TENDER FOR ENGINEERING, PROCUREMENT, CONSTRUCTION, OPERATION AND MAINTENANCE OF 20 MW GRID-CONNECTED SOLAR PHOTOVOLTAIC POWER PLANT AT VILLAGE: RENGALI, DISTRICT ANGUL, STATE: ODISHA

TENDER DOCUMENT:

Ref. No. GEDCOL/ 05
28 April, 2014

Issued by:
Green Energy Development Corporation of Odisha Limited (GEDCOL)

OHPC Corporate Office, OSPH&W Corporation Building
Janpath, Bhoinagar, Bhubaneswar-751022, Odisha

Ph: 0674-2542922
Fax: 0674-2542102
Email: info@gedcol.com
Web: www.gedcol.com
NOTICE INVITING TENDER (NIT)


Ref: GEDCOL/ 05 dated 28 April, 2014.

Green Energy Development Corporation Limited (GEDCOL) invites interested parties to participate in this Tender (this “Tender”) for bidding and selection process for the appointment of Contractor for Engineering, Procurement, Construction, Operation and Maintenance of the 20 MW Grid-Connected Solar Photovoltaic Power Plant at Village: Rengali, District: Angul in the State of Odisha (the “Project”).

This Tender may be downloaded from GEDCOL website: www.gedcol.com. Tender fee and Earnest Money Deposit (EMD) shall be paid along with submission of the Bid Documents. All the relevant Bid Documents shall be submitted physically by Registered Post A.D., Speed Post or Courier such that they are received at the OHPC Corporate Office before the deadline stipulated in this Tender.

The Bidder shall completely understand and strictly comply with all the instructions, terms, conditions and provisions stipulated in this Tender in order to be considered for this Tender as no deviations shall be allowed. The Bidder shall ensure a timely submission of the Bid with appropriate labelling as indicated in this Tender. Only the Bidders complying with all the instructions, terms, conditions and provisions including but not limited to the Eligibility Criteria on this Tender shall be considered for opening of their Financial Bid.

A Pre-Bid Meeting shall also be held at the OHPC Corporate Office or an alternate location in Bhubaneswar to clarify any doubts or amend the Tender if deemed necessary by GEDCOL. All Bidders should send in their queries by the time and as per the format indicated in this
Tender to be considered for the Pre-Bid Meeting. Any amendments and annexure/attachments to this Tender shall be considered as a part of the Tender itself, and all provisions of the original Tender shall be applicable to such amendments and annexure/attachments.

All queries as well as Bids shall be addressed to:

The Dy. General Manager (EL)
Green Energy Development Corporation of Odisha Limited
OHPC Corporate Office, OSPH&W Corporation Building
Janpath, Bhoinagar, Bhubaneswar-751 022, Odisha

GEDCOL reserve the rights to accept or reject any or all Bids without assigning any reasons thereof. Kindly visit GEDCOL’s website on a regular basis in order to be updated with the latest status of the Tender. We look forward to executing a successful Project with your kind cooperation. Thanking you,

For and on behalf of GEDCOL

Sd/-
Dy. General Manager (EL)
(C&P Head, GEDCOL)

--- End of Section ---
Disclaimer

i. The information contained in this Tender (the “Tender”) or amendments, annexure or attachments subsequently provided to Bidders, in documentary or in any other form, by or on behalf of GEDCOL, 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 GEDCOL 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 GEDCOL 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 GEDCOL, 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. GEDCOL would not bear any responsibility for the accuracy or otherwise for any interpretation or opinion on law expressed herein.

v. GEDCOL, 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. GEDCOL 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. GEDCOL 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 GEDCOL is bound to select and shortlist prequalified Bids or to appoint the selected Bidder, as the case may be, for the Project and GEDCOL 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 the GEDCOL or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Bidder and the GEDCOL 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.

--- End of Section ---
### Document Checklist

[Note: Document Checklist shall be attached with Appendix 1: Format for Covering Letter.]

<table>
<thead>
<tr>
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<th>Document</th>
<th>Complied/ Attached?</th>
<th>For Official Use</th>
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<tr>
<td>1.</td>
<td>Complete sets of Bids (original and copies) as prescribed in Section 4.3.</td>
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<td>2.</td>
<td>Signed Tender Document(s) in Cover-I.</td>
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<td>3.</td>
<td>Tender Fees in the form of Demand Draft in Cover-III.</td>
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<td>4.</td>
<td>EMD in the form of Demand Draft and/ or Bank Guarantee as per format prescribed in Appendix 17: Format of Earnest Money Deposit in Cover-III.</td>
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<td>5.</td>
<td>Enclosures of the Bid including the Covering Letter as per the format prescribed in Appendix 1: Format for Covering Letter in Cover-II.</td>
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<td>6.</td>
<td>Details of the Bidder as per format prescribed in Appendix 2: Format of Details of Bidder.</td>
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<td>Attested copy of Service Tax Registration Certificate of Bidder.</td>
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<td>Attested copy of PAN Card for Bidder.</td>
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<td>Attested copy of Provident Fund Code of Bidder.</td>
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<td>11.</td>
<td>Details of similar technical experience of the Bidder as per format prescribed in Appendix 3: Format of Details of Similar Technical Experience.</td>
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<td>12.</td>
<td>Details of qualified technical staff as per format prescribed in Appendix 4: Format of Details of Qualified Technical Staff.</td>
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<td>13.</td>
<td>Curriculum Vitae of all qualified technical staff indicated in Appendix 4: Format of Details of Qualified Technical Staff.</td>
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<td>14.</td>
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<td>15.</td>
<td>Technical specifications and warranty document of PV modules</td>
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<td>16.</td>
<td>Technical specifications and warranty document of inverter</td>
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</table>
17. Project execution plan as mentioned in Appendix 6: Format of Project Execution Plan.

18. Declaration of Compliance as per format prescribed in Appendix 7: Format of Declaration of Compliance.

19. No Deviation Certificate as per format prescribed in Appendix 8: Format of No Deviation Certificate.

20. Declaration of Bidder's relation to Directors of the Company as per format prescribed in Appendix 9: Format of Declaration on Bidder's Relation to Directors.


22. Format of Summary of audited financial statements as per format prescribed in Appendix 11: Format of summary of Audited Financial Statements.


24. (If applicable) Authorization of use of financial capability by Parent as per format prescribed in Appendix 12: Format of Authorization by Parent Company with the necessary financial statements and summary required from the Bidder.

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--- End of Section ---
1. Definitions, Interpretation, Important Dates and Amounts

1.1. Definitions

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

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

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


1.1.5. “Bidder” shall mean Bidding Company. Any reference to the Bidder includes Bidding Company including its successors, executors and permitted assigns severally, as the context may require;

1.1.6. “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.

1.1.7. “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.

1.1.8. “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 the Company and necessary certificates are issued by the all concerned/ nodal agencies appointed by SECI/ Government.

1.1.9. “Completion” 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.

1.1.10. “Company” means Green Energy Development Corporation of Odisha Limited (GEDCOL) and includes the legal successors or permitted assigns.

1.1.11. “Contract” or “Contract Agreement” means the Contract signed between the Company and the Contractor to execute the entire Scope of Work as given in Appendix 21: Format of Agreement between the GEDCOL and the Contractor.


1.1.13. “Contractor” means the Successful Bidder signing the Contract with and acceptable by the Company and is named as such the Contract Agreement, and includes the legal successors or permitted assigns of the Contractor.

1.1.14. “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.

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

1.1.16. “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 (Defect Liability) hereof.
1.1.17. “Effective Date” for this Contract shall mean the date of issuance of Letter of Intent by the Company.

1.1.18. “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).


1.1.20. “Government Authority” means Government of India, any state government or any governmental department, commission, board, body, bureau, agency, authority, undertaking, court or other judicial 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.

1.1.21. “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.

1.1.22. “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 Company’s personnel etc.

1.1.23. “JNNSM” means the Jawaharlal Nehru National Solar Mission.

1.1.24. “Month” means calendar month of the Gregorian calendar.


1.1.27. “Owner(s)” means Green Energy Development Corporation of Odisha Limited (GEDCOL) and includes the legal successors or permitted assigns.

1.1.28. “Party” or “Parties” means individually any one of the Bidder, Contractor or Company; or collectively any or all of the Bidder, Contractor or Company; respectively.

1.1.29. “Plant” means the 20 MW Grid-Connected Solar Photovoltaic Power Plant proposed at at Village: Rengali, District Angul, State: Odisha as per the provisions in this Tender.

1.1.30. “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 and thin film 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 SECI for JNNSM Phase 2 Batch 1 as well as the requirements stipulated by the Company.

1.1.31. “Project” means the 20 MW Grid-Connected Solar Photovoltaic Power Plant proposed at at Village: Rengali, District Angul, State: Odisha as per the provisions in this Tender including but not limited to its engineering, procurement, construction, operation and maintenance.

1.1.32. “Project Manager” means the person appointed by the Company in the manner provided in the RFP (Project Manager) hereof and named to perform the duties delegated by the Company.

1.1.33. “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.

1.1.34. “RFP” or “RFP Document(s)” shall mean this “Tender for Engineering, Procurement, Construction, Operation and Maintenance of 20 MW Grid-Connected Solar Photovoltaic Power Plant at Village: Rengali, District Angul, State: Odisha,” Ref. No. GEDCOL/ 05 dated 28 April, 2014 issued by GEDCOL including its amendments, annexure and attachments as added or modified by the Company as per the provisions in this Tender.

1.1.35. “Scheme” means the rules and regulations set under the First Batch of the Second Phase of the Jawaharlal Nehru National Solar Mission (JNNSM).

1.1.36. “SECI” means Solar Energy Corporation of India.

1.1.37. “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.

1.1.38. “Solar Power System(s)” means the solar photovoltaic grid interactive power system(s) to be established at the site specified in the RFP.

1.1.39. “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.

1.1.40. “Successful Bidder” means the Bidder who is financially and technically eligible and qualified, and evaluated as the Highest Evaluated Bidder as per the provisions in this Tender.

1.1.41. “Tender” or “Tender Document(s)” shall mean this “Tender for Engineering, Procurement, Construction, Operation and Maintenance of 20 MW Grid-Connected Solar Photovoltaic Power Plant at Village: Rengali, District Angul, State: Odisha,” Ref. No. GEDCOL/ 05 dated 28 April, 2014 issued by GEDCOL including its annexures, appendices, attachments, amendments and any other documents as added or modified
by the Company as per the provisions in this Tender.

1.1.42. “Time for Completion” shall be the date on or before which Commissioning of the Facility has to be achieved to the satisfaction of the Company and such date is specified in Instruction to Bidders and Clause No. 1.3.11.

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, Annexures 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 the Company 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 the Company 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 the Company.

b. Not in any case the sub-contractor shall claim or shall put any binding to the Company and the sub-contractor must be handled by the Contractor and the Company 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 Clause 1.2.12 (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/ SECI guidelines in accordance to the relevant provisions of JNNSM Phase 2 Batch 1.

1.3. Important Dates

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Event</th>
<th>Date (and Time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3.1</td>
<td>Date of floating of this Tender</td>
<td>Friday, 28 April, 2014</td>
</tr>
<tr>
<td>1.3.2</td>
<td>Last date and time for receipt of questions/queries/clarifications</td>
<td>Friday, 2 May 2014 at 1600 Hrs</td>
</tr>
<tr>
<td>1.3.3</td>
<td>Site visit guided by GEDCOL</td>
<td>Wednesday, 7 May 2014</td>
</tr>
<tr>
<td>1.3.4</td>
<td>Pre-Bid Meeting</td>
<td>Thursday, 8 May 2014 at 1100 Hrs</td>
</tr>
<tr>
<td>1.3.5</td>
<td>Last date and time for submission of Bid (the “Bid Submission Deadline”)</td>
<td>Tuesday, 27 May 2014 at 1500 Hrs</td>
</tr>
<tr>
<td>1.3.6</td>
<td>Bid Validity</td>
<td>One Hundred and Eighty (180)</td>
</tr>
</tbody>
</table>
1.3.7. **Opening of Technical Bid**: Tuesday, 27 May 2014 at 1530 Hrs

1.3.8. **Opening of Financial Bid**: Tuesday, 3 June 2014 at 1500 Hrs

1.3.9. **Issue of Letter of Intent (LoI) to Successful Bidder**: Friday, 6 June 2014

1.3.10. **Signing of Contract with Contractor**: Friday, 13 June 2014

1.3.11. **Target date for Commissioning of Project**: Saturday, 6 December 2014

1.3.12. **Performance Acceptance Testing period**: 1 year from date of Commissioning of Project

1.3.13. **Operation and Maintenance period**: 10 years from date of Commissioning of Project

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

1.4. **Important Amounts**

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Head</th>
<th>Amount (and Validity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4.1.</td>
<td><strong>Estimated Project Cost</strong></td>
<td>Rupees One Hundred and Fifty Crores Only (Rs. 150,00,00,000/-)</td>
</tr>
<tr>
<td>1.4.2.</td>
<td><strong>Tender Fees (non-refundable) in the form of Demand Draft</strong></td>
<td>Rupees Fifteen Thousand Only (Rs. 15,000/-)</td>
</tr>
<tr>
<td>1.4.3.</td>
<td><strong>Earnest Money Deposit (EMD) in the form of</strong></td>
<td>Rupees One Crore Fifty Lakhs Only (Rs.1,50,00,00,000/-), to be submitted with the Bid, valid for a period of six days from the date of its opening</td>
</tr>
</tbody>
</table>
### Bank Guarantee

- **(6) months from the Bid Submission Deadline.**

| 1.4.4. **Advance Bank Guarantee (ABG)** | 10% of the Contract Price, to be submitted upon signing of the Contract, valid for a period of nine (9) months from the date of signing of contract, to be returned upon commissioning of the Project (against O&M BG). |
| 1.4.5. **Performance Bank Guarantee (PBG)** | 10% of the Contract Price, to be submitted upon signing of the Contract, valid for a period of twenty four (24) months from the date of signing of contract, to be returned upon successful Performance Acceptance Test and after submission of O&M BG |
| 1.4.6. **O&M Bank Guarantee (O&M BG)** | 10% of the Contract Price, to be submitted upon successful Performance Acceptance Test of the Project, valid up to an aggregate period of ten (10) years. (E.g. O&M BG with validity of one (1) year can be submitted, and can be renewed every year for the ten (10) years.) |

--- End of Section ---
2. Introduction

2.1. About GEDCOL

2.1.1. In pursuance to Govt. of Odisha in Dept. of Energy Notification No-2296 dated 15 March 2013, Green Energy Development Corporation of Odisha Ltd. (GEDCOL) has been incorporated under the companies act, 1956 as a public limited company on 18 April 2013.

2.1.2. GEDCOL is a wholly owned subsidiary of Odisha Hydro Power Corporation Ltd. (OHPC); a Gold Rated PSU of Govt. of Odisha. The main objective for creation and constitution of GEDCOL is to explore the huge renewable energy resources in the State which are otherwise untapped for a long time.

