of the business]*, has recorded the following turnovers and net worth:

| **Financial Year** | **Turnover (in INR)** | | **For Official Use Only** |
|---|---|---|---|
| | | | **Audited Statement Attached?** |
| 2019-20 | | | Yes / / No |
| 2018-19 | | | Yes / No |
| 2017-18 | | | Yes / No |

All figures indicated herein are arrived from the Audit Reports of the Bidder duly submitted to the Income Tax Department.

Sincerely yours,

[Official seal of the Chartered Accountant]

.....

[Insert Name of the Chartered Accountant]

Date: [Insert Date]

[Insert address and contact information of the Chartered Accountant]

Pace: [Insert Place]

All figures indicated herein are calculated as per the guidelines mentioned in the Tender. [NOTES:

A. If the Bidder is seeking financial qualification based on the financial standing of the Parent Company, then a similar certificate summarizing the financial statement of the Parent Company shall be attached by the Bidder as a part of the Bid.
B. All audited statements to be attached by the Bidder as a part of the Bid.

**Appendix 13: Format of Authorization by Parent Company**

[On the Official Letterhead of the Parent Company]

[Reference No.]
From: [Name of Parent Company]
[Address of Parent Company]
[Date]

To:

CE/DCRTPP (Planning Section, HQ)

Haryana Power Generation Corporation Limited (HPGCL), Ground Floor, C-7,
Urja Bhawan, Sector-6,
Panchkula-134 109, Haryana

**Sub: Authorization of use of financial capability by Parent HPGCL.**

*Ref:* ***Request for Proposal for Bid for Tender for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years of*** **10 MW , Grid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar).**

Dear Sir,

A. With reference to the abovementioned Tender, we confirm that we hold..... [Insert percentage of share held in words] percent ([Insert percentage of share held in figures] %) share in M/s. .....[Insert Name of the Bidder].

B. We confirm that M/s.....[Insert Name of the Bidder] is authorized by us to use our financial capability for meeting the financial criteria as specified in the Tender, meeting all the provisions including but not limited to terms and conditions of the Tender and undertaking the Scope of Work as defined in the Tender.

C. We further confirm that we shall by jointly and severely be held responsible for the performance of M/s. ..... [Insert Name of the Bidder] as per the various provisions including but not limited to the terms and conditions in undertaking the Scope of Work as defined in the Tender.

D. Our financial summary is attached as a part of the Bid submitted by..... [Insert Name of the Bidder] as per the appropriate format indicated in the Tender.

For and on behalf of..... [Insert Name of Parent Company]

[Signature and Stamp of any Whole-Time Director]
Name: [Insert name of the Whole-Time Director]
Place: [Insert Place]
Date: [Insert Date]

[NOTE:

A. The Authorization of use of financial capability by Parent Company shall be supported by a specific Board Resolution of the Parent Company satisfactorily conveying the same.]

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## Appendix 14: Format of Financial Proposal

Date:

To,

CE/DCRTPP (Planning Section, HQ)
Haryana Power Generation Corporation Limited (HPGCL),
Ground Floor, C-7, Urja Bhawan, Sector-6,
Panchkula-134 109, Haryana

**Sub: Financial Proposal for Bid for Tender for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years *of* 10 MW Grid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar).**

Dear Sir,

I,_____,

present the Financial Proposal for the Bid for "Tender for Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years *of* 10 MW Grid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar) on EPC basis through the Tender Document No. ……..., confirming that:

i. I agree to all the terms and conditions set forth in this Tender Document. If awarded the Project, the implementation of the Project shall also conform to the terms and conditions, as well as specifications indicated in the Tender Document and as finally indicated by the Evaluation Committee.

ii. Rates quoted in this Bid is for destination prices inclusive of all taxes (unless stated otherwise), levies, duties, packing, forwarding, freight, insurance, loading, unloading, supply, installation, commissioning, and any/all charges for successful Engineering, Supply & Installation, Construction, Comprehensive Operation and Maintenance of "Project" at the Site. The break-up of taxes considered are also furnished in price bid.

iii. Rates quoted in this Bid are INCLUSIVE of taxes and duties. The statutory variation in taxes shall be admissible in accordance with the Clause no. 7.13 Taxes and duties of Tender Document. Under no circumstances shall escalation in the prices of this Tender Document be entertained.

iv. The details quoted herein stand valid for at least six months from the date of opening of the Price Bid.

## Table 14.A

**Price Quote for EPC Contract for *of* 10 MW Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar)**

| Sr. No. | Item | Unit rate/ 10 MW (without taxes & duties) | Freight and transportation | Duties (if applicable) | GST (as applicable) | Final Rate For 10 MW SPV Plant |
|---|---|---|---|---|---|---|
| | | (A) | (B) | (C) | (D) | (G)= (A+B+C+ D+E+F) |
| | | (In Rs.) | (In Rs.) | (In Rs.) | (In Rs.) | (In Rs.) |
| 1 | PV Modules | | | | | |
| 2 | Inverters | | | | | |
| 3 | Supply of Balance of System includes all equipment, materials, spares, accessories, MMS etc. excluding 1&2 above | | | | | |
| **4** | Civil work | | | | | |
| **5** | General work including erection, commissioning, testing etc. of entire plant including MMS excluding 4 above | | | | | |
| **6= (1+2+ 3+4+5 )** | Total | | | | | |
| | **"EPC Contract Price" quoted by the Bidder (in Words) (=TOTAL of Final Rate for 10 MW SPV Plant, Column (G)** | | | | | |

Note:

1. EPC cost with taxes and duties shall be considered for evaluation of bid.
2. No variation due to change in forex rate shall be admissible.
3. Payment shall be made in Indian National Rupees (INR) only. Bidder(s) has to quote their rate in INR only.
4. Arithmetical errors will be rectified on the following basis: If there is a discrepancy between words and figures, the amount written in words will prevail.

**Table 14.B**

**Price Quote for O&M Contract for 10 MW Grid-Connected Solar Photovoltaic Haryana (India)**

| Sr. No. | Head | Rate for Comprehensive O&M including all taxes (each year "O&M Contract Price") | NEEGG |
|---|---|---|---|
| | | **(In Rs.)** | **(In kWh)** |
| **1.** | Operation and Maintenance of the 10 MW Plant for **First Year.** | | |
| **2.** | Operation and Maintenance of the 10 MW Plant for **Second Year.** | | |
| **3.** | Operation and Maintenance of the 10 MW Plant for **Third Year.** | | |
| **4.** | Operation and Maintenance of the 10 MW Plant for **Fourth Year.** | | |
| **5.** | Operation and Maintenance of the 10 MW Plant for **Fifth Year.** | | |
| **6.** | Operation and Maintenance of the 10 MW Plant for **Sixth Year.** | | |
| **7.** | Operation and Maintenance of the 10 MW Plant for **Seventh Year.** | | |
| **8.** | Operation and Maintenance of the 10 MW Plant for **Eighth Year.** | | |
| **9.** | Operation and Maintenance of the 10 MW Plant for **Ninth Year.** | | |
| **10.** | Operation and Maintenance of the 10 MW Plant for **Tenth Year.** | | |
| | **TOTAL (In Figures)** | | |
| | **TOTAL Rate for Comprehensive O&M including all taxes " Total O&M Contract Price" (In Words)** | | |
| | **TOTAL NEEGG (In Words)** | | |

# All applicable taxes including service tax and any surcharge or cess thereon are included in the quoted number.

Signature:_____ Designation: _____

Name:_____

Address: _____ _____

_____ Seal of HPGCL / Organization:

_____ Phone: _____

Email: _____

**Appendix 15: Bid Evaluation Criteria (BEC)**

The Evaluated Bid Value (EBV) shall be calculated using the following parameters:

Parameters Quoted by the Bidder:

i. Quoted EPC Contract Price,
ii. Quoted Annual Net Electrical Energy Generation Guarantee (NEEGG) at the metering point of the Plant for each year during the O&M period (of 10 years),
iii. Quoted O&M Contract Price for each year during the O&M period (of 10 years),

Parameters assumed constant for evaluation of each Bidder:

iv. Discount Factor of 10.00% annually.

The Evaluated Bid Value (EBV) shall be calculated using the abovementioned parameters as follows:

| | | | |
|---|---|---|---|
| **Step 1** | | : | Quoted EPC Contract Price at the zero$^{th}$ ($0^{th}$) year |
| **Step 2** | | : | Net Present Value (NPV) of 10 years of O&M Cost quoted by the Bidder |
| **Step 3** | ADD | : | EPC Contract Price and NPV of O&M for 10 years |
| **Step 4** | | : | Summation of quoted NEEGG for 10 years |
| **Step 5** | DIVIDE | | (Sum of EPC Contract Price and NPV of each year O&M Contract Price for 10 years) by (Summation of quoted NEEGG for 10 years) i.e. *(Step3/Step4)* |

The Evaluated Bid Value (EBV) shall be the Net Present Value (NPV) as calculated above.

**Evaluated Bid Value (EBV) =**

$$\frac{\textbf{EPC Cost + NPV of each year O\&M Contract Price of 10 years}}{\textbf{∑NEEGG of 10 years}}$$

The Bidder with the lowest EBV in Rs./ kwh shall be the Successful Bidder.

**EXAMPLE:**

The following example (considering Constant Discount Factor as 10.81%) will further clarify the methodology of comparison:

Note: Figures quoted by Bidder are in **Box** .