2.1.3. GEDCOL is a Board-managed company and the Board functions under the Chairmanship of Principal Secretary, Dept. of Energy, Govt. of Odisha and Chairman OHPC. The company is currently functioning at its Regd. Office situated at Bhubaneswar.

2.1.4. GEDCOL has planned to install initially at least 100 MW solar and small Hydro Power in the coming 3 yrs in the State of Odisha.

2.2. About OHPC

2.2.1. Consequent to the reform in power sector in Odisha, Odisha Hydro Power Corporation Ltd. (OHPC) was incorporated in 21st April 1995 under the companies Act 1956. Its objective are:

2.2.2. To acquire, establish, operate, maintain, renovate, modernize in the State of Odisha and else while hydroelectric generating stations, thermal and nuclear electric generating stations and any other electric generating stations based on any non-conventional sources of energy.

2.2.3. To carry on the business of purchasing, selling, importing, exporting, producing, trading, manufacturing or otherwise dealing in hydroelectric power, thermal and nuclear electric power based on any non-conventional sources of energy.

2.2.4. To study, investigate, collect information and data, review operations, plan, research,
design, prepare feasibility reports, prepare project reports, diagnose operational difficulties and weaknesses and advise on the remedial measures to improve and modernize existing stations and facilitate and to undertake for and on behalf of others the setting up of hydroelectric power plants, thermal and nuclear electric power plants and any other power plants based on any non-conventional source of energy.

2.2.5. The objectives incidental or ancillary to the attainment of the main objects are to acquire business / companies for carrying on business of electric power, to acquire know-how, to carry on consultancy services in any field of activity in which it is engaged, to act as an entrepreneur on behalf of the Central or any State Govt.

2.2.6. OHPC’s present installed capacity is 2,062 MW, while its peak capability ranges from 800 MW to 1,800 MW. In the Financial Year (FY) 2012-13, OHPC sold net 4,242 million units (MU) recording a turnover of Rupees Three Hundred and Forty Seven Crores (Rs. 347,00,00,000/-) and booked an annual net profit of Rupees Sixty Nine Crores (Rs. 69,00,00,000/-).

2.3. About the Project

2.3.1. GEDCOL proposes to implement a 20 MW project of crystalline silicon solar photovoltaic grid-interactive power station to harness green energy under Jawaharlal Nehru National Solar Mission Phase 2 Batch 1 (the “Scheme”). It is under this Government of India’s (GoI) initiative to promote renewable energy that GEDCOL has been allotted 20 MW capacity under the Domestic Content Requirement (DCR) of the Scheme and hence proposes to established a 20 MW capacity Project including development of land, buildings, plant, machinery, ancillary equipment, material, switch-gear, transformers, protection equipment and the development, design, construction, operation and maintenance at Village: Rengali, District: Angul, in the State of Odisha. The Company has now decided to undertake a competitive Bidding process for selection of the EPC Contractor to implement the Project (the “Contractor”).

2.3.2. The details of the facilities which the Company requires to be set up in the present instance and for which Bids are hereby invited are described in this Tender. The overall responsibility of complete Scope of Work rests with the Bidder.
2.3.3. Sealed Bids are invited in the prescribed Bid forms and formats, for the Scope of Work described in the RFP document.

2.4. About GERMI

2.4.1. Gujarat Energy Research and Management Institute (GERMI) an ISO 9001: 2008 certified institute, is a Centre for Excellence in industry learning, research & development and education. It is set up to develop human resource assets to cater to both renewable and non-renewable energy sectors, improve knowledge base of policy makers and technologists, and provide a competitive edge to leaders to compete in the global arena. GERMI was brought into existence and is promoted by Gujarat State Petroleum Corporation Limited (GSPC), a Government of Gujarat Undertaking.

2.4.2. GERMI has already established specialized research, education, management and training institutes, and is continually expanding its horizons to cater to the allied energy sectors. GERMI is a registered Society and a Trust under the Societies Registration Act, 1860 and the Bombay Public Trust Act, 1950. GERMI is a recognized Scientific and Industrial Research Organization (SIRO) by the Department of Scientific and Industrial Research (DSIR), Government of India.

2.4.3. GERMI is acting as a Consultant to GEDCOL for the Project.

--- End of Section ---
3. Instruction 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. The Company expects Bidders to confirm compliance to Tender terms, conditions and specifications at the time of submission of Bids, failing which the Bids are liable to be rejected. Hence, the Bidders in their own interest are advised to submit their Bids complete in all respects conforming to all terms and conditions of this Tender.

3.1.3. Bids shall be evaluated based on the information/documents available in the Bid. Hence, Bidders are advised to ensure that they submit appropriate and relevant supporting documentation along with their proposal in the first instance itself. Bids not complying with the requirements of this Tender are liable to be rejected without any further opportunity.

3.1.4. Bidders need to ensure that in the event the Project is awarded to it, and during execution of the Project, it shall not seek to alter any agreed contractual terms, conditions and specifications.

3.1.5. All Bids must be accompanied by a Tender fee and EMD of value as specified in the Clause 1.4 in the form and manner as specified in the Tender and must be delivered along with Bids.

3.1.6. The specification provided with this Tender outlines the functional requirement. The Bidder must submit the Bid based upon their own design, meeting the functional requirements.

3.1.7. Bidders shall deploy the latest state-of-the-art technology and must ensure that the goods supplied are new, unused and of most recent or current models and incorporate all recent improvements in design and materials for the implementation of the Project.

3.1.8. This Tender document shall be submitted by the Bidder along with Bid duly signed by the Bidder as the token of acceptance of the terms and conditions stipulated herein. Bid
sent without having the prescribed Tender document and without complying with the terms and conditions of Tender shall be summarily rejected.

3.1.9. Issuance of this Tender does not construe that the Bidder has been short-listed or qualified.

3.1.10. The Company reserves the right, to accept or reject any Bid and to annul the bidding process and reject all Bids at any time prior to award of the Contract, without assigning any reason thereof and without thereby incurring any liability to the affected Bidder(s).

3.1.11. The Company reserves the right to reject any Bid submitted with deviations beyond the one that is specified and mentioned in the Tender and no time shall be given in any circumstance after opening of Financial Proposal for submission of documents which are missing with Bid.

3.1.12. In case of change in ownership of the Project, all the Agreements and Contracts signed with the Company will stand true and valid with the new Owner of the Project.

3.2. Eligibility/ Qualification Criteria

3.2.1. The Bidder shall fulfil the following criteria to be eligible for participating in the bidding process:

   a. The Bidder shall have an experience of installation and commissioning of at least one 5 MW Solar Power Plant in last 4 years, which shall be successfully commissioned and in operation for at least one (1) years as on the Deadline for Submission of Bid.

   b. Average annual Turnover of the Bidder for last four (4) years shall be at least Rupees One Hundred Crore Only (Rs. 100,00,00,000/-).

   c. The Net Worth of the Bidder during the last Financial Year shall be at least Rupees Forty Crore Only (Rs. 40,00,00,000/-), wherein the Net Worth shall be calculated as follows:
Net Worth = (Equity + Reserves) – (Revaluation reserves + intangible assets + miscellaneous expenses to the extent not written off + carried forward losses).

The Bidder will provide a copy each of audited annual report of previous two financial years for ascertaining their turnover & net-worth.

3.2.2. The Bidder shall submit audited annual report of FYs 2010-11, 2011-12, 2012-13 and an annual report certified by Charted Accountant for FY 2013-14.

3.3. Cost of Bidding

3.3.1. The Bidder shall bear all costs in relation to its Bid and consequent bidding process activities. The Company shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

3.4. Understanding the Tender document

3.4.1. The Bidder shall be deemed to have carefully examined the general conditions, specifications and schedules and also to have satisfied himself as to the nature and character of the plant and equipment to be supplied and installed under the Contract, the proposed Solar Power Plant, site conditions and all relevant matters & details.

3.4.2. The Bidder should ensure that all information listed under Tender has been attached / enclosed in appropriate envelopes. Failure to furnish relevant information and documentary evidences as stipulated in the Tender or submission of Bid that is not substantially responsive to the Tender document in all respects may be summarily rejected.

3.5. Local Conditions

3.5.1. 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.

3.5.2. The Bidder and any of its personnel or agents shall be granted permission by the Company 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 the Company 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.

3.5.3. 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.

3.5.4. In no case the Target Date for Completion of Project shall be extended, due to the failure of the Bidder to visit the site and it shall be in line with the timeline of Solar Energy Corporation Limited and MNRE for the project under the Scheme.

3.5.5. 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.

3.5.6. 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 the Company;

   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 the Company 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 Clause 3.3 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 Company, 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.

3.5.7. The Company 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 the Company.

3.6. **Local Regulatory Frame Work**

3.6.1. 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. The Company shall not entertain any request for clarification from the Bidder, regarding such local conditions.

3.6.2. 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 the Company and that neither any change in the time schedule of the Contract nor any financial adjustments arising thereof shall be permitted by the Company.

3.7. **Clarifications to Tender Document**

3.7.1. A Bidder requiring any clarification of the Tender documents may notify the Company in writing or by facsimile or by e-mail at the Company’s contact details as indicated in this document specified in Clause 1.3.2.

3.8. **Amendments to Tender Document**

3.8.1. The Company may, for any reason, whether at his own initiative or in response to a clarification requested by a particular Bidder, modify the Tender Documents.
3.8.2. The amendments will be notified on website as mentioned in NIT of this Tender.

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

3.9. Acceptance of Bids

3.9.1. Company does not bind itself to accept the lowest or any Bid neither will any reason be assigned for the rejection of any Bid. It is also not binding on the Company to disclose any analysis report.

3.10. Withdrawal of Invitation to Bid

3.10.1. While the Company has floated this Tender and has requested Bidders to submit their proposals, the Company shall always be at the liberty to withdraw this invitation to bid at any time before its acceptance.

3.11. Representative/ Agent of Bidder

3.11.1. All the Bidders are requested to mention the name of their authorized representative/ agent, if any, with full address in the Bid.

3.11.2. In case the representative is changed during the bidding process such changes shall be notified by the Bidder, failing which, Company shall not accept any responsibility.

3.12. Financial Proposal and Currencies

3.12.1. The Bidders shall quote the prices exclusive of all the taxes, while also providing the breakup of taxes as per format given in Appendix 13: Format for Financial Proposal.

3.12.2. The Bidder shall indicate the price in Financial Proposal in Indian National Rupee only.

3.13. Bank Guarantees

3.13.1. Bidder shall be required to submit EMD as specified in Clause 1.4.3. The
Bank Guarantee shall be in favour of Green Energy Development Corporation of Odisha Limited payable at Bhubaneswar from any bank specified in the Appendix 16: List of Banks (for Bank Guarantee). The Company shall not be liable to pay any interest on the Bid Security deposit so made and the same shall be interest free.

3.13.2. The Bank Guarantee submitted should have the clear one time validity in all respect as specified in respective clause. If by any reason it is required to extended the Bank Guarantee, bidder shall undertake to renew the Bank Guarantee at least one month before the expiry of the validity failing which GEDCOL will be at liberty to encash the same.

3.13.3. A Bid submitted without the tender fee and EMD shall not be considered and shall be summarily rejected.

3.13.4. The validity of EMD shall be as per Clause 1.4.3.

3.13.5. 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 the Company desiring to award the work to the said Bidder. The Company shall have an unqualified discretion not to release the EMD and adjust the amount up to the full value there under 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.

3.13.6. The Company shall, however, arrange to release the EMD in respect of unsuccessful Bidders, without any interest, as soon as possible after the Contract is awarded.

3.13.7. The EMD in respect of the Successful Bidder shall be released after receipt of the Bank Guarantee against Advance Payment for mobilization and Performance Bank Guarantee as per Clause 1.4 in the format prescribed in Appendix 17: Format of Earnest Money Deposit.

3.13.8. The Bidder shall also undertake that the validity of the bank guarantee for EMD shall be extended suitably until it furnishes to the Company a bank guarantee
towards advance payment as well as performance for the specified value in the event of the Bidder becoming the Successful Bidder.

3.13.9. All the bank guarantees shall have an additional validity for Forty Five (45) days beyond the stipulated period as an encashment period, in case the bank guarantee is to be forfeited.

3.13.10. The EMD shall be forfeited and appropriated by the Company as per the discretion of the Company as genuine, pre-estimated compensation and damages payable to the Company for, inter alia, time, cost and effort of the Company without prejudice to any other right or remedy that may be available to the Company 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 the specified time limit – (a) to sign the Contract Agreement and/ or (b) to furnish the Advance Bank Guarantee 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 Advance Bank Guarantee or the Performance Bank Guarantee.

3.13.11. The Successful Bidder shall furnish the following Bank Guarantee upon award of Letter of Intent (LoI):


3.13.14. O&M Bank Guarantee: The Contractor shall undertake comprehensive operation and maintenance (O&M) activities for a period of ten (10) years from the date of successful Commissioning of the Project. The Contractor shall submit the O&M
Bank Guarantee to the Company upon successful Performance Acceptance Test of the Project. The format of the O&M Bank Guarantee is given in Appendix 20: Format of O&M Bank Guarantee.

3.13.15. Due to an extended nature of the O&M Bank Guarantee, the Contractor is allowed to provide O&M Bank Guarantees of not less than one (1) year and renew the same each year. However, the Contractor shall renew the O&M Bank Guarantee during the last month of validity of that O&M Bank Guarantee and ensure no lapse of the overall validity of the subsequent bank guarantees.

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


3.14.1. A Project Management Consultancy (PMC) or Third Party Inspection agency (TPI) may be appointed by the Company, 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.

3.15. Applicability of Labour Laws

3.15.1. The Bidder shall furnish valid Employee Provident Fund (EPF) code number together with supporting relevant document duly notarized by notary public to this effect along with its Bid.

3.15.2. The Successful Bidder shall obtain license under Contract Labour (Regulation & Abolition) Act 1970, read with rules framed there under and furnish the same to the Company within 15 days of the issue of Detailed order of Contract failing which the detailed order of contract shall be cancelled/terminated without any further notice and its EMD and/ or Advance Bank Guarantee and/ or Performance Bank Guarantee shall be forfeited.

3.15.3. The Bidder shall ensure payment of minimum wages as per labour laws, and
shall comply with all labour laws applicable to it under Indian law.

3.16. **Right to Accept or Reject any or all Bids**

3.16.1. Notwithstanding anything contained in this RFP, the Company 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 therefor.

3.16.2. The Company 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 Company, the supplemental information sought by the Company for evaluation of the Bid.

3.16.3. 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 the Company reserves the right to:

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

b. invite the remaining Bidders to submit Bids; or

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

3.16.4. 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 the Company to the Successful Bidder or Contractor, without the Company being liable in any manner whatsoever to the Bidder or Contractor, as the case may be. In such an event, the Company shall forfeit and appropriate the bank guarantees, as per the discretion of the Company as genuine pre-estimated compensation and damages payable to the Company for, inter alia, time, cost and effort of the Company, without prejudice to any other right or remedy that may be available to the Company.