| Figures Quoted by Bidder 1 | | | | | | Derived/ Evaluated Figures | |
|---|---|---|---|---|---|---|---|
| EPC Price | : | Rs. | **55.0** | Crore | | | |
| Year | | | NEEGG | O&M Cost | | | |
| | | | (MU) | (Rs. Cr.) | | | |
| 0 | | | NA | NA | | | |
| 1 | | | **15.99** | **0.70** | | | |
| 2 | | | **15.83** | **0.70** | | | |
| 3 | | | **15.67** | **0.70** | | | |
| 4 | | | **15.52** | **0.70** | | | |
| 5 | | | **15.36** | **0.70** | | | |
| 6 | | | **15.21** | **0.70** | | | |
| 7 | | | **15.05** | **0.70** | | | |
| 8 | | | **14.90** | **0.70** | | | |
| 9 | | | **14.75** | **0.70** | | **NPV of each year O&M Contract Price for 10 years (in Rs)** | **Rs. 4,15,55,134** |
| 10 | | | **14.61** | **0.70** | | | |
| Total | | | **152.89** | **7.00** | | **EBV (in Rs/ kWh)** | **3.8691** |

| Figures Quoted by Bidder 2 | | | | | | Derived/ Evaluated Figures | |
|---|---|---|---|---|---|---|---|
| EPC Price | : | Rs. | **58.30** | Crore | | | |
| Year | | | NEEGG | O&M Cost | | | |
| | | | (MU) | (Rs. Cr.) | | | |
| 0 | | | NA | NA | | | |
| 1 | | | **16.50** | **0.94** | | | |
| 2 | | | **16.34** | **0.94** | | | |
| 3 | | | **16.17** | **0.94** | | | |
| 4 | | | **16.01** | **0.94** | | | |
| 5 | | | **15.85** | **0.94** | | | |
| 6 | | | **15.69** | **0.94** | | | |
| 7 | | | **15.53** | **0.94** | | | |
| 8 | | | **15.38** | **0.94** | | | |
| 9 | | | **15.23** | **0.94** | | **NPV of each year O&M Contract Price for 10 years (in Rs)** | **5,58,02,608** |
| 10 | | | **15.07** | **0.94** | | | |
| Total | | | **157.77** | **9.40** | | **EBV (in Rs/ kWh)** | **4.0490** |

**Result:**

- EBV in Rs/kWh of Bidder 1 is Rs. 3.8691 per kWh.
- EBV in Rs/kWh of Bidder 2 is Rs. 4.0490 per kWh.
- EBV of Bidder 2 is higher than Bidder 1.
- Hence, Bidder 1 would be preferred as the Successful Bidder compared to Bidder 2. Bidder with lower EBV in Rs./kWh shall be L-1 and Bidder higher than that shall be the L-2 and so on.

## Appendix 16: Procedure for Performance Testing

### Part A: Solar PV power plant Net power generation

1. The Contractor shall quote the 'Net Electrical Energy Generation Guarantee" for annual basis considering the Reference Global Average Radiation indicated in this Tender.
2. The Contractor shall demonstrate "Actual Delivered Energy" at metering point as compared to the '*Base NEEGG'* for every year from the date of starting of O&M Period.
3. The quoted NEEGG as in Table no. 14 B in Appendix 14 for any year shall be permitted with maximum 1 % degradation factor in previous year generation.
4. The quoted NEEGG will be used for the calculating CUF.
5. The Bidder shall clearly mention the technology used i.e. fixed/tilt or seasonal tracker (please specify) as per Table given in Appendix 6.

**Operational Acceptance Test Procedure**

**Performance Ratio (PR) - Test Procedure**

1. Performance Ratio as determined through the PR Test Procedure specified here should not be less than 0.75 for Operational Acceptance Test.
2. The Performance Ratio Test to prove the guaranteed performance parameters of the power plant shall be conducted at site by the Contractor in presence of the Company. The Contractor's Engineer shall make the plant ready to conduct such tests. The Operational Acceptance Test shall be commenced, within a period of one (1) month after successful Commissioning and, there will be continuous monitoring of the performance for 30 days. 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. This monitoring will be performed on the site under the supervision of the Company/ Company's engineer.

3. The test will consist of guaranteeing the correct operation of the plant over 30 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.

4. PR shall be demonstrated against the installed DC Capacity.

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

**Performance Ratio (PR)** = **YA / YR**

Where;

$Y_A$ = Final (actual measured) PV system yield in kilo-watt hours at the point of measurement during the testing period, and

$Y_R$ = Reference yield calculated as the product of the insolation on the plane of the collector (i.e. PV modules) in kWh/ $m^2$ during the testing period and the installed DC capacity of the plant in kW.

**Monitoring System for PR Verification**

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

- Power Meter at the delivery point.
- Power Meter for each inverter for reference only.
- One nos. calibrated pyranometer to determine irradiance on the plane of array (with a target measurement uncertainty of ± 2).
- One nos. calibrated pyranometer to determine irradiance on horizontal plane (with a target measurement uncertainty of ± 2)
- Two nos. thermocouples to measure module temperature with a measurement uncertainty of ±1 °C.
- Shielded ventilated thermocouple with a measurement accuracy of ±1°C.
- 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 employer and the contractor jointly for the said period.
- The Contractor shall show the specified PR for Operational Acceptance.