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

--- End of Section ---
4. Submission of Bid

4.1. General Terms

4.1.1. A Bidder is eligible to submit only one Bid for the Project. A Bidder shall not be entitled to submit another Bid either individually or in a Consortium, as the case may be.

4.1.2. 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.

4.1.3. 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 will be submitted in separate envelope.

4.1.4. The Bidder should submit a power of attorney as per the format given in Appendix 10 authorizing the signatory of the Bidder to commit to the Bid.

4.1.5. 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 the Company, 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.

4.1.6. The Tender Documents, Bid Documents and all attached documents are and shall remain the property of the Company 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. The Company will not return any Bid or any information provided along therewith.

4.1.7. The Bidder shall submit PF code number allotted by Regional PF Commissioner. Failure to do so is likely to result in the offer being rejected.
4.1.8. Bidder shall note that Price Bid of only those Bidders shall be opened who are found technically qualified and responsive to GEDCOL’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. The Company 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 four (4) Envelopes as follows:

4.3.3. “Original” Envelope;

4.3.4. “Copy 1” Envelope;

4.3.5. “Copy 2” Envelope; and

4.3.6. “CD” Envelope.

4.3.7. The “Original,” “Copy 1” and “Copy 2” Envelopes shall each contain the following Envelopes:

   a. Cover-I: Signed Copy of the Tender Document(s)
   b. Cover-II: Enclosures of the Bid
   c. Cover-III: EMD and Tender Fee
   d. Cover-IV: Financial Proposal

4.3.8. The “CD” Envelope shall contain two (2) 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: EMD and Tender Fee

4.3.9. All original attested Tender Documents, Bid Enclosures, EMD and Tender Fee, and Financial Proposal shall be contained in the “Original” Envelope.

4.3.10. All attested copies of the Tender Documents, Bid Enclosures, EMD and Tender Fee, and Financial Proposal shall be contained in each of the “Copy 1” and “Copy 2” Envelopes.

4.3.11. All soft/ scanned copies of the original attested Tender Documents, Bid Enclosures, EMD and Tender Fee shall be contained in each of the two (2) CDs 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.

4.3.12. All Envelopes shall be clearly marked as “Original,” “Copy 1,” “Copy 2” and “CD”, with the

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 annexures, appendices, attachments, amendments and any other documents as added or modified by the Company as per the provisions in this Tender.

4.4.2. The documents accompanying the Bid other than the attested Tender Document(s), Tender Fee, EMD and Financial Proposal 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 1: Format for Covering Letter.
b. Details of the Bidder as per format prescribed in Appendix 2: Format of Details of Bidder.

c. Attested copy of Service Tax 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.


g. Details of similar technical experience of the Bidder as per format prescribed in Appendix 3: Format of Details of Similar Technical Experience.

h. Details of qualified technical staff as per format prescribed in Appendix 4: Format of Details of Qualified Technical Staff.

i. Curriculum Vitae of all qualified technical staff indicated in Appendix 4: Format of Details of Qualified Technical Staff.

j. List of proposed PV technologies as per format prescribed in Appendix 5: Format of Disclosure of PV Technology Proposed.

k. Project execution plan as mentioned in Appendix 6: Format of Project Execution Plan.

l. Declaration of Compliance as per format prescribed in Appendix 7: Format of Declaration of Compliance.

m. No Deviation Certificate as per format prescribed in Appendix 8: Format of No Deviation Certificate.

n. Declaration of Bidder’s relation to Directors of the Company as per format prescribed in Appendix 9: 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 10: Format of Power of Attorney as Authorized Signatory.

q. Audited financial statements of the Bidder for the years indicated in Appendix 11: Format of summary of Audited Financial Statements.

r. (If applicable) Authorization of use of financial capability by Parent as per format prescribed in Appendix 12: Format of Authorization by Parent Company with the necessary financial statements and summary required from the Bidder.

4.4.3. Cover–III shall be duly marked as “EMD and Tender Fee” and shall contain the Tender Fee as Demand Draft and EMD as a bank guarantee as per format prescribed in Appendix 17: Format of Earnest Money Deposit.

4.4.4. Cover-IV shall be duly marked as “Financial Proposal” and shall contain the Financial Proposal as per the format prescribed in Appendix 13: Format for Financial Proposal.

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

4.4.6. “Copy 1” and “Copy 2” Envelopes shall contain true copies of the documents accompanying the Bid documents and shall be placed in hard binding and the pages shall be numbered serially. Each page thereof shall be initialled in blue ink by the authorized signatory.

4.4.7. All envelopes in the Bid Documents shall be sealed.

4.4.8. The outer envelope shall clearly bear the following identification:


4.4.9. Cover-I shall bear the following identification:

4.4.10. Cover-II shall bear the following identification:


4.4.11. Cover-III shall bear the following identification:


4.4.12. Cover-IV shall bear the following identification:


4.4.13. Each of the envelopes shall clearly indicate the name and address of the Bidder.

4.4.14. In addition, the Bid Due Date should be indicated on the right hand top corner of each of the Envelopes.

4.4.15. Each of the envelopes shall be addressed to:

ATTN.: The Dy. General Manager (EL)
Green Energy Development Corporation of Odisha Limited
OHPC Corporate Office, OSPH&W Corporation Building
Janpath, Bhoinagar, Bhubaneswar-751 022, Odisha

Tel. No.: +91 674 2542922
Fax No.: +91 674 2542102
Email: info@gedcol.com
4.4.16. If the envelopes are not sealed and marked as instructed above, the Company assumes no responsibility for the misplacement or premature opening of the contents of the Bid submitted.

4.4.17. 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 Clause No. 1.3.5 at the address provided in Clause No. 4.4.15 in the manner and form as detailed in this Tender.

4.5.2. The Company may, in its sole discretion, extend the Bid due date by issuing an Amendment/ Addendum in accordance with Clause No.3.8, uniformly for all Bidders.

4.6. Late Bids

4.6.1. Bids received by the Company after the specified time on the Bid due date shall not be eligible for consideration and shall be summarily rejected. In case of the unscheduled holiday being declared 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 the Company in relation to or matters arising out of, or concerning the bidding process. The Company 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. The Company 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 the Company.

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 and EMD;

d. it is duly formatted and signed as prescribed in Clause 4.2;

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

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

g. it contains all the information (complete in all respects) as requested in this Tender (in the same formats as specified);
h. it complies with all the terms, conditions and provisions specified in this Tender; and

i. it does not contain any conditions or deviations;

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

4.11. Modification and Withdrawal of Bids

4.11.1. In case any clarifications are sought by the Company 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 the Company, 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. No Bid shall be withdrawn in the interval between the bid due date and the expiration of the validity period of the Bid. 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. The Company 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, the Company 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. The Company’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 the Company.
and may not subsequently be made responsive by the Bidder by correction of the nonconformity.

4.12.4. The Company 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. EPC Contract Price;
   ii. NPV of O&M Price of 10 (Ten) years;
   iii. Net Electrical Energy Generation Guarantee; and
   iv. Constant parameters as indicated in the Tender.

b. The Bid with the Highest Evaluated Bid Value shall be considered as L-1. The Bid with next lowest value shall be considered as L-2 and so on.

4.12.6. The Bidder with the Highest Evaluated Bid Value shall be the Successful Bidder.

4.12.7. Thus, 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 the Company 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, the Company and/ or their employees/ representatives on matters related to the Bids under consideration.


4.14.1. Bidders are advised not to employ serving the Company employees. It is also
advised not to employ ex-personnel of the Company within the initial two years period after their retirement/ resignation/ severance from the service without specific permission of the Company. The Company may decide not to deal with such firm(s) who fail 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 7: Format of Declaration of Compliance, whether he/ they is/ are related to any of the Directors/ Senior Personnel of the Company 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 and the Successful Bidder shall accept the LoI within seven (7) days of the issuance of the LoI. The Successful Bidder shall not be entitled to seek any deviation from the Contract, as may have been amended by the Company prior to the bid submission date.

4.16.2. On acceptance of the LoI by the Successful Bidder and submission of the stipulated bank guarantees the Company shall sign the Contract with the Successful Bidder.

4.17. **Performance Guarantee**


4.17.2. The bank guarantee by the Contractor will be given from bank specified in Appendix 16: List of Banks (for Bank Guarantee) only.

4.18. **Fraudulent Practices**

4.18.1. The Bidders may please note that the Company 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 the Company’s office for making such inquiries.

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

--- End of Section ---
5. General Terms and Conditions

5.1. GENERAL SCOPE OF WORK

5.1.1. The bids are invited for 20MW Project (the project) comprises of min. 21 MW DC calculated as cumulative capacity of rated power of all solar PV modules as measured under standard test condition (STC) as prescribed by latest edition of IEC 61215. Successful Bidder shall comply that the maximum AC capacity measured at the injection point which in no case shall exceed 20 MW AC.

![Schematic of Proposed 20 MW Solar Project for GEDCOL](image)

**Figure 5.1 Schematic of Proposed 20 MW Solar Project for GEDCOL**

5.1.2. The general scope of work for the project involves Engineering, Procurement and Construction (EPC) of the grid-connected solar photovoltaic power plant with complete switchyard commissioning and evacuation of power into 220/33 kV Rengali substation of OTPC corresponding to the guaranteed plant performance in the form of guaranteed CUF as defined in Appendix 19: Format of Performance Bank Guarantee

5.1.3. Evacuation of Power & Metering Point:

For the purpose of this project, the evacuation voltage shall be 33 kV AC (three phase) wherein evacuating / injection cum metering point shall be 220/33 kV SS at Rengali.

5.1.4. Operation and Maintenance (O&M):
The scope of work includes Comprehensive Operation and Maintenance of the power plant for Ten (10) years. After the first year, wherein the plant should perform at a minimum annual guaranteed CUF derated every year by not more than 1% referring to the installed DC capacity of the plant indicated by the Bidder and shall generate at least equivalent to the Guaranteed Performance of Plant as defined Appendix 19: Format of Performance Bank Guarantee. 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.

5.1.5. Tracking Structures:

The Company encourages Bidders to employ proven and reliable, seasonal or single axis tracking structures (daily tracking solutions), for the Project. Bidder should note that total land available is approximately 120 acres and the Project needs to be completed in the available area. The Bidder shall submit in the Bid details / specifications / designs / guarantees and warranties / and any other claims on performance / output of the solar tracking solutions in the Bid document.

5.1.6. Electrical Work:

Consisting of installation of solar PV modules, junction boxes, grid-tied inverters, transformers, meters, control panel, switchyard and transmission line, meters and feeder bay at evacuation point at substation etc.; interconnection through wires, cables, bus bars, etc.; plant earthing system; lightening protection system; solar PV streetlight based plant area lighting system, plant auxiliary 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.

5.1.7. Civil and Other Non-Electrical Work:

i. **Module Mounting Structures (MMS):** Successful Contractor shall design, fabrication, supply and install module mounting structures with all required accessories like clamps, nuts, bolts, cable ties etc.; The structures can be of fixed / seasonal / daily tracking are accepted;
ii. **Foundations:** Successful Contractor shall design and construct appropriate civil foundations for MMS, prefabricated structures, transformers, switchyard equipments, feeder bay etc.

iii. **Prefabricated Structures:** Successful Bidder shall plan for prefabricated structures with RCC foundations for

iv. Inverter rooms

v. Control room

vi. Separate conference room with pantry and toilet block sufficient for 20 people.

vii. Security cabin (9 ft X 9 ft) near plant gate

viii. Watchman’s cabin (4 ft X 4 ft) at six locations at site

ix. **Storm Water Drainage System:** Successful Bidder shall provide complete storm water drainage system with masonry pitching for entire plant.

x. **Solar PV Module Cleaning System:** Successful Contractor shall plan for one wash of all solar PV modules at least once in every 15 days. For this, contractor shall create and operate 5 lakh litre capacity partly underground RCC water storage tank, water softening plant, tanker with pump, water jet and pipeline to supply water from the bore-well having appropriately sized water lifting pump with electrical panel, to the storage tank;

xi. **Boundary Wall:** Successful Contractor shall construct boundary wall for entire plant as detailed into the section 5.2 “CIVIL WORK”.

xii. **Approach / Internal Roads and Pathways:** Successful Contractor shall provide internal roads and approach roads / pathways of asphalt / WBM type with plinth protection.

xiii. **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 Successful Contractor.
xiv. **Main Gate:** Contractor shall provide main gate of structural steel material of appropriate design.

xv. **Site levelling:** 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.

xvi. **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. Contractor shall also provide necessary internet connection through GPRS enabled modem for data communication over remote server and shall bear the cost of the same during the Contract period.

xvii. **Plant Safety Equipment:** The Contractor shall provide appropriate no. of foam type fire extinguishers / CO₂ extinguishers, sand buckets and transformer discharge road. Further, all high voltage places to be provided with danger sign boards with appropriate size and material to last for 25 years.

5.1.8. **Statutory Requirements:**

All construction, operation and maintenance procedures shall be carried out through appropriate relevant standards, regulations laid by local and national statutory organizations like local DisComs / State Regulatory Authority / MNRE / SECI / NVVN and/or any other agency as and when applicable. Further, this shall comply with the applicable labour laws. The Bidder shall make himself aware of such requirements and shall not solely depend on the Company to avail full information.

5.1.9. **Planning and Designing:**

i. The Bidder 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 agency 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 I.S Specifications while designing any civil structure. Also the environmental conditions, soil characteristics, atmospheric effect, ground water table level, rain water data, land profile etc. will be considered as per site condition and accordingly appropriate precautions, preventive measures will be taken while designing the structures. RCC of appropriate grade will be adopted considering surrounding weather and soil effect of site and as per the relevant I.S standard specifications. The concrete mix design of required strength shall be carried out in Govt. approved laboratory.

iii. Bidder shall take into consideration all parameters like wind speed, seismic zone, safety factor and safe bearing capacity (SBC) of soil etc. for the purpose design and construction of civil foundations for all civil work.

iv. The Bidder shall carry-out Shadow Analysis at the site and accordingly design strings and arrays layout considering optimal usage of space, material and labour.

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 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 Successful Bidder 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. Details of the Project with location and the successful operational period of the Project utilizing this technology shall also be mentioned.

viii. The Company reserves right to modify the specifications at any state as per local site conditions / requirements.
5.1.10. Approval of Designs / Drawings

i. All designs, specifications, reports, etc. submitted or used by the Successful Contractor at any point in time shall first be approved by Company and shall be revised by Successful Bidder as per instructions given by Company if required prior to execution.

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

iii. The Bidder shall submit in the Bid general engineering drawings of all civil work, including but not limited to, layout of the power plant at different buildings indicating rows of photovoltaic modules, SLD, location of control panels, DC and AC Distribution Boxes, MMS design, civil foundations and anchoring design / details, shading analysis and generation estimation report etc.

iv. 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 Company.

v. The Bidder shall submit a comprehensive maintenance schedule for operation and maintenance of the photovoltaic power plant along with checklists 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.

5.1.11. Final Commissioning and Plant Acceptance

i. The commissioning procedure shall be as per SECI requirements mentioned in its Tender document dtd.28.10.2013

ii. Successful Bidder shall operate and maintain the facility and shall demonstrate the Monthly and Annual plant CUF as derived at metering point as plant acceptance test. For the purpose of evaluation of the plant performance, it shall offer access to the electrical parameters and weather data through remote monitoring system. The period
of evaluation shall be 12 months after achieving completion of all activities mentioned hereunder.

iii. 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 authorised representative from Government of India (GoI)/SECI/GoO.

iv. Inspection and successful electrical commissioning certificate from the Company/SECI

v. Obtaining all certificates required by SECI from agency appointed by them.

vi. Satisfactory completion certificate towards completion of all other contractual obligations by the Successful Bidder from the Company.

5.2. DETAILED ELECTRICAL WORK:

5.2.1. Photovoltaic modules

i. The Contractor shall employ solar PV module of Crystalline-Si (Poly / Multi or Mono / Single) solar technology only.

ii. The PV modules to be employed shall be of 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 / SECI 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.

iii. 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).

iv. Minimum certified module efficiency shall be 15% for crystalline. The temperature co-efficient of the module shall not be more than 0.50% / °C.
v. All photovoltaic modules should carry a performance warranty of >90% during the first 10 years, and >80% during the consecutive 15 years. Further, module shall have performance warranty of > 97.5% during the first year of installation.

vi. The module mismatch losses for modules connected to an inverter should be less than 2%.

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

viii. The SPV module shall be made up of high transmittivity 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.

ix. 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.

x. 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.

xi. 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 100% 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 150 km/hr on the surface of the panel.

xii. Modules only with the same rating and manufacturer shall be connected to any single inverter. Modules there 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.
<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Name of the manufacturer of the PV module and RFID code</td>
</tr>
<tr>
<td>2</td>
<td>Name of the manufacturer of solar cells</td>
</tr>
<tr>
<td>3</td>
<td>Month &amp; year of the manufacture (separate for solar cells and modules)</td>
</tr>
<tr>
<td>4</td>
<td>Country of origin (separately for solar cells and module)</td>
</tr>
<tr>
<td>5</td>
<td>I-V curve for the module at standard test condition (1000 w/m², AM 1.5, 25°C)</td>
</tr>
<tr>
<td>6</td>
<td>Wattage, Imp, Vmp, Isc, Voc, temperature co-efficient of power and FF for the module</td>
</tr>
<tr>
<td>7</td>
<td>Unique Serial No. and Model No. of the module</td>
</tr>
<tr>
<td>8</td>
<td>Date and year of obtaining IEC PV module qualification certificate</td>
</tr>
<tr>
<td>9</td>
<td>Name of the test lab issuing IEC certificate</td>
</tr>
<tr>
<td>10</td>
<td>Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO 14001</td>
</tr>
</tbody>
</table>

Table 5.1 Information to be displayed on solar PV module

i. The Successful Bidder shall provide to Company the power performance test data sheets of all modules. The exact power of the module shall be indicated if the data sheet consists of a range of modules with varying output power.

ii. Only those crystalline modules which are supplied for a capacity more than 20 MW has successful operation of at least one year shall be considered for existing project. On this account, Bidder shall provide full information, to the satisfaction of the Company, before placing final order for the modules. Bidder shall also submit the proof of original purchase.
iii. Company or its authorized representative reserves the right to inspect the modules at the manufacturer’s site prior to dispatch.

iv. The Bidder is advised to check and ensure the availability of modules prior to submitting the RFP document

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

5.2.2. Junction Box / Combiner Box

i. Successful Bidder shall provide sufficient no. of junction boxes / PV combiner boxes / DCDB.

ii. All switch board 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 General (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 20
   - 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.

vi. Each Array Junction Box will have Suitable Reverse Blocking Diodes / Fuses of maximum DC blocking voltage of 1000 V with suitable arrangement for its
connecting. The Array Junction Box will also have suitable surge protection. 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.

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

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

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

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

xi. To provide group array isolation

xii. The rating of the Junction Boxes shall be suitable with adequate safety factor to interconnect the Solar PV array.

xiii. The junction boxes shall be dust, vermin, and waterproof and made of thermoplastic/metalllic 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.

xiv. 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.

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

xvi. 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.

xvii. The bypass & reverse blocking diodes should work for temperature extremes and should have efficiency of 99.98%, confirmed by appropriate IEC standards.

xviii. Adequate capacity solar DC fuses & isolating miniature circuit breakers should be provided if required.
xix. Detailed junction box specifications and data sheet shall be provided in the Bid document.

xx. 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 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 5MW capacity solar PV projects till date shall be considered for this project. Bidder has to provide sufficient information to the satisfaction of the Company before placing the final order for PCUs/Inverters.

ii. Power Conditioning Unit (PCU) shall consist of an electronic inverter along with associated control, protection and data logging devices.

iii. All PCUs should consist of associated control, protection and data logging devices and remote monitoring hardware, software for string level monitoring.

iv. Dimension and weight of the PCU shall be indicated by the Bidder in the offer.

v. The minimum European efficiency of the inverter shall be 96%, and that of string inverters shall be 94% 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 its offer. The Bidder should specify the overload capacity in the bid.

vi. 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.

vii. The inverters shall have minimum protection to IP 65(Outdoor)/ IP 21(indoor) and Protection Class II.
viii. Nuts & bolts and the PCU enclosure shall have to be adequately protected taking into consideration the atmosphere and weather prevailing in the area.

ix. (Grid Connectivity) Relevant CERC 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.

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

xi. 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.

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

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

xiv. 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 of MPPT shall be mentioned by the Bidder in its offer. The MPPT must have provision for constant voltage operation. The MPPT unit shall confirm to IEC 62093 for design qualification.

xv. 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.

xvi. 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.
xvii. 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.

xviii. 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.

xix. 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.

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.
xx. 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.

xxi. 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.

xxii. 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 / 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,

xxiii. 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.

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

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

xxvii. 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.

xxviii. Standards and Compliances
<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Particulars</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PCU Mounting</td>
<td>As per the design</td>
</tr>
<tr>
<td>2</td>
<td>Nominal AC Output Power</td>
<td>≥ 1000 kW</td>
</tr>
<tr>
<td>3</td>
<td>Nominal AC Output Voltage</td>
<td>415 Volts +15%/-10% AC / 270 V / As per design</td>
</tr>
<tr>
<td>4</td>
<td>Maximum Input Voltage</td>
<td>800 V DC Extendable up to 1000 V</td>
</tr>
<tr>
<td>5</td>
<td>Wave Form</td>
<td>Pure Sine wave</td>
</tr>
<tr>
<td>6</td>
<td>DC voltage range, MPPT</td>
<td>450 to 800 volts DC</td>
</tr>
<tr>
<td>7</td>
<td>Minimum Efficiency at 100% load</td>
<td>&gt; 96% as IEC- 1683(Efficiency)</td>
</tr>
<tr>
<td>8</td>
<td>Output frequency</td>
<td>50 Hz +.3% to - 5% Hz</td>
</tr>
<tr>
<td>9</td>
<td>Power Factor</td>
<td>0.8 lag- 0.8 lead</td>
</tr>
<tr>
<td>10</td>
<td>Max. THD</td>
<td>Less than 3 %</td>
</tr>
<tr>
<td>11</td>
<td>Ambient dry bulb temperature range</td>
<td>0 to 50° deg C</td>
</tr>
<tr>
<td>12</td>
<td>Humidity</td>
<td>15% to 95 % non- condensing</td>
</tr>
<tr>
<td>13</td>
<td>Enclosure</td>
<td>IP 20 / IP 65 (Indoor/ Outdoor rated) IEC-60068-2 (environmental)</td>
</tr>
<tr>
<td>14</td>
<td>Protection rating (as per IEC-60721-3-3)</td>
<td>Classification of chemically active substances: 3C2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Classification of chemically active substances: 3S2</td>
</tr>
</tbody>
</table>
Table 5.2: Detailed Specifications of PCU

<table>
<thead>
<tr>
<th></th>
<th>Grid Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Nominal Voltage &amp; Frequency</td>
</tr>
<tr>
<td>16</td>
<td>Voltage Tolerance</td>
</tr>
</tbody>
</table>

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 inverter (Central / String) 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

- DC power input
- DC input voltage
- DC Current
- AC power output
- AC voltage (all the 3 phases and line)
- AC current (all the 3 phases and line)
- Power Factor

c. If the Bidder is not able to provide PCU with display, the same has to be made available at the SCADA monitoring & controlling desk installed in Main Control Room.

xxiv. Documentary Requirements & Inspection.

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

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

**Note: The Company or its authorized representative reserves the right to inspect the PCUs/Inverters at the manufacturer’s site prior to dispatch.**

5.3.1. 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)

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 90°C wet rated insulation cable. 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. Successful Bidder 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.

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 90°C wet rated insulation cable.

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 Shall confirm IS: 7098 PART-3 & IEC - 60287, IEC-60332.

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

viii. 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.
ix. 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.

x. 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.

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

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

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

xiv. 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.

xv. 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.

xvi. Data sheets of the joints and kits shall be submitted for approval by the Company.

5.3.2. 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 follows.
Table 5.3 Clamps & Connectors

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Application</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bolted type connection</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>For connection to ACSR/AAAC/ Aluminium terminal</td>
<td>Aluminium Alloy conforming to designate A6 as per IS 617</td>
</tr>
<tr>
<td>3</td>
<td>For connection to copper terminals, with crimping facility to connect ACSR/AAAC jumper</td>
<td>Electrolytic grade copper, forged and tinned</td>
</tr>
<tr>
<td>4</td>
<td>Crimping type connection</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>For connection to Electrolytic grade aluminium ACSR/AAAC jumper</td>
<td></td>
</tr>
</tbody>
</table>

ii. The connector/jumper terminal intended for crimping type connection shall be manufactured by the ‘drop-forging’ method. Other types of clamps and connectors (which are not meant for crimping type connection) shall be ‘gravity die-cast and normalized’.

iii. 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.

iv. All the clamps and connectors shall be designed to carry a continuous current not less than 120% 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.
v. 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.

vi. 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.

vii. 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.

viii. As an alternative to the various types of clamps and connectors detailed under 2.0 above, the Bidders may offer connectors of Power Fired Wedge Pressure Technology (PFWPT).

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

x. 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 Bidder shall furnish the following information in the offer:
   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 the Company

5.3.3. 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 IEC 60099 / IS: 2309 – 1989 (Reaffirmed – 2005), Edition 3.1 (2006-01).

ii. 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.

iii. 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 lighting 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.

iv. If necessary more numbers of lightning conductors may be provided. Bidder is also free to provide franklin rod 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.
v. The Bidder shall submit the drawings and detailed specifications of the PV array lightning protection equipment to Company for approval before installation of system.

5.3.4. AC Bus and Panels

i. AC converted by the inverter is transmitted through the appropriate cables from the Inverter (2 no. of 1 MVA each) room to 2 MVA transformer and from transformer to RMU of the next inverter unit in the loop. 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 an adequate protection relays, fuses, annunciations and remote operating and controlling facility from the Main Control Room.

ii. 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.

iii. 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 color coded as per IS 375.

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

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. 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.

vii. 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.
viii. Bidder should submit theoretical design calculations and detailed explanations along with drawings shall be provided and approved by Owner.

**SWITCHYARD BLOCK**

5.3.5. Step-Up Transformer

i. The Bidder 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; 20 MW solar plant shall be connected to one no. of ring main unit (RMU) to control room which shall be connected with second Ring of such 20MW capacity of the solar plant with provision of rated 33kV Vacuum circuit breaker panel with single outgoing provision. Appropriate size for the 20 MW solar photovoltaic power plant.

ii. Ten (10) nos. of 3 phase, three-winding, 2 MVA, Oil Filled, 33 kV, 50 Hz, Power Transformers 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%.

iii. Cumulative loss shall be as per EGBC guidelines.

iv. 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.

v. Relevant national and international standards in this connection are as follows:

<table>
<thead>
<tr>
<th>IS: 2026 (Part 1 to 4)</th>
<th>Specifications for Power Transformer</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS: 2099</td>
<td>Bushings for alternating voltage above 1000 V</td>
</tr>
<tr>
<td>IS: 3639</td>
<td>Fittings and accessories for power transformer</td>
</tr>
</tbody>
</table>
Table 5.4 General Standards for Transformers

<table>
<thead>
<tr>
<th>IEC: 60076</th>
<th>Specifications for Power Transformer (Part 1 to 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS: 9921 Part 1 to 5</td>
<td>Alternating currents disconnectors (isolators) and earthing switches rating, design, construction, tests etc</td>
</tr>
<tr>
<td>IS: 2705 Part 1 to 4 &amp; IEC: 185</td>
<td>Current transformer</td>
</tr>
<tr>
<td>IS: 3156 Part 1 to 4</td>
<td>Voltage Transformer</td>
</tr>
<tr>
<td>IS: 3070 Part 1 to 3</td>
<td>Lightning arrestors</td>
</tr>
<tr>
<td>IS: 2544</td>
<td>Porcelain insulators for system above 1000 V</td>
</tr>
<tr>
<td>IS: 5350</td>
<td>Part III – post insulator units for systems greater than 1000 V</td>
</tr>
<tr>
<td>IS: 5621</td>
<td>Hollow Insulators for use in electrical equipment</td>
</tr>
<tr>
<td>IS: 5556</td>
<td>Serrated lock washers – specification</td>
</tr>
<tr>
<td>IEC: 186</td>
<td>Voltage transformer</td>
</tr>
</tbody>
</table>

i. 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.

ii. 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.

iii. 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

iv. 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.

v. 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.

vi. The reference ambient temperatures for which the transformers are to be designed are as under.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Particulars</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Maximum ambient temperature</td>
<td>50 degree C</td>
</tr>
<tr>
<td>2</td>
<td>Maximum daily average ambient temp</td>
<td>40 degree C</td>
</tr>
<tr>
<td>3</td>
<td>Maximum yearly weighted average ambient temp</td>
<td>40 degree C</td>
</tr>
<tr>
<td></td>
<td>Minimum ambient air temperature:</td>
<td>Minus 5 degree C</td>
</tr>
<tr>
<td></td>
<td>(cooling medium shall be Air)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CLIMATIC CONDITIONS :</td>
<td></td>
</tr>
<tr>
<td>5a</td>
<td>Maximum relative humidity</td>
<td>100%</td>
</tr>
<tr>
<td>5b</td>
<td>Yearly average number of thunder storms</td>
<td>Varies from 30 to 50</td>
</tr>
<tr>
<td>5c</td>
<td>Average no. of rainy days per annum</td>
<td>60 days</td>
</tr>
<tr>
<td>5d</td>
<td>Fog:</td>
<td>The atmosphere is</td>
</tr>
</tbody>
</table>
subject to fog for two month in winter

| 5e | Number of months during which tropical monsoon conditions prevail | 3 months |
| 5f | Dust storms | occur at frequent intervals |
| 5g | Average annual rainfall | 60 cms |
| 5h | Maximum wind speed | 150 kmph |

Table 5.5 Reference Weather Conditions for Transformer Design

vii. The rating and electrical characteristics of the 2 MVA, LV / 33 kV Outdoor type transformer (typical) shall be as under:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Particulars</th>
<th>2 MVA (Outdoor type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Continuous kVA ratings</td>
<td>2 MVA ONAN</td>
</tr>
<tr>
<td>2</td>
<td>Type</td>
<td>Oil immersed</td>
</tr>
<tr>
<td>3</td>
<td>Frequency</td>
<td>50 Hz</td>
</tr>
<tr>
<td>4</td>
<td>Type of cooling</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>No. of phases</td>
<td>Three</td>
</tr>
<tr>
<td>6</td>
<td>Rating voltage H.V. side</td>
<td>33 kV</td>
</tr>
<tr>
<td>7</td>
<td>Highest System voltage on H.V. side</td>
<td>36 kV r.m.s.</td>
</tr>
<tr>
<td>8</td>
<td>Rated voltage on L.V. side</td>
<td>LV (Output of the Inverter) kV r.m.s.</td>
</tr>
<tr>
<td>9</td>
<td>Vector Group</td>
<td>Dy5/Dy11</td>
</tr>
<tr>
<td>10</td>
<td>Connections a) H.V. Winding</td>
<td>Delta</td>
</tr>
<tr>
<td></td>
<td>b) L.V. winding</td>
<td>Star</td>
</tr>
</tbody>
</table>
On load taps on H.V. Side (for H.V. Variation) + 5 to − 10.0 % (in steps of 1.25%)

Impedance voltage (%) as per IS 2026 5-6%

Minimum Creepage distance at 32 mm/kV 400 phase to earth

Transformer connections LV side – Bus Duct with weather proof enclosure, HV Side – Bushing with enclosure

Table 5.6 Rating and electrical characteristics of 2 MVA Transformer

5.3.6. 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.