**Part C: The procedure for Performance Guarantee Test (PGT) - cum- Final Acceptance Test- shall be as follows:**

1. A weather station with a calibrated pyranometer shall be installed by the Contractor at the location mutually agreed by the Contractor and HPGCL. The test report for the calibration shall be submitted by the Contractor for approval by HPGCL. The calibration should be traceable to a national/international laboratory. The output of this pyranometer for shall be logged in the SCADA system.
2. In case the pyranometer is found to be working erratically then immediately the Contractor shall take necessary steps to rectify and/or recalibrate the instrument to the satisfaction of HPGCL. However, for the dispute period for which such error has occurred and until the instrument is recalibrated to the satisfaction of HPGCL, data from any one of the following list of sources as decided by HPGCL will be used:
    i. A separate pyranometer installed by the Company near the site, if available
    ii. Average of two closest solar power projects, as identified by HPGCL
    iii. Nearest MNRE weather station
3. "Actual Delivered Energy" from the plant supplied by the Contractor shall be noted for every month and summed up for entire year. For this purpose, the net delivered energy at the metering point shall be taken into account.
4. The measured value of energy at step (3) shall be compared with '*Base NEEGG'* and hence with 'B*ase CUF'* value. *"Base NEEGG/ CUF"* for a month is calculated by using the NEEGG quoted in the offer by the Contractor adjusted with a correction factor to take into account the

actual average global solar radiation measured by the calibrated pyranometer for that year.

5. Further, if the plant is not able to achieve the calculated *Base NEEGG*/*CUF* during PGT and O&M period and there is a shortfall in energy generation, then the Contractor shall be penalized as per relevant Clause of the Tender.
6. The Contractor shall share with HPGCL all the radiation, generation, etc. parameters details and all other factors necessary for HPGCL to corroborate the estimate. HPGCL has the right to cross verify data submitted by the Contractor by all possible means/sources.

**Following factors may be noted for computing the Base NEEGG/ CUF:**

7. Effect due to variation in annual insolation shall only be considered for computing the Base NEEGG/ CUF.
8. Effect due to variation of meteorological parameters e.g. ambient temperature, wind speed, humidity etc. shall not be considered.
9. **Generation loss due to grid outage (or power evacuation system which is not in the scope of the Contractor**): The measured global solar radiation of the period of the outage of the power evacuation system shall be excluded to calculate average global solar radiation for the period of PGT and O&M.

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## Appendix 17: List of Banks (for Bank Guarantee)

Bank Guarantee from the following Banks will be acceptable.

1. All Scheduled Nationalized Bank
2. The Bank Guarantee submitted should have the clear one time validity in all respect and up to the completion period. If by any reason the contract period is extended, bidder shall undertake to renew the Bank Guarantee at least one month before the expiry of the validity failing which HPGCL will be at liberty to encash the same.

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**Appendix 18(A): Format of EMD in the shape of Bank Guarantee**

*[To be on non-judicial stamp paper of Rupees One Hundred Only (INR 100/-) or appropriate value as per Stamp Act relevant to place of execution, duly signed on each page. The EMD for individual project shall be submitted]*

Ref.: _____ Bank Guarantee No.: _____

Date: _____

To,

CE/DCRTPP (Planning Section, HQ)

Haryana Power Generation Corporation Limited,

C-7, Urja Bhawan, Sector-6,

Panchkula-134 109, Haryana

**BANK GUARANTEE FOR EARNEST AMOUNT DEPOSIT**

WHEREAS Haryana Power Generation Corporation Limited, a Company incorporated under the Companies Act, 1956, having its Registered Office at Panchkula, Haryana (India) (Hereinafter referred to as the "Company" which expression shall unless repugnant to the context include its successors, executors, administrators, legal representatives and assigns) is setting-up 10 MW Solar Photovoltaic Grid-connected Power Plant at Chandpur, Faridabad, **Haryana (India)** (Hereinafter referred to as "Project").

WHEREAS the Company has placed a Letter of Intent No…dated …….. as also a Contract dated…….. (hereinafter called the CONTRACT) on; M/s …… registered in India under the Companies Act, 1956, having its Registered Office …… …… (Hereinafter referred to as the "Contractor") for setting up of the said Project on the terms, specifications and conditions specified therein for **Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years of** 10 MW Solar Photovoltaic Grid-connected Power Plant**,** which shall include any amendments/alterations made in the Tender Document thereto before the date of submission of the Tender by the Company, which has been unequivocally accepted by (the "Contractor"), include its successors and assignees vide Tender e-NIT no. **23/CE/PLG/SPP-335 Dated: 17.02.2021** [hereinafter called "the Tender"] which expression shall include any amendments / alterations to the Tender by the company for execution of services for the company and the company having agreed to accept Bank Guarantee towards Earnest money deposit for the same amount i.e. Rs……/- (Rupees ……. only) for the fulfillment and the performance of the said tender in terms thereof.

This Bank Guarantee by the Tenderer will be forfeited as per Tender Documents if

i) After opening the tender, the tenderer revokes his tender within the validity period or increases his earlier quoted rates.

ii) The tenderer does not commence the work within the period as per Letter Of Intent (LOI) / Contract. In case the LOI / contract is silent in this regard then within 15 days after award of contract.

Earnest Money i.e Bank Guarantee in this case is to be submitted by the tenderer to ensure that the tenderer does not refuse to execute the work after it is awarded to him by the company and the company has every right to encash the Bank Guarantee and the tenderer has to forfeit the same.

Bank Guarantee shall not carry any interest.