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

iii. 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.

iv. Current Transformer, Voltage Transformer, Circuit Breaker and Relays should match – Local distribution company requirements.

5.3.7. 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.
ii. Technical specifications – Current ratings, design, Temperature rise and testing etc. should be in accordance with IS: 2705 (part I to IV)

**Type and Rating**

i. 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.

ii. Each current transformers should have the following particulars under the site conditions for the system under design (typical values for 33 kV system are given).

iii. General Parameters: 33kV CT

iv. Each current transformer should have the following particulars under the site conditions for the system under design (typical values for 33kV system are given).

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Particulars</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Highest system Voltage (Um)</td>
<td>36 kV rms</td>
</tr>
<tr>
<td>2</td>
<td>Rated frequency</td>
<td>50 Hz</td>
</tr>
<tr>
<td>3</td>
<td>System Neutral Earthing</td>
<td>Effective earthed</td>
</tr>
<tr>
<td>4</td>
<td>Installation</td>
<td>Outdoor/indoor(IP 65)</td>
</tr>
<tr>
<td>5</td>
<td>Rated short time thermal current</td>
<td>25 kA for 1 sec or appropriate thermal current as per design calculations</td>
</tr>
<tr>
<td>6</td>
<td>Rated dynamic current</td>
<td>63 kA (Peak) appropriate dynamic current as per design calculations</td>
</tr>
<tr>
<td>7</td>
<td>Rated min power frequency withstand voltage (rms)</td>
<td>28 kV</td>
</tr>
<tr>
<td>Sr.No</td>
<td>Particulars</td>
<td>Details</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8 T</td>
<td>Rated lightning impulse withstand voltage (peak value)</td>
<td>170 kV</td>
</tr>
<tr>
<td>9</td>
<td>Minimum Creepage distance at 32 mm/kV</td>
<td>900 phase to earth</td>
</tr>
<tr>
<td>10</td>
<td>Temperature rise</td>
<td>As per IS 2705/1992</td>
</tr>
<tr>
<td>11</td>
<td>Type of insulation</td>
<td>Class A</td>
</tr>
<tr>
<td>12</td>
<td>Number of cores</td>
<td>Two (2) with One (1) protection core and one (1) metering core of accuracy 0.5 class</td>
</tr>
<tr>
<td>14</td>
<td>CT secondary current</td>
<td>Protection cores – 1 Amp.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metering Core – 1 Amp</td>
</tr>
<tr>
<td>15</td>
<td>Number of terminals in marshalling box</td>
<td>All terminals of control circuits wired up to marshalling box plus 20 terminals spare</td>
</tr>
<tr>
<td>16</td>
<td>CT ratio &amp; Rated VA Burden, short time thermal rating, class of accuracy</td>
<td>Minimum burden required:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Metering core – 40 VA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Protection core – 10 VA</td>
</tr>
</tbody>
</table>

Table 5-7 General parameters for 33 kV CT

5.3.8. General Parameters of 33 kV VT
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) 28 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 Bidder

Table 5-8 General parameters for 33 kV VT

5.3.9. 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.

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

iii. 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/M1 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. Bidder shall indicate 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 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 coil DC supply through appropriately rated battery bank and charger to be supplied by the Bidder.

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.

xvii. Applicable Standards: The materials shall conform in all respects to the relevant Indian Standard Specifications/ IEC Standards, with latest amendments indicated below:
### Standards for Circuit Breakers

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

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particulars</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type of circuit breaker</td>
<td>Vacuum type</td>
</tr>
<tr>
<td>2</td>
<td>Highest System Voltage</td>
<td>36 kV</td>
</tr>
<tr>
<td>3</td>
<td>Rated operating voltage</td>
<td>33 kV</td>
</tr>
</tbody>
</table>
### Table 5.10 General Parameters for Vacuum Type Circuit Breakers

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

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

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particulars</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type of Ring Main Unit</td>
<td>Metal enclosed, compact module, panel type, IEC 62271-200</td>
</tr>
<tr>
<td>---</td>
<td>------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>2</td>
<td>Highest System Voltage</td>
<td>36 kV</td>
</tr>
<tr>
<td>3</td>
<td>Rated operating voltage</td>
<td>33kV</td>
</tr>
<tr>
<td>4</td>
<td>Rated frequency</td>
<td>50 Hz (+3% to -5%)</td>
</tr>
<tr>
<td>5</td>
<td>Number of poles</td>
<td>Three (3)</td>
</tr>
<tr>
<td>6</td>
<td>Rated/minimum power frequency Withstand voltage</td>
<td>70 kV</td>
</tr>
<tr>
<td>7</td>
<td>Rated lightning impulse Withstand voltage</td>
<td>170 kV</td>
</tr>
<tr>
<td>8</td>
<td>Rated Current Busbar</td>
<td>630A</td>
</tr>
<tr>
<td>9</td>
<td>Insulation Gas</td>
<td>SF₆</td>
</tr>
<tr>
<td>10</td>
<td>Minimum Creepage</td>
<td>900 phase to earth distance at 32 mm/kV</td>
</tr>
<tr>
<td>11</td>
<td>Rated operating duty cycle</td>
<td>0 - 0.3 sec. - CO – 3 min. – CO</td>
</tr>
<tr>
<td>12</td>
<td>Rated line charging breaking</td>
<td>As per IEC</td>
</tr>
<tr>
<td>13</td>
<td>Reclosing</td>
<td>Single and three phase high speed auto reclosing</td>
</tr>
<tr>
<td>14</td>
<td>Maximum fault level</td>
<td>21 kA (rms) for 1 sec. Or appropriate as per design</td>
</tr>
<tr>
<td>15</td>
<td>Rated Making Capacity</td>
<td>52 kA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>16</td>
<td>Rated Breaking Capacity</td>
<td>21 kA</td>
</tr>
<tr>
<td>17</td>
<td>Auxiliary contacts</td>
<td>As required plus 6NO and 6NC contacts per pole as spare.</td>
</tr>
<tr>
<td>18</td>
<td>Noise level</td>
<td>Maximum 140dB at 50m distance from base of circuit breaker</td>
</tr>
</tbody>
</table>

**Table 5.11 General Parameters for SF₆ Type RMU**

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 bellow table.

<table>
<thead>
<tr>
<th>Rated Voltage (kV)</th>
<th>Rated Short Circuit Breaking Current (kA)</th>
<th>Rated Normal Current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>8</td>
<td>630 1250 1600 2500 4000</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>630 1250 1600</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>72.5</td>
<td>12.5</td>
<td>800 1250 1600 2000</td>
</tr>
<tr>
<td></td>
<td>20.0</td>
<td>1250</td>
</tr>
<tr>
<td></td>
<td>31.5</td>
<td>1250</td>
</tr>
</tbody>
</table>

**Table 5.12 Circuit Breaker Co-ordination parameters**

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

5.3.10. 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 and earth fault relays have to be essentially provided. All relay should be numerical type & should be remote operating and controlling facility from the control room.

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

iii. 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 Owner/Electricity Authority.

5.3.11. 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.

ii. 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.
iii. 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 GI pipe / chemical compound filled, double walled earthing electrodes including accessories, and providing masonry enclosure with cast iron cover plate having pad-locking arrangement, watering pipe using charcoal or coke and salt 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 Bidder should submit the earthing system design calculations along with the system layout for Owner 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 be prepared and installed in entire power plant.

5.3.12. 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 IEC 60099 / IS: 2309 – 1989 (Reaffirmed – 2005), Edition 3.1 (2006-01).

ii. 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.

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, watering pipe using charcoal or coke and salt as required as per provisions of IS.

iv. If necessary more numbers of lightning conductors may be provided.

v. The Bidder shall submit the drawings and detailed specifications of the PV array lightning protection equipment.

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

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

5.3.13. Isolators cum Earthing Switches, Contacts, Insulators, Busbars

i. 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).
ii. The Isolators shall be double break, outdoor, gange operated type, with blades rotating in horizontal plane. The design shall be for upright mounting. If required, and the Isolators shall be convertible for right or left hand control with minimum labour and replacement of part. The live parts shall be so designed that as far as possible, sharp points, edges and other corona producing surface are eliminated. Except the Insulator caps and bases, all other live parts shall be non-ferrous. Bolts, Screws and Pins shall be provided with locking arrangement and shall be of the best materials.

iii. 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.

iv. 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.

v. The length of the handle for manual operation shall not be more than one meter and shall be stated on the drawing. The rotating parts shall have a smooth movement.

vi. The clearance of 4000 mm from live parts to ground as per provision of I.E. Rules shall be considered while manufacturing of isolators & to decide location of operating mechanism box. Height of structure of isolator from ground is to be considered as 2900 mm including 150mm for muffing.

Contacts

i. 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.

ii. 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.

iii. 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 Bidder shall give full details of such contacts with necessary drawings.

iv. 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 tender shall give full details of such contacts with necessary drawings.

v. 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.

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**Busbars**

i. The outdoor bus-bars and equipment connections shall be with ACSR conductor (Panther /Dog/ 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.

5.3.14. **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 Owner, 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 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 kV systems with aluminum strips and ‘ON’ ‘OFF’ indications for isolators

5.3.15. 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.
5.3.16. **Execution**

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

ii. Incomer feeders: mains incomer - Electrically operated draw out type Air Circuit Breakers (ACBs).

iii. 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.

5.3.17. **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**

i. 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 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.

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

5.3.18. 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 the Company.

5.3.19. 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 directly from the grid through a separate meter and should not interfere with accounting of solar electricity fed into the grid.

5.3.20. 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 the Company.

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.

5.3.21. 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

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

   ii. PT circuit – clip on type terminals

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

Specific Requirements
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.

ACBs shall be complete with microprocessor release and shall be provided with over current, short circuit and earth fault protections.

Minimum 10% spare feeders of each rating shall be provided in the switchgear.

All current transformers shall have 5/1A secondary and all meters shall be suitable for 5/1A operation.

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

All indicating instruments shall be flush mounting, Digital, 96 sq.mm size.

Window annunciator with hooter and accept, test, reset button shall be provided. Necessary auxiliary relays for contact multiplication shall be provided in the panel.

The maximum temperature of the bus bars, droppers and contacts at continuous current rating under site reference ambient temperature of 50° C shall not exceed 105° 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
5.3.22. 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 Owner.

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 GEDCOL/.

xxxiv. All routine tests shall be carried out on the panel in presence of 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.
xxxvii. Detail bill of material.

xxxviii. 33 kV Transmission Line

xxxix. Bidder shall provide 33 kV transmission with bay and metering on Turnkey basis as per OTPCL requirement

5.3.23. Metering System

i. ABT energy meter shall be provided as approved by OPTCL 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 Bidder. All charges incurred on Meter testing, shall be borne by the Bidder. ABT energy metering system is to be approved by OPTCL.

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

iii. Separate metering system has to be provided for L.T. (incoming) and H.T. (outgoing) supply.

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 OERC 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, the Company 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 5.13 Circuit Breaker Co-ordination parameters

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

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 Owner and shall be permanently marked on the front of the meter and stored in the non-volatile memory of the meter.

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

5.3.24. 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.

ii. 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.

iii. 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.

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 66 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 2 Duo processor having 2 X 150 GB HDD with 2 GB RAM. The PC shall also have 17” 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 the Company 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. Successful Bidder 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 the Company at no extra cost.

d. It shall also have local data logging and communication through Bluetooth / Wi Fi and Ethernet port.

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 Company the detailed specifications, and all administrative rights/ privileges / passwords to the string monitoring system.

k. Bidder shall provide following measuring instruments with all necessary software & hardware compatible with the Data logging and web based monitoring system.

Pyrometer: Bidder 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:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Particulars</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Class</td>
<td>II</td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>Spectral Response</td>
<td>0.31 to 2.8 micron</td>
</tr>
<tr>
<td>3</td>
<td>Sensitivity</td>
<td>Approx. 9 micro - volt/w/m2</td>
</tr>
<tr>
<td>4</td>
<td>Time response (95%)</td>
<td>Max 15 sec.</td>
</tr>
<tr>
<td>5</td>
<td>Non linearity</td>
<td>±0.5%</td>
</tr>
<tr>
<td>6</td>
<td>Temperature Response</td>
<td>±2%</td>
</tr>
<tr>
<td>7</td>
<td>Temperature Response</td>
<td>Max ±2%</td>
</tr>
<tr>
<td>8</td>
<td>Tilt error</td>
<td>±0.5%</td>
</tr>
<tr>
<td>9</td>
<td>Zero offset thermal radiation</td>
<td>±7 w/m2</td>
</tr>
<tr>
<td>10</td>
<td>Zero offset temperature change</td>
<td>±2 w/m2</td>
</tr>
<tr>
<td>11</td>
<td>Operating temperature range</td>
<td>- 40 deg. to +80 deg.</td>
</tr>
<tr>
<td>12</td>
<td>Uncertainty(95% confidence Level)</td>
<td>Hourly- Max-3%</td>
</tr>
<tr>
<td>13</td>
<td>Daily-</td>
<td>Max -2%</td>
</tr>
<tr>
<td>14</td>
<td>Non stability</td>
<td>Max ±0.8%</td>
</tr>
<tr>
<td>15</td>
<td>Resolution</td>
<td>Min + / - 1 W/m2</td>
</tr>
<tr>
<td>16</td>
<td>Input Power for Instrument &amp; Peripherals</td>
<td>230 VAC (If required)</td>
</tr>
<tr>
<td>17</td>
<td>Output Signal</td>
<td>Analogue form which is</td>
</tr>
</tbody>
</table>
Table 5.14 Specification of Pyranometers

i. Temperature Sensor: Bidder 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.

ii. Anemometer and Wind Vane: The Bidder 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.

iii. 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.

iv. 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.

v. 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.

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

viii. 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

ix. Solar irradiation/isolation over horizontal and in-plane of the module

x. Voltage, frequency and other important electrical parameters etc. in the local grid.

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

xii. 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.

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

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

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

xvii. The Bidder shall submit the data sheet with technical specifications of the RMS system.

5.4.1. Detailed Civil and other Non-Electrical Work

The all material, installations, fixtures, accessories etc. to be provided shall be as per the relevant I.S. specifications. These shall be of best quality and of standard manufacturer as approved by the Engineer In-Charge (EIC), when there are no standard specifications. The fresh OPC cement and TMT steel reinforcement bars Fe 415 shall be used confirming to relevant IS Specifications of the approved manufacturers of Company. The agency has to keep the full proof records of purchase and consumption along with original purchase bills of Cement and Steel reinforced bars of Fe-415 grade shall be used confirming to relevant IS / specifications of the approved manufactures of Company. The agency has to keep the full proof records of purchase and consumption along with original purchase bills of Cement and Steel as per the Company procedures and rules. The agency has to provide best workmanship with skilled manpower for all the civil items as per the standard specifications/ best practice as approved by the EIC. The booklet Standard Specifications for Civil Works will be applicable wherever there is dispute in the items of civil works. Company will not supply any material for this work.

5.4.2. Topographical Survey:

Topographical survey shall have to be done by the Successful Bidder of the proposed site at 5 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.

5.4.3. Soil Test:

i. Company has provided soil test report in Annexure 3: Soil Investigation Report which is meant to indicate kind of soil condition site may have 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 use of planning / designing / construction / providing guarantee / warranty of all civil work including but not limited to foundations / piling for module mounting structures, HT lines, switchyard equipment etc. The Contractor shall carry out soil investigation through Govt. approved / certified soil consultant. These reports shall be furnished to the Company prior to commencing work. All RCC works shall be provided of required grade of concrete (mix. design) as per relevant IS specifications as well as 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. However, merely meeting minimum design requirement does not leave Contractor from the guarantee / warrantee / lifetime of the same.

iii. Contractor shall provide certificate of foundation design from competent chartered structural engineer in support of the foundation design proposed by him.

iv. The Successful Bidder 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.

v. Successful Bidder 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.

5.4.4. Foundations:

Foundations should be designed considering the weight and distribution of the structure and assembly, and a wind speed of 150 km per hour or highest wind speed recorded at site whoever is maximum. Seismic factors for the site have to be considered while making the design of the foundation.

5.4.5. Storage, Construction Power and Water:

Successful Bidder shall also plan for transport and storage of materials at site and shall arrange for its own construction power and water.

5.4.6. Land Development and Cleaning: Contractor will make sure that land for the plant is sufficiently flat and should remove undulences so as to avoid shadow of solar PV module rows on the adjacent rows. Bidders shall visit the site to study the site contours. It is responsibility of Contractors to conduct topographical survey to estimate and plan for in such a way that land is perfectly flat. As per requirement, Contractor shall plan for cutting / filling / excavation of land.

5.4.7. Storm Water Drainage System: Contractor has to design, submit and take approval from client/consultant for storm water in the plant. As per general design practise the system should be designed so as to naturally (by gravity) drain the rain water and water used for module cleaning to the drainage system. Storm water drain shall be of Trapezoidal section. The peripheral drain and internal drains (both sides of the central road, pathways etc.) shall be of brick pitching which is backed up by cement mortar bed and all joints are filled up with cement mortar, no pointing and plastering is required. Contractor shall also provide RCC hume pipe at the crossing of road and drains and at required locations.
5.4.8. Area Lighting

i. Contractor shall plan for sufficient no. of solar PV streetlights to meet illumination requirements of entire plant area as per relevant IS standards.

ii. 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 solar PV streetlights on the sides of roads, periphery, etc.

iii. All the enclosures shall be made of stainless steel, Dust & Vermin Proof, which is to be recessed at 3 feet above the base of each lighting system for ease of maintenance. The lights shall have solar sensor to enable its automated operation.

iv. The batteries shall be of sealed and maintenance free (SMF) type, Lead Acid battery having sufficient capacity to provide 2 days of autonomy. Solar PV modules and charger shall be of adequate capacity to charge solar batteries.

v. The lighting fixtures with control gear shall be mounted on tubular poles of approved height and mounting arrangement.

vi. All the yard lighting towers and lighting fixtures shall be effectively grounded using adequate size of GI earthing wires / GI earthing strips.

vii. The lighting poles shall be concreted with 600 mm coping above ground level for pole protection.

viii. The control gear box (non-integral type) shall be encased in the coping.

ix. The cables shall be properly glanded to the control gear box gland plate.

x. Solar grade cables only shall be used for solar PV streetlight system.

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 not exceed 2.0 mts from ground. Lighting fixtures shall be installed close to plant boundary, roads, inverter / control room / other buildings.

xiii. Boundary Wall:

Plant shall be protected by masonry boundary wall. The minimum height of the wall shall be 2.0 m from finished ground level. Thickness of the boundary wall shall be of 230 mm with 18 mm plaster on outer side and 12 mm plaster on inside of the boundary wall. The boundary wall shall be rested on proper RCC foundations and beams. Masonry pillars of 350 mm X 350 mm at every 5m span, is to be provided in front side of the plant with providing expansion joint at suitable interval. Rest all sides shall have continuous masonry with expansion joint at suitable interval. Concertina wire fencing upto 700mm height shall be erected with MS angles at appropriate distance over the boundary wall shall be provided.

5.4.9. Roads:

Contractor has Design as per relevant IS, submit and take approval from the Company/consultant for Asphalt and WBM roads. Road connecting Main Gate, Control Room, Switchyard shall be of Asphalt with sufficient base courses like WBM layer, Wet Mix layer, DBM layer and at top Seal Coat. Also all peripheral roads and pathways from central road to Inverter room road shall be WBM road. WBM/Asphalt road width shall be of 4m having sufficient camber at centre with appropriate thickness to access heavy equipment like transformers / inverter / switchyard equipment transportation.

5.4.10. Underground RCC water Tank:

Contractor has design as per relevant IS codes, submit and take approval from client / consultant and construct 5 lacs litre underground RCC water tank with silting chamber for filtration of the water before the inlet which will match with invert level of Storm water drain. Design of RCC water tank shall be such that it shall resist Earth pressure and Water pressure and satisfy all IS codes.

5.4.11. Water supply:

i. Contractor has design as per relevant IS codes, submit and take approval from client / consultant and construct 5 lakhs litre partly underground RCC water tank with silting
chamber for filtration of the water before the inlet which will match with invert level of Storm water drain. Design of RCC water tank shall be such that it shall resist Earth pressure and Water pressure and satisfy all IS codes.

ii. All necessary arrangement for wet cleaning of the solar panels shall be in the scope of the Contractor and accordingly the Contractor has to provide all the necessary equipments such as submersible pump, water lifting pump, Water softener plant, Electric panel, Tankers with accessories like pump and flexible pipe etc., Tractors, Pipeline from Borewell to Storage Tank, Wipers for cleaning etc. Contractor also has to make borewells for water required for cleaning of modules. Contractor has to ensure that wash cycle for module cleaning shall be at least one time per 15 days. All the tools and tackles are to be handed over to client after completion of O&M period.

5.4.12. Pre-fab Inverter/Pre-fab Control cum Operator Room, Dedicated Conference Room, Security Cabin

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. 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. All prefab invertor room shall be layed on RCC plinth with sufficient foundation. The plinth shall minimum 450 mm high from formation level of the plant.

iii. Pre-fab Control room be of adequate size for fixing the panels, Inverter etc. with conference room and pantry and toilet unit of standard manufacturer and RCC cable trenches with covers and should have sufficient ventilation and false ceiling in conference room.

iv. Contractor shall provide 6 numbers of prefabricated Watchman’s portable cabin at 6 places along the plant boundary. The Minimum size of watchmen’s (Security Cabin) cabin is 4 ft x 4 ft and height of 8 ft with appropriate roof at the top. Location of the watchman’s Cabin (Security Cabin) will be as directed by Company.
v. Contractor shall provide one no. of prefabricated security cabin of size 3 metre x 3 metre at the main entrance gate rested on RCC foundations, Grad slab etc. This is in addition to the six watchman’s cabin to be provided. Successful Bidder shall construct the design keeping in view the safety and security of the power plant.

vi. **Control Room** should have appropriate area for fixing necessary panels and invertors, RCC cable trench with necessary trays arrangement with cover at top, necessary lighting points and should having sufficient height and ventilation. Control Room also have adequate size SCADA cabin with necessary work station, chairs and split A.C of required capacity in accordance to the space to cool and occupancy of the people. All material, installations, accessories to be provided shall be of best quality and of standard manufacturer as approved by the EIC.

vii. **Flooring:** Best quality Vitrified tile flooring having min size of 600 mm x 600 mm x 8-10 mm thickness of standard manufacturers as approved by EIC.

viii. **RCC frame structure** shall have adequate size of footing, pedestal columns, plinth beam, grad slab as per relevant IS specifications considering seismic zone, wind and soil detail etc.

ix. The plinth of the Pre-fab rooms shall be minimum 450mm high from the formation level of the plant.

5.4.13. **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. **Toilet:** Toilet shall be designed for 20 persons having separate toilets for male and female with appropriate no. of urinals with following finish

a. Floor : Vitrified tiles/ ceramic tiles
b. Ventilators : Mechanical exhaust facility
c. Plumbing fixtures : Jaquar or equivalent make
d. Sanitary ware : Hindware, Cera or equivalent make
e. **EWC**: 2 numbers of 390 mm high with health facet, toilet paper roll holder and all fittings (for ladies and gents separately)

f. 3 numbers of urinal (430 x 260 x 350 mm size) with all fittings.

g. 2 numbers of wash basin (550 x 400 mm) with all fittings.

h. 2 number of Bathroom mirror (600 x 450 x 6 mm thick) hard board backing

i. 2 number of CP brass towel rail (600 x 20 mm) with C.P. brass brackets

j. 2 number of Soap holder and liquid soap dispenser

k. **Water Supply for Pantry & Toilets**: Bidders has to provide GI pipes (B class) Tata or equivalent make. Overhead water tank of Sintex or equivalent make of 1,000 litre capacity. Bidder has to lay underground pipeline for meeting water supply with required accessories/fixtures/pumps from Storage tank to Overhead tank.

l. **Drainage for Toilets**: Drainage pipes shall be of PVC (6 kg/cm²) Supreme, Ganga, Gangotri Prince or equivalent make. Gully trap, inspection chambers, septic tank for 20 people and soak well to be constructed for above mentioned requirement.

iv. **Doors and Windows**: Doors and windows of prefabricated structures shall be made of aluminium sections. All sections shall be 20 microns anodized. Sections of door frame and window frame shall be adopted as per industrial standards. Door shutters shall be made of aluminium sections and combination of compact sheet and clear float/ wired glass. The control room shall require a number of windows/ louvers to provide ventilation/ fresh air circulations. All fixtures for doors and windows shall be of Dorma or equivalent make.

v. **Projector**: Project shall be ceiling mounted with fluoroscene screen(minimum 2mt x 2mt) of standard make like sony, Panasonic etc.

vi. **Conference table**: Conference table designed for 20 persons with 20 revolving chair of Godrej or equivalent make. It shall have electrical sockets at suitable intervals.

vii. **SCADA and Workstations**: Adequate size SCADA cabin with necessary 1 number of work station with 1 Desktop, table, side table, mobile drawer unit, 2 numbers of mid back chairs, and 48”LCD Display of sony or Panasonic make.
viii. **Air Conditioner for Control Room:** The control room shall be equipped with appropriate numbers of fans for effective heat dissipation and wall mounted split ACs properly sized for the maximum occupancy of the conference room. The split AC shall be of Hitachi, Daikin or Samsung make and shall be of best quality and of standard manufacturer as approved by the EIC.

5.4.14. **Electrical Panel for Prefabricated Control Room cum Operator Room:**

Electrical panel 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/isolator 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 overall dimension shall be fitted with other Power Conditioning Units of the Power Plant. However, 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 inverter 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 Owner. 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 client/consultant.

5.4.15. Main Entrance Gate

An all-weather main gate with width of at least 6 meter shall be erected at the entrance of the plant site.

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.

5.4.16. 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 CUF. 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 150 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 Owner.

vi. Modules shall be mounted on a non-corrosive support structures (EPDM rubber gasket is to be provided as separator). The frames and leg assemblies of the array structures shall be made of hot dip Galvanized steel per ASTM A123.

vii. In case of galvanization of structures, thickness of galvanization should be at least 80 microns. Ensure inner side should also be galvanised.

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 GI / 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 earthing.

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 10 mm in vertical / horizontal line.

xiv. The Contractor shall provide to Company the detailed design, specifications and calculations of the MMS and take approval from client/consultant.

xv. The Bidder / manufacturer 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.

xvii. 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.

xviii. The material of construction, structural design and workmanship shall be appropriate with a factor of safety of not less than 1.5.

xix. The Bidder 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 800 mm.

xx. 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.

xxi. Cable 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.

xxii. For multiple module mounting structures located in a single row, the alignment of all modules shall be within an error limit of maximum 10mm.
xxiii. The Contractor shall provide to the Company the detailed design, specifications and calculations of the MMS.

xxiv. The Bidder / manufacturer shall specify installation details of the Solar PV modules and the support structures with appropriate diagrams and drawings.

xxv. The Bidder shall be permitted ramming of the module mounting structure provided that they obtain consent of the Company. The Company 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.

xxvi. Civil foundation design for Module Mounting Structures (MMS) as well as control room, inverter 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.

xxvii. Switchyard structures / transmission line structure designs shall be strictly as per local transmission companies. Module Mounting Structures Design is to be certified by Chartered Structure Engineer and certificate to be produced along with the design details for approval by Company / Consultant.

5.4.17. Structural Steel Work

i. The structural steelwork required for termination incoming 33 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.

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 Owner before procuring the material.

v. The design of the switchyard towers, gantries and equipment structures shall also be designed in conformity with the standards followed by the Company. Approval from the Company also shall be obtained by the Bidder if required.

5.4.18. 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.

5.4.19. Fire Extinguishers:

Liquefied CO2 fire extinguisher shall be upright type of capacity 10 kg having IS: 2171. 7 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. Bidder shall provide 4 no. of portable fire extinguisher as given below.

<table>
<thead>
<tr>
<th>DCP Type (ABC type) (10 kg Cap)</th>
<th>CO₂ Type Hand 9 kg</th>
<th>Foam Type Hand 9 kg</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>2</td>
<td>1</td>
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</table>

5.4.20. Sand Bucket:

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 – 4 Nos.