1. We, ……. (Bank), having office at address…….....……
[hereinafter referred to as "The Bank"] which expression shall unless repugnant to the context or contrary to the meaning thereof, include its successors and assignees, at the request and on behalf of the tenderer hereby agree to pay to the company without any demur on first demand an amount not exceeding Rs……../- [Rupees …….. only] against any loss or

damage, costs charges and expenses caused to or suffered by the company by reason of non performance and non fulfillment or for any breach on the part of the Tenderer of any of the terms and conditions of the said tender.

2. We, ……(Bank), further agree that the company shall be the sole judge whether the said tenderer has failed to perform or fulfill the said tender in terms thereof or committed breach of any of the terms and conditions of the tender and the extent of loss, damage, costs, charges and expenses suffered or incurred or would be suffered or would be incurred by the company on account thereof.
3. We, ……(Bank), further agree that the amount demanded by the company as such shall be final and binding on the Bank and the Bank undertake to pay to the company the amount so demanded on first demand and without any demur notwithstanding any dispute raised by the tenderer or any suit or other legal proceedings including arbitration pending before any Court, Tribunal or Arbitrator relating thereto and the Bank's liability under this guarantee being absolute and unconditional.
4. We, …….…… (Bank), further agree with the company that the company shall have the fullest liberty without our consent and without affecting in any manner the Bank's obligations hereunder to vary any of the terms and conditions of the said tender or extend time for the performance by the tenderer from time to time or to postpone for any time any of the powers exercisable by the company against the tenderer and to forbear to enforce any of the terms and conditions relating to the Tender and the Bank shall not be relieved from its liability by reason of any such variation or extension being granted to the tenderer or for any forbearance, act or omission on the part of the company or any indulgence by the company to the tenderer or by any such matter or things whatsoever which under the law related to sureties would but for this provision have the effect of relieving the Bank.
5. We, ……(Bank), further undertake not to revoke this guarantee during its currency except with the previous consent of the company in writing.
6. This guarantee shall not be affected by any changes in the constitution of the tenderer or the Bank or the company and shall remain in full force and effect until the liabilities of the Bank are discharged by the company.

Not withstanding anything to the contrary:

1. Our liability under this Bank Guarantee shall not exceed Rs. ……../- [Rupees ……. only]

2. This Bank Guarantee shall be valid upto date ……..

3. The Bank is liable to pay the guarantee amount or any part thereof under this Bank Guarantee only and only if the company serve upto the Bank written claim or demand on or before date ……

IN WITNESS WHEREOF we have set our hands and seal hereunder at this……

day of

…… at .....

For,_____Bank,

Signature:_____

Name: _____

Designation:_____

Address: _____

_____

Power of Attorney No._____

_____

Banker's Stamp and Full address

**Appendix 18 (B): Format of Performance Bank Guarantee**

*[To be on non-judicial stamp paper of Rupees One Hundred Only (INR 100/-) or appropriate value as per Stamp Act relevant to place of execution, duly signed on each page.]*

Ref.: _____ Bank Guarantee No.: _____

Date: _____

To,

CE/DCRTPP (Planning Section, HQ)
Haryana Power Generation Corporation Limited,
C-7, Urja Bhawan, Sector-6,
Panchkula-134 109, Haryana

**PERFORMANCE BANK GUARANTEE FOR CONTRACT PERFORMANCE**

WHEREAS Haryana Power Generation Corporation Limited, a Company incorporated under the Companies Act, 1956, having its Registered Office at Panchkula, Haryana (India) (Hereinafter referred to as the "Company" which expression shall unless repugnant to the context include its successors, executors, administrators, legal representatives and assigns) is **setting-up 10 MW Grid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar)** (Hereinafter referred to as "Project").

WHEREAS the Company has placed a Letter of Intent No…dated …….. as also a Contract dated…….. (hereinafter called the CONTRACT) on; M/s …… registered in India under the Companies Act, 1956, having its Registered Office …… …… (Hereinafter referred to as the "Contractor") for setting up of the said Project on the terms, specifications and conditions specified therein for **Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years of 10 MW, Grid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar)** which shall include any amendments/alterations made in the Tender Document thereto before the date of submission of the Tender by the Company, which has been unequivocally accepted by (the "Contractor").

AND WHEREAS in conformity with the provisions of Clause No..... of the said CONTRACT, the "Contractor" has agreed to· furnish an unconditional Bank Guarantee for an amount equivalent to 10% of the EPC Contract Price i.e. Rs……..……..... for the timely completion and faithful execution of the Contract and successful completion of the Performance Guarantee Tests of plant equipment to demonstrate the guaranteed values.

AND WHEREAS the Company has agreed to accept a Bank Guarantee for Rs ..... from …… Bank having its Head Office at ……
Through its Branch……. (hereinafter referred to as the "Bank" which expression shall

unless repugnant to the context include its successors and permitted assigns).

In consideration of the above, the “Bank” hereby unconditionally and irrevocably guarantees and undertakes as a direct responsibility, to pay to the Company merely on demand any amount not exceeding Rs. …… without any demure, reservation, recourse, contest or protest and *I* or without reference to the “Contractor”.

Any such demand made by the “Company” on the “Bank” shall be conclusive and binding notwithstanding any difference between Company and the Contractor or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. The bank undertakes not to revoke this guarantee herein contained and shall continue to be enforceable till the Company discharge this guarantee.