5.4.21. Sign Boards: The sign board containing brief description of various components of the power plant as well as the complete power plant in general shall be installed at appropriate locations of the power plant. The Signboard shall be made of steel plate of not less than 3 mm. Letters on the board shall be with appropriate illumination arrangements. The Contractor shall provide to the Company, detailed specifications of the sign boards. Size of each Danger Notice plates shall be 200 mm x 150 mm made of mild steel sheet and at least 2 mm thick, and vitreous enameled white on both sides and with inscription in signal red colons on front side as required. The inscriptions shall be in Oriyai and English.

5.4.22. Testing Instruments for Electrical & Electronic: Bidder 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.
5.4.23. **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 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 RFP 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

--- End of Section ---
6. General Terms and Conditions

6.1. Use of Contract Documents & Information

6.1.1. The Contractor shall not, without the Company’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 Company’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 the Company.

6.2. Patent Rights

6.2.1. The Contractor shall indemnify the Company against third party claims of infringement of patent, trademark or industrial design rights arising from use of goods 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 Electrotechnical 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, 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 the Company 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 the Company and shall be immediately deposited by the Contractor to the Company’s Store at Project Site.

6.6. **Power to Vary or Omit Work**
6.6.1. No alterations, amendments, omissions, additions, subtractions, or variations of the work (hereinafter referred to as “Variation”) under the contract shall be made by the Contractor except as directed by Company.

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

6.6.3. The differences in cost, if any, occasioned by such variations, shall be added to or deducted from the EPC Contract Price, as the case may be at the Company’s discretion.

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

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

6.7. Negligence

6.7.1. 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 the Company or contravenes any provisions of the Contract, the Company 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 the Company 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 the Company 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.

6.7.2. If the cost of executing the work as aforesaid shall exceed the balance due to the Contractor and the Contractor fails to make good such deficiency, the Company shall take action in the manner it may consider deem fit in terms of the Contract.

6.8. Statutory Responsibility

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

6.9. Insolvency and Breach of Contract

6.9.1. The Company 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 being an individual or a firm or any partner thereof shall at any time, be adjudged insolvent or shall have a receiving order or order from administration of its state made against it or shall take any proceeding for compensation under any Insolvency Act for the time being in force or make any conveyance or assignment with its creditors or suspend payment or if the firm be dissolved under Partnership Act; or

b. 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.

6.10. Timeline

6.10.1. 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.

6.10.2. The work must be completed as per the Timeline below from the date of handing over of site.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Stage</th>
<th>Reference from Zero Date (“D”)</th>
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<tbody>
<tr>
<td>1.</td>
<td>Issue of LoI</td>
<td>D</td>
</tr>
<tr>
<td>2.</td>
<td>Completion of site developmental work</td>
<td>D+30</td>
</tr>
<tr>
<td>3.</td>
<td>Approval of major drawings</td>
<td>D+60</td>
</tr>
<tr>
<td>4.</td>
<td>Completion of supply of major balance of system</td>
<td>D+90</td>
</tr>
<tr>
<td>5.</td>
<td>Completion of supply of PV modules</td>
<td>D+120</td>
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<tr>
<td>6.</td>
<td>Installation and interconnection of all major equipment</td>
<td>D+150</td>
</tr>
<tr>
<td>7.</td>
<td>Interconnection and testing of entire plant</td>
<td>D+170</td>
</tr>
<tr>
<td>8.</td>
<td>Commissioning of entire plant</td>
<td>D+180</td>
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6.10.3. 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.

6.10.4. The Bar/PERT Chart provided by the Contractor shall submitted to the Company for approval prior to commencement of the execution of the Project. All comments and modifications provided by the Company shall be incorporated and adhered to by the Contractor in the Timeline, Bar/PERT Chart, detailed execution plan, etc. for execution of the Project.

6.10.5. This schedule shall be prepared so as to ensure the commissioning of complete plant within six (6) months from issue of LoI, which shall also be the Zero Date.

6.10.6. Partial commissioning shall not be considered.

6.11. **Delay in Execution or Failure to Supply**

6.11.1. Any delay in completion of the work shall attract liquidated damage/ penalty for late
completion as per Liquidated Damage Clause 6.12 of this Tender.

6.11.2. If the Contractor fails to deliver the plant or fails to start the work within specified time frame after signing of Contract Agreement or leaves the work site after partial execution of the work, the Company shall have the right to get the work done through any other agency at the risk and cost of the Contractor. Further to this, Company may, without prejudice to the right of the Company to recover damages for breach of trust of the Contract, may impose penalties.

6.12. **Liquidated Damages for Delay and Underperformance**

6.12.1. In case the Contractor fails to achieve successful commissioning of plant by the due date indicated in Timeline, then the Company for their respective project shall levy the Liquidated Damages on the Contractor individually at the following rate (wherein partial commissioning shall not be accepted):

   a. For delay in Commissioning for up to thirty (30) days, penalty equivalent to Rs. Forty (40) Lakhs per day (i.e. Rs. Two (2) Lakhs per MW per day) shall be imposed. (E.g. for a delay of 20 days from the target Commissioning date, the Liquidated Damages shall be Rs. Eight (8) Crores.)

   b. For delay of more than ninety (90) days, additional Liquidated Damages equivalent to Rs. Forty (40) Lakhs per day shall be levied up to a max of (the additional) thirty (30) days.

6.12.2. 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 10 months, the Company may terminate the Contract and get the Project complete by other suitable agency at the risk and cost of the Contractor.

6.12.3. For calculation of penalty, date of LoI shall be the reference date.

6.12.4. The Contractor shall demonstrate an Annual CUF as per the Guaranteed CUF as per the Bid submitted, failing which, a penalty at the rate of Six Rupees and Eighty One Paisa Only (Rs. 6.81) per kWh of under-generation compared to the Guaranteed Generation shall be imposed by the Company on the Contractor calculated on a pro rata-basis.
6.12.5. The Plant with (annual) actual or Guaranteed CUF of less than or equal to seventeen percent (17%) shall be summarily rejected.

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 Project Manager that any supplies have been executed with unsound, imperfect or unskilled workmanship, or with materials of any inferior description, or that any materials or articles provided by the Contractor for the execution of Contractor are unsound or otherwise not in accordance with the Contract, the Contractor shall on demand in writing inform the Project Manager or its authorized representative specifying the item, materials or articles complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for. The Contractor shall forthwith rectify or remove and replace that item so specified and provide other proper and suitable materials or articles at its own charge and cost, and in the event of failure to do so within a period to be specified by the Project Manager 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 expense in all respects of the Contractor. The decisions of the Project Manager as to any question arising under this Clause shall be final and conclusive.

6.13.3. The Contractor shall also be undertaking 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 should be found in the design, engineering, materials and workmanship of the Plant and Equipment supplied or of the work executed by the Contractor, the Contractor shall promptly, in consultation and agreement with the Company 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. The Company shall give the Contractor a notice stating the nature of any such defect together with all available evidence thereof, promptly following the discovery thereof. The Company shall afford all reasonable opportunity for the Contractor to inspect any such defect.

6.13.7. The Company shall provide the Contractor all necessary access to the Facilities and the Site to enable the Contractor to perform its obligations under this Clause 6.13.

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 the Company 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 shall in 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 the Company in connection therewith shall be paid to the Company 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 the Company 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 the Company 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 termination of the Contract due to default, the Contractor may be blacklisted from the Company, its associate companies, Consultants, 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, 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 Contractors negligence and other causes which the Contractor has no control and accepted as such by the Company 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, the Company 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. 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, Contractor shall use additional manpower to keep the due date of completion of Project unchanged.

6.17.2. The authorized representative of Contractor shall review the progress of Project work every fortnight on a prefixed day at project site with the Company or its representative as per the network and record the minutes in a register.

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 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 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.


6.19.1. The work shall be executed in conformity with the relevant standard of Bureau of Indian Specification (or equivalent International Standard), Indian Electricity Rules, 1956 (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. Contractor shall comply with Odisha State Pollution Board regulation.

6.23. Stoppage of Work

6.23.1. 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 Company to Make Change(s) in Design**

6.26.1. All designs shall be approved by the Company 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 the Company to make the plant and materials conform to the provisions and contents of the specification without extra cost to the Company.

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.

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 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 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 the Company or its duly authorized representative.

6.32.2. The Company 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 the Company 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, the Company 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 the Company’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 the Company, 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 the Company 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 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 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 Company whenever required free of charge.

6.32.7. The Contractor has to provide the necessary testing reports to the Company as and when required.

6.32.8. Neither the waiving of inspection nor acceptance after inspection by the Company 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 for their qualification as per above specified IEC/ BIS Standards by one of the NABL Accredited Test Centres in India. In case of module types ro equipment for which such Test facilities may not exist in India, 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 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 and at the following time for achieving the respective milestones:

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Payment Milestones</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Advance mobilization payment (against Advance Bank Guarantee and Performance Bank Guarantee)</td>
<td>10% of ECP Contract Price</td>
</tr>
<tr>
<td>2.</td>
<td>Upon complete delivery of Balance of Systems including inverters, transformers, MMS etc. at site</td>
<td>20% of ECP Contract Price</td>
</tr>
<tr>
<td>3.</td>
<td>Upon delivery and acceptance of all PV modules at site</td>
<td>20% of ECP Contract Price</td>
</tr>
<tr>
<td>4.</td>
<td>Upon installation and interconnection of all major equipment</td>
<td>20% of ECP Contract Price</td>
</tr>
<tr>
<td>5.</td>
<td>Upon achieving Commissioning of the Facility</td>
<td>20% of ECP Contract Price</td>
</tr>
<tr>
<td>6.</td>
<td>Final commissioning of the Facility pursuant to successful Guarantee Tests and demonstration of Annual guaranteed CUF (against O&amp;M Bank Guarantee)</td>
<td>10% of ECP Contract Price</td>
</tr>
</tbody>
</table>
| 7.  | On successful Operation and Maintenance of the Solar Power Plant on quarterly basis for each year till 10 years | Year 1: OM-1  
Year 2: OM-2  
Year 3: OM-3  
Year 4: OM-4  
Year 5: OM-5  
Year 6: OM-6  
Year 7: OM-7  
Year 8: OM-8  
Year 9: OM-9  
Year 10: OM-10 |
• ECP’ indicates the “EPC Contract Price” quoted by the Contractor in its Financial Proposal.

• ‘OM’ indicates the “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 VAT, Service Taxes 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.

6.39.  Warranty/ Guarantee

6.39.1. The Plant shall perform as per the Guaranteed Performance indicated by the Bidder in its Financial Proposal.

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, the Company 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 the Company within a reasonable time as may be considered from the date of receipt of such intimation from the Company failing which the Company shall take up rectification work at the risk and cost of the Contractor.

6.40. Arbitration

6.40.1. All questions, disputes or differences whatever which may at any time arise between the parties to this contract in connection with the contract or any matter arising out of
or in relation thereto shall be reported to Odisha Public Works Contract Dispute Arbitration Tribunal and provision of Odisha Public Work Contract Disputes Arbitration and Tribunal Act 1996 shall be applied as updates time to time.

6.40.2. The Contractor shall ensure that the work under this Contract shall continue with its obligations as per this Tender during arbitration proceedings and dispute and no payments due from or payment by the Company shall be withheld on account of such proceedings except to the extent which maybe in dispute.

6.41. **Court of Competent Jurisdiction**

6.41.1. The Courts of Bhubaneshwar for GEDCOL 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.

6.42.2. The Law governing the procedure and administration of any arbitration instituted under the Clause for Arbitration shall be the 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 the Company. 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 the Company recorded in a minute signed by the authorized representatives of both the Company 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 Bill relating to the Contract shall be prepared only after the Guaranteed Performance of the plant has been observed as under Clause 6.39 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.

6.45.2. 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.

6.45.3. The date of Comprehensive Operation and Maintenance Contract period shall begin
on the date following the Commissioning of the Plant. 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.

6.46. Degradation of Solar Modules

6.46.1. The Contractor should warrant for each block the output of Solar Module(s) for at least 90% of its actual rated capacity or requisite capacity (whichever is lower) at Standard Testing Condition after initial 10 years and 80% of its rated capacity or requisite capacity (whichever is lower) after 25 years upon commissioning of the Plant. 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 3.5%.

6.46.2. 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 the Company with an amount equivalent to the loss of revenue from 11th to 25th years which shall be calculated based on Net Present Value of amount of loss of revenues from 11th to 25th years discounted at the rate of Company’s cost of capital.

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, the Company 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 the Company to cancel the LoI placed on the Contractor, it shall be liable to compensate the loss or damage, which the Company may sustain due to reasons of failure on Contractor’s part to execute the work in time.
6.48. Confidential Information

6.48.1. The Company 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 the Company 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.

--- End of Section ---
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 designing, engineering, manufacturing, supply, erection, testing and commissioning of 20 MW Solar Photovoltaic Grid-Connected Power Plant using Photovoltaic Technology with associated ten (10) years comprehensive operation and maintenance of the same on turnkey basis at Village Rengali, District Angul, in the state of Odisha for GEDCOL.

7.3. Compliance with SECI/ MNRE Guidelines

7.3.1. The Bidders and Contractor shall make themselves fully aware of and comply with the norms and guidelines provided by SECI and MNRE under the JNNSM Phase 2 Batch 1 Scheme (the “Scheme”) towards the Project.

7.3.2. The Contractor shall ensure that the Project shall comply with all the norms and guidelines of SECI [RfS No. SECI/JNNSM/SPV/P-2/B-1/RfS/102013 Dated: 28th October, 2013] and subsequent clarifications or amendments issued from time to time. The Contractor is required to refer above documents of SECI for necessary compliances of SECI’s requirements.

7.3.3. In case of any conflict between the Scheme and this Tender or any aspect of the Project, the Contractor shall immediately notify the Company 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 shall have no bearing on the Contract Price.

7.4. Project Site

7.4.1. Details of the Project Site will be as per the Annexure 1: Details of 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 Company’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 the Company as and when requested by the Company.

7.7. Net Electrical Energy Generation Guarantee (NEEGG)

7.7.1. The Bidder shall be required to quote the Net Electrical Energy Generation Guarantee (NEEGG) for 10 years period, which should not be lower than the Minimum Guaranteed Generation specified in the detailed Scope of Work. 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, 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.

7.7.2. 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 any 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.

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

7.7.4. The NEEGG so obtained or provided into the Bid Document for each consecutive year should have maximum 1% annual degradation factor in NEEGG. This NEEGG shall be used for the evaluation of the Bids as specified in the Financial Proposal.

7.7.5. The Bidder shall be required to quote the NEEGG for a 10 years period which shall not be higher than (+) 10% and lower than (-) 15% of the declared NEEGG as specified in the detailed Scope of Work. The Bidder shall give NEEGG per annum after considering proposed configuration and all local conditions, solar insolation, wind speed and direction, air temperature and 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, and various inverter losses, etc. To assess/ verify feasibility of quoted NEEGG, Bidders are required to provide computation documents along with considered factors base on which NEEGG has been computed.