The decision of the Company as to whether the “Contractor” has fulfilled its obligation or not under the CONTRACT shall be final and binding on the “Bank” and the “Contractor”.

The Company shall have the fullest liberty without affecting in any way the liability of “the Bank” under this guarantee from time to time to extend the time for performance of the Contract by the “Contractor”. The Company shall have the fullest liberty without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the “Contractor”, and to exercise the same at any time in any manner, and either to enforce or to forebear to enforce any covenants contained or implied in the Contract between the Company and “the Contractor” or any other course of remedy or security available to the Company. The Bank shall not be released of its obligations under these presents by any exercise by the Company of its liberty with reference to matters aforesaid or any of them or by reason of any other act or' forbearance to other acts of omission or commission on the part of the Company of any other indulgence shown by the Company or by any other matter or thing whatsoever which under the law would, but for this provision, have the effect of relieving the Bank.

The Bank also agrees that the Company at its opinion shall be entitled to enforce this guarantee against the Bank as a principle debtor, in the first instance without proceeding against “the Contractor”, and notwithstanding any security or other guarantee that the Company may have in relation to “the Contractor's” liabilities.

This Guarantee shall be valid for a period of …… Refer NIT) months from ..... i.e. upto ..... The Guarantee herein contained shall be a continuing Guarantee and shall not be affected by any change in the constitution of the “Bank” or of the “Contractor”. This Guarantee shall be in addition to and shall not affect or be affected by any other security now or hereafter held by the Company and Company at its discretion and without any further consent from the Bank and without affecting the liability of the “Bank” and other indulgence to or make other arrangements with the Contractor and nothing done or omitted to be done by the Company in pursuance of any authority contained in this guarantee shall affect or discharge the liability of the Bank.

However, it has been agreed between the Contractor and the Company that there shall be only one composite Bank Guarantee for Performance Guarantee valid for a period of twenty four (24) months from the date of issue of Letter of Intent (LOI) or timeline referred in of *NIT, Table B* whichever is later, as per the terms of the referred Tender Document.

NOTWITHSTANDING anything herein before above contained, the liability of the Bank under this Guarantee shall be restricted to Rs..... *<10% of the EPC Contract Price>* and the Guarantee shall remain in force up to and including

_____.

This Bank Guarantee shall be revalidated automatically till the Contract Performance Guarantee is extended.

Bank undertakes not to revoke this guarantee during its currency except with the previous expressed consent of the Company in writing and agrees that any change in the constitution of the Bank or the Contractor shall not discharge our liability hereunder.

IN WITNESS WHEREOF we have set our hands and seal here under at this……
day of…… at .....

For,_____Bank,

Signature:_____
Name: _____

Designation:_____

Address: _____

_____

Power of Attorney No._____

_____

Banker's Stamp and Full address

Dated this_____day of_____, 20xx

## Appendix 19: Format of O&M Bank Guarantee

[To be on non-judicial stamp paper of Rupees One Hundred Only (INR 100/-) or appropriate value as per Stamp Act relevant to place of execution, duly signed on each page.]

Ref: _____ Bank Guarantee No.:_____

Date:_____

To,

CE/DCRTPP (Planning Section, HQ)
Haryana Power Generation Corporation Limited (HPGCL), Ground Floor, C-7,
Urja Bhawan, Sector-6,
Panchkula-134 109, Haryana

**O&M BANK GUARANTEE FOR CONTRACT PERFORMANCE**

WHEREAS Haryana Power Generation Corporation Limited, a Company incorporated under the Companies Act, 1956, having its Registered Office at Panchkula, Haryana (India) (Hereinafter referred to as the "Company" which expression shall unless repugnant to the context include its successors, executors, administrators, legal representatives and assigns) is **setting-up of 10 MW Grid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar)** (Hereinafter referred to as "Project").

WHEREAS the Company has placed a Letter of Intent No… .....dated …….. as also a Contract dated…….. (hereinafter called the CONTRACT) on; M/s …… registered in India under the Companies Act, 1956, having its Registered Office (Hereinafter

referred to as the "Contractor") for setting up of the said Project on the terms, specifications and conditions specified therein for **Design, Engineering, Procurement & Supply, Construction, Commissioning And Comprehensive Operation & Maintenance For Five (5) Years Extendable for Another Five (5) Years of 10 MW Grid-Connected Solar Photovoltaic Power Plant at Village Dhandlan (Jhajjar),** which shall include any amendments/alterations made in the Tender Document thereto before the date of submission of the Tender by the Company, which has been unequivocally accepted by (the "Contractor").

AND WHEREAS in conformity with the provisions of Clause No. ----------of the said CONTRACT, the "Contractor" has agreed to· furnish an unconditional Bank Guarantee for an amount equivalent to 10% of the EPC Contract Price i.e. Rs…….…….... against any loss or damage, costs, charges and expenses caused to or suffered by Company by reason of non-performance and fulfilment or for any breach on the part of the Contractor of any of the terms and conditions of the referred Tender Document/Contract Agreement.

We,_____Bank, further agree that the Company shall be the sole judge whether the

said Contractor has failed to perform or fulfil the O&M scope of work and the extent of loss, damage, cost, charges and expenses suffered or incurred or would be suffered or incurred by the Company on account thereof and we waive in favour of the Company all the rights and defences to which we as Guarantors and/or the Contractor may be entitled to.

AND WHEREAS the Company has agreed to accept a Bank Guarantee for Rs ..... from …… Bank having its Head Office at ……
Through its Branch……. (hereinafter referred to as the “Bank" which expression shall unless repugnant to the context include its successors and permitted assigns).

In consideration of the above, the “Bank” hereby unconditionally and irrevocably guarantees and undertakes as a direct responsibility, to pay to the Company merely on demand any amount not exceeding Rs. …… without any demure, reservation, recourse, contest or protest and *I* or without reference to the “Contractor”.

Any such demand made by the “Company” on the “Bank” shall be conclusive and binding notwithstanding any difference between Company and the Contractor or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. The bank undertakes not to revoke this guarantee herein contained and shall continue to be enforceable till the Company discharge this guarantee.

The decision of the Company as to whether the “Contractor” has fulfilled its obligation or not under the CONTRACT shall be final and binding on the “Bank” and the “Contractor”.

The Company shall have the fullest liberty without affecting in any way the liability of “the Bank” under this guarantee from time to time to extend the time for performance of the Contract by the “Contractor”. The Company shall have the fullest liberty without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the “Contractor”, and to exercise the same at any time in any manner, and either to enforce or to forebear to enforce any covenants contained or implied in the Contract between the Company and “the Contractor” or any other course of remedy or security available to the Company. The Bank shall not be released of its obligations under these presents by any exercise by the Company of its liberty with reference to matters aforesaid or any of them or by reason of any other act or' forbearance to other acts of omission or commission on the part of the Company of any other indulgence shown by the Company or by any other matter or thing whatsoever which under the law would, but for this provision, have the effect of relieving the Bank.

The Bank also agrees that the Company at its opinion shall be entitled to enforce this guarantee against the Bank as a principle debtor, in the first instance without proceeding against “the Contractor”, and notwithstanding any security or other guarantee that the Company may have in relation to “the Contractor's” liabilities.

This Guarantee shall be valid for a period of …… {*Refer NIT*} days from ..... [*the date of both A) Completion of Facilities and B) Successful Operational Acceptance Test, whichever is later*,] i.e. upto ..... .The Guarantee herein contained shall be a continuing Guarantee and shall not be affected by any change in the constitution of the “Bank” or

of the “Contractor”. This Guarantee shall be in addition to and shall not affect or be affected by any other security now or hereafter held by the Company and the Company at its discretion and without any further consent from the Bank and without affecting the liability of the “Bank” and other indulgence to or make other arrangements with the Contractor and nothing done or omitted to be done by the Company in pursuance of any authority contained in this guarantee shall affect or discharge the liability of the Bank.

NOTWITHSTANDING anything herein before above contained, the liability of the Bank under this Guarantee shall be restricted to Rs..... *<10% of the EPC Contract Price>* and the Guarantee shall remain in force up to and including _____. [*One year plus **45 days** from the date of both A) Completion of Facilities and B) Successful Operational Acceptance Test, whichever is later*],

This Bank Guarantee shall be revalidated automatically till the Operational & Maintenance Period is over.

Bank undertakes not to revoke this guarantee during its currency except with the previous expressed consent of the Company in writing and agrees that any change in the constitution of the Bank or the Contractor shall not discharge our liability hereunder.

IN WITNESS WHEREOF we have set our hands and seal hereunder at this……
day of…… At .....

For,_____Bank,

Signature:_____

Name:_____

Designation:_____

Address: _____

_____

Power of Attorney No._____

_____

Banker’s Stamp and Full address

## Appendix 20: Format of Agreement between HPGCL and the Contractor

This agreement is made at Panchkula the ----------day of ----------in the Christian year Two thousand -------- 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 the Haryana Power Generation Corporation Ltd. having their Head Office at C-7, Urja Bhawan, Sector-6, Panchkula (hereinafter called "HPGCL" which expression shall unless excluded by or repugnant to the context include its successors or assigns) of the other part.

WHEREAS the aforesaid HPGCL has accepted the Tender of the aforesaid contractors for ---------- as per HPGCL's Order No.---------- hereinafter called "**the Works**" and more particularly described enumerated or referred to in the specification, terms and conditions prescribed in the Order letter, covering letter and other letters and schedule of price which for the purpose of identification have been signed by Shri ----------on behalf of the Contractors and by on behalf of HPGCL 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 HPGCL has accepted the Tender of the contractors for the construction of the said works for the sum of Rs ---------- (Rupees:----------) upon the terms and subject to the conditions herein mentioned.

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

(a) The Contractors shall do and perform all works and things in this Contract mentioned and described or which are implied therein or there from 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, HPGCL both hereby covenant with the contractor to pay all the sums of money as and when they become due and payable to the contractors under the provisions of the contract. Such payments to be made at such times and in such manner as are 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 HPGCL 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 HPGCL's Order 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. Important Dates and Amounts
2. Instructions to Bidders;
3. Submission of Bid;
4. Scope of Work;
5. General Conditions of Contract;
6. Special Conditions of Contract;
7. Appendices referred to in this Tender Document (“the Tender”);
8. Any amendments, notices and documents issued by HPGCL in relation to this Bid Document/this Contract.
9. ……..
10. ……

## Annexure 1: Details of Plant Location and Site Analysis

### A. Project Site at Village Dhandlan, Jhajjar

10 MW Solar Photovoltaic Grid Connected Power Plant using PV technology at village Dhandlan, block-Beri, district-Jhajjar in the State of Haryana.

The 10 MW grid-connected solar PV Project is to be developed on the Panchayat land. The proposed land is in shamilat deh measuring 45 Acre 5 Canal 7 Marla measuring Khasra No. 86//2/2(7-0), 3(8-0), 4(8-0), 5(7-12), 79//2/2(7-0), 3(8-0), 4(8-0), 5/1(5-8), 5/2(2-4), 6/1(7-12), 7(8-0), 8(8-0), 9/1(7-0), 8(8-0),9/1(7-0), 12/2(7-0), 79//13(8-0), 14(8-0) 15(7-12), 16(7-12), 17(8-0), 18(8-0), 19/1(7-0), 22/2(7-0), 23(8-0), 24(8-0), 25(7-1), 65//2/2(7-0), 3(8-0), 4(8-0), 5(7-12), 6(7-12), 7(8-0), 8(8-0), 9/1(7-0), 12/2(7-0), 13(8-0), 14(8-0), 65//15(7-12), 16(7-12), 17(8-0),18(8-0), 9/1(7-0) 22/2(6-8), 23(7-7), 24(7-7), 25(6-19), 39//22/2(7-0), 23(8-0), 24(8-0), 25(8-0) at Village Dhandlan, Block-Beri, District-Jhajjar, State-Haryana.

--- End of Section ---

## Annexure 2: Soil Investigation Report

The soil test is to be got done by the bidders at their own cost. HPGCL shall not have any responsibility in this regard. Bidder/ Contractor is advised to and is solely responsible to carry out detailed Geotechnical investigation to ascertain soil parameters of the proposed site for the planning / designing / construction / providing guarantee / warranty of all civil work including but not limited to foundations / piling for module mounting structures, HT lines, 33/66 kV switchgear equipment etc.

--- End of Section ---

## Annexure 3: Water Test Report

The water test is to be got done by the bidders at their own cost. HPGCL shall not have any responsibility in this regard. Bidder/ Contractor is advised to and is solely responsible to carry out detailed investigation to ascertain water parameters of the proposed site for the planning / designing / construction / providing guarantee / warranty of all civil work including but not limited to foundations / piling for module mounting structures, HT lines, 33 kV/66kV switchgear equipment etc.

--- End of Section ---

**Disclaimer**

i. The information contained in this Tender or amendments, annexure or attachments subsequently provided to Bidders, in documentary or in any other form, by or on behalf of HPGCL, any of their employees, consultants or advisors, is provided to Bidders on the terms and conditions set out in this Tender and such other terms and conditions subject to which such information is provided.

ii. This Tender is not an agreement and is neither an offer nor invitation by HPGCL to the prospective Bidders or any other person. The purpose of this Tender is to provide interested parties with information that may be useful to them in the formulation of their Bid for qualification pursuant to this Tender. This Tender includes statements, which reflect various assumptions and assessments arrived at by HPGCL or their employees or consultants or agents, in relation to the Project. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require. This Tender may not be appropriate for all persons, and it is not possible for HPGCL, their employees or consultants to consider the investment objectives, financial situation and particular needs of each party who reads or uses this Tender.

iii. The assumptions, assessments, statements and information contained in this Tender may not be complete, accurate, adequate or correct. Each Bidder should therefore conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements and information contained in this Tender and obtain independent advice from appropriate sources.

iv. Information provided in this Tender to the Bidders is on a wide range of matters, some of which depends upon interpretation of law. The information given may not be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. HPGCL would not bear any responsibility for the accuracy or otherwise for any interpretation or opinion on law expressed herein.

v. HPGCL, its employees and consultants make no representation or warranty and shall have no liability to any person, including any Bidder or Bidders, under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this Bid or otherwise, including the accuracy, adequacy, correctness, completeness or reliability of this Tender and any assessment, assumption, statement or information contained therein or deemed to form part of this Tender or arising in any way with prequalification of Bidders for participation in the Bidding process.

vi. HPGCL also accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused arising from reliance of any Bidder upon the statements contained in this Tender. HPGCL may, in their respective absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumptions contained in this Tender.

vii. The issuance of this Tender does not imply that HPGCL is bound to select and shortlist prequalified Bids or to appoint the selected Bidder, as the case may be, for the Project and

HPGCL reserves the right to reject all or any of the Bid or Bids without assigning any reasons whatsoever.

viii. The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Bid including but not limited to preparation, copying, postage, delivery fees, estimation, travel, expenses associated with any demonstrations or presentations which may be required by HPGCL or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Bidder and HPGCL shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of the Bid regardless of the conduct or outcome of the Bidding process.

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