7.7.6. This NEEGG shall be used for the evaluation of the Bids as specified in Appendix 13: Format for Financial Proposal.

7.8. Mode of Execution

7.8.1. 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.

7.9. Programme of Work

7.9.1. The Contractor/ Successful Bidder 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.

7.10. Starting of Work

7.10.1. 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 the GEDCOL accordingly.

7.11. Completion Schedule

7.11.1. The time of completion and Commissioning of the Plant is six (6) months from the date of issue of LOI. The O&M Contract Period is ten (10) years thereafter. However after the ten (10) years of O&M, upon mutual discussion between the Company and the Contractor, the Company may ask the Contractor to continue the O&M work for the remaining period of the working life of the plant. The rate of O&M shall be decided by considering the average rate for last three years of O&M and escalated as per the Central Electricity Regulatory Commission’s (CERC) norms prevailing at that time.

7.11.2. The Contractor shall inform the Company 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.

7.11.3. The Contractor shall prepare the completion schedule accordingly and in conformity 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.

7.12. Site Inspection & Basis of Bid
7.12.1. 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 the Company. In case of any defects arising in the building during guarantee period, the Contractor shall have to rectify the same at its own cost.

7.13. Price Escalation

7.13.1. The rate(s) quoted against the work shall remain firm during the entire Contract period.

7.14. Taxes and Duties

7.14.1. The price quoted shall be exclusive 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.

7.14.2. 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.

7.14.3. 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 GEDCOL 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 GEDCOL or GEDCOL 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 GEDCOL, 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 GEDCOL shall not admit the same; however GEDCOL 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 GEDCOL or GEDCOL shall admit the decreased rate of taxes and duties while making the payment.

7.14.4. Variation on account of exchange rate will not be payable. No statutory variation shall be payable by GEDCOL on the input items. i.e. raw materials etc.

7.14.5. No statutory variation shall be admitted if the excise duty becomes payable because of exceeding of the prescribed limits for turnover of the Bidder.

7.15. Procurement of Materials

7.15.1. 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 the Company for approval in respect of the materials procured by the Contractor.

7.16. Samples

7.16.1. Apart from adhering to special provision made in the specification regarding submission of samples, the Contractor shall within ten (10) days of its receipt of Letter of Award, provide to the Company 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. The Company shall check the samples and give his comments and/or approval to the same.

7.17. Notice of Operation

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

7.18. Rejection of Materials

7.18.1. The Company’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 from the Site of work.

7.19. Power and Water Supply during Construction

7.19.1. The Contractor shall arrange for the temporary Power Supply at the site for construction purpose at its own cost.

7.19.2. Cost of water shall be as per prevailing rate and to be borne by the Contractor. However, sweet water tapping at one point shall be provided by the Company.

7.19.3. 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.

7.19.4. The Company shall not provide facility for storage of material, and accommodation for labours at site. The Contractor shall make his own arrangement for the same.

7.20. Labour Engagement

7.20.1. 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.

7.20.2. 65% of the jobs that will be created due to the Project in the supervisory and managerial cadres and 80% of the jobs that will be created in other cadres due to the Project shall be filled in by employing the local persons. The expression “local person”
shall mean a person domicile in Odisha state for a minimum period of 15 years prior to applying for employment to Bidder.

7.21. **Handing Over –Taking Over**

7.21.1. The Project shall be taken over by the Company 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.

7.21.2. Immediately after taking over of complete Plant, the same will be handed over to the Contractor for Operation & Maintenance for a period of as mentioned in the Tender.

7.22. **Penalty for Loss of Generation**

7.22.1. If for any Contract Year, it is found that the Contractor is not able to generate minimum energy corresponding to the value of annual CUF below the lower limit of CUF declared by the Company to SECI on account of reasons solely attributable to the Contractor, for such shortfall in performance, the Contractor shall pay the compensation to the Company equivalent to sum payable by the Company or to SECI including REC. However, this compensation shall not be applicable in events of Force Majeure.

7.22.2. No additional amount shall be payable to Contractor for excess generation against the guaranteed CUF.
7.22.3. In case of any defect in the system after commission, the Contractor shall repair it within forty eight (48) hours. Otherwise penalty shall be charged and the same shall be deducted from the Bank guarantee submitted to the Company.

7.22.4. A penalty at the rate of Six Rupees and Eighty One Paisa Only (Rs. 6.81) per kWh of loss of generation calculated with respect to the Guaranteed CUF shall be imposed during the defect period by the Company on the Contractor calculated on a pro rata-basis.

7.22.5. All penalties shall be recovered from the bank guarantees available with the Company or payments yet to be made by the Company to the Contractor.

7.22.6. In case the Project fails to generate any power continuously for 1 year any time during the O&M period, it shall be considered as an Event of Default.

7.22.7. Upon occurrence of any Event of Default mentioned in Clause 7.22.6 herein above, the Company shall have the right to deduct from the O&M Bank Guarantee submitted by the Contractor, which shall be equal to the amount scheduled to be paid by SECI to the Company as VGF to the Company on a pro rata-basis.

7.22.8. Up to end of 5th years from the Commercial Operation Date (COD), amount equal to the full value of VGF disbursed by the SECI shall be recovered;

7.22.9. From 6th year and up to 10th year from the COD - amount equal to the following percentage of full VGF disbursed by SECI to the Company shall be deducted from the O&M Bank Guarantee.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Year of Default</th>
<th>Company’s Right on BG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>5-6 Years</td>
<td>90%</td>
</tr>
<tr>
<td>2.</td>
<td>6-7 Years</td>
<td>80%</td>
</tr>
<tr>
<td>3.</td>
<td>7-8 Years</td>
<td>70%</td>
</tr>
<tr>
<td>4.</td>
<td>8-9 Years</td>
<td>60%</td>
</tr>
<tr>
<td>5.</td>
<td>9-10 years</td>
<td>50%</td>
</tr>
</tbody>
</table>
7.23. Miscellaneous

7.23.1. The Project Manager appointed by EPC contractor shall not be replaced without the prior written approval of the Company.

7.23.2. Any Project Manager or member of the Contractor at Site shall be replaced within a period of forty eight (48) hours of intimation by the GEDCOL without assigning any reason thereof.

7.23.3. The Contractor shall take care of all statutory, local clearance, approvals, etc.

7.23.4. All warranties on the equipment shall be in the name of the Company with reference to the Clause No. 6.39.

7.23.5. 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, the Company is responsible to provide any additional amount other than the Contract Price.

7.23.6. 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.

7.23.7. 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 the Company’s approval of the new design or specification.

7.23.8. Based on reviewing the Project, if the progress is below expectation as judged based on the Company’s discretion, then the Company 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.

7.23.9. 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 the Company at the time of hand over at no
extra cost to the Company for the rest of the life of the Plant.

7.23.10. The Contractor shall construct a dedicated site office including tables, chairs, functional power outlets, light, fan air conditioner, etc. for at least four (4) people to host the Company’s employees or authorized representatives at the time of construction of the Plant.

7.23.11. Provision for installing any additional monitoring equipment to facilitate on-line transfer of data shall be provided by the Contractor at the request of the Company.

7.23.12. The Contractor shall dismantle two existing 33kV line and one 11kV line from the Project Site. The Contractor shall also construct an alternate route for above three lines. The Contractor shall also construct switchyard at Sub-station and evacuation line from 33kv substation to 220/33kv at Rengali. The construction of one 33kv bay at Rengali Substation alongwith extension of existing busbar which includes supply of all the materials and equipment shall also be done by the Contractor.

--- End of Section ---
Appendix 1: Format for Covering Letter

To,

The Dy. General Manager (EL)

Green Energy Development Corporation of Odisha Limited (GEDCOL)

OHPC Corporate Office, OSPH&W Corporation Building,

Janpath, Bhoinagar, Bhubaneshwar-751 022, Odisha

Sub: Submission of the Tender Document No. GEDCOL/05

Dear Sir,

We, the undersigned, have considered and complied with the "Instructions to Bidders" and have accepted the terms stipulated in the Tender Document No. GEDCOL/ 05 dated 28th April, 2014.

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 Eighty (180) days from the date of signing of Contract Agreement.

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 the Company in connection with the selection of Applicants, selection of the Bider, 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 date of floating the 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 2: 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 the 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 the 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 3: 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 GEDCOL shall not be considered towards technical evaluation of the Bidder.

D. The Bidder may indicate more than five (5) projects.

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Name of Client (with name and contact information of Contact Person)</th>
<th>PV Project AC/DC Capacity (in MW)</th>
<th>For Official Use Only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>LOA attached?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Commissioning Certificate attached?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Certificate of Satisfactory Completion attached?</td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td>Yes/ No</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td>Yes/ No</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td>Yes/ No</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td>Yes/ No</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td>Yes/ No</td>
</tr>
</tbody>
</table>

---
Appendix 4: Format of Details of Qualified Technical Staff

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Relevant Qualification</th>
<th>Additional Certifications</th>
<th>Total Years of Relevant Experience</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Kindly submit copies of resumes and appropriate certifications with this sheet. Additional sheets may be used to provide accurate information.
## Appendix 5: Format of Disclosure of PV Technology Proposed

### PV MODULE

<table>
<thead>
<tr>
<th>Type</th>
<th>Select One:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>□ Poly-crystalline Silicon</td>
</tr>
<tr>
<td></td>
<td>□ Mono-crystalline Silicon</td>
</tr>
<tr>
<td></td>
<td>□ Other variant of the above. Please specify ..................</td>
</tr>
</tbody>
</table>

| Manufacturer | : |
| Model Number | : |
| Module Capacity | : ................. W |
| No. of Cells per Module | : |
| No. of Modules | : |

### PV INVERTER

<table>
<thead>
<tr>
<th>Type</th>
<th>Select One:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>□ Central Inverter</td>
</tr>
<tr>
<td></td>
<td>□ String Inverter</td>
</tr>
<tr>
<td></td>
<td>□ Micro Inverter</td>
</tr>
<tr>
<td></td>
<td>□ Other, Please specify ..................</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Select One:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>□ Independent Operation</td>
</tr>
<tr>
<td></td>
<td>□ Master-Slave Operation</td>
</tr>
<tr>
<td></td>
<td>□ Other, Please specify ..................</td>
</tr>
</tbody>
</table>

| Manufacturer | : |
| Model Number | : |
| Inverter Capacity | : ................. kW |
| Number of Inverters | : |

### MODULE TRACKING

<table>
<thead>
<tr>
<th>Type</th>
<th>Select One:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>□ Fixed</td>
</tr>
<tr>
<td></td>
<td>□ 1-Axis Manual Seasonal</td>
</tr>
<tr>
<td></td>
<td>□ 1-Axis, Fixed Tilt, Automatic, Daily Tracking</td>
</tr>
<tr>
<td></td>
<td>□ 1-Axis, Azimuth, Automatic, Daily Tracking</td>
</tr>
<tr>
<td></td>
<td>□ 2-Axis, Automatic, Tracking</td>
</tr>
<tr>
<td></td>
<td>□ Other, Please specify ..................</td>
</tr>
</tbody>
</table>

---
Appendix 6: Format of Project Execution Plan

I. Division of Scope of Work

<table>
<thead>
<tr>
<th>Discipline/Equipment</th>
<th>Basic Engineering</th>
<th>Design/Detailed Engineering</th>
<th>Procurement</th>
<th>Supply</th>
<th>Project Management</th>
<th>Construction/fabrication/installation</th>
<th>Commissioning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES:
1. Bidder shall clearly indicate the agency which will carry out 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

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Activity</th>
<th>Start Date</th>
<th>End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Issue of LoA</td>
<td>Zero Date</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES:
1. The Bidder shall ensure that the entire work is completed within 6 (Six) months of issue of LoA.
2. All Start Dates and End Dates to be indicated with respect to the Zero Date, e.g. +3 Days.
3. The Bidder may use as many lines as required to satisfactorily provide the detailed project schedule.

SIGNATURE OF BIDDER
NAME
DESIGNATION
COMPANY SEAL DATE
Appendix 7: Format of Declaration of Compliance

Date:

To,

The Dy. General Manager (EL)
Green Energy Development Corporation of Odisha Limited (GEDCOL)
OHPC Corporate Office,
OSPH&W Corporation Building,
Janpath, Bhoinagar, Bhubaneshwar, Odisha-751 022


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 8: Format of No Deviation Certificate

Date:

To

The Dy. General Manager (EL)
Green Energy Development Corporation of Odisha Limited (GEDCOL)
OHPC Corporate Office,
OSPH&W Corporation Building,
Janpath, Bhoinagar, Bhubaneshwar, Odisha -751 022


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 9: Format of Declaration on Bidder's Relation to Directors

Date:

To

The Dy. General Manager (EL)

Green Energy Development Corporation of Odisha Limited (GEDCOL)

OHPC Corporate Office,

OSPH&W Corporation Building,

Janpath, Bhoinagar, Bhubaneshwar, Odisha -751 022

Sub: Declaration of relationship with Directors/any other employee/associates

Dear Sir,

This has reference to our proposed Bid regarding Engineering, Procurement, Construction, Operation and Maintenance of 20MW Solar Photovoltaic Grid Interactive Power Plant using Photovoltaic at Village: Rengali, District: Angul, Odisha, and for the purpose of Section 184/188 of the Companies Act, 2014, we certify that to the best of my/our knowledge:

i) I am not a relative of any Director of GEDCOL or;

ii) We are not a firm in which a Director of GEDCOL or its relative is a partner;

iii) I am not a partner in a firm in which a Director of GEDCOL or, or its relative is a partner;

iv) We are not a private company in which a Director of GEDCOL or is a member or director;

v) We are not a company in which Directors of GEDCOL or hold more than 2% of the paid-up share capital of our company or vice-versa.

__________________________________

Authorised Signatory of the Contracting Party

(Sign and Seal of Bidder)
Appendix 10: 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 Engineering, Procurement, Construction, Operation and Maintenance of 20MW Solar Photovoltaic Grid Interactive Power Plant using Photovoltaic at Village Rengali, District Angul, in the State of Odisha, pursuant to the Tender Document no. GEDCOL/ 05 issued by Green Energy Development Company of Odisha Limited (GEDCOL), 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 the Company, representing us in all matters before the Company, signing and execution of all contracts including the Contract Agreement and undertakings consequent to acceptance of our Bid, and generally dealing with the Company 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 GEDCOL.

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 11: Format of summary of Audited Financial Statements

To

The Dy. General Manager (EL)

Green Energy Development Corporation of Odisha Limited (GEDCOL)

OHPC Corporate Office,

OSPH&W Corporation Building,

Janpath, Bhoina gar, Bhubaneswar, Odisha -751 022

Sub: Summary of Financial Statement


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:

<table>
<thead>
<tr>
<th>Financial Year</th>
<th>Turnover (in INR)</th>
<th>Net Worth (in INR)</th>
<th>For Official Use Only Audited Statement Attached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-14</td>
<td></td>
<td></td>
<td>Yes / Unaudited / No</td>
</tr>
<tr>
<td>2012-13</td>
<td></td>
<td></td>
<td>Yes / No</td>
</tr>
<tr>
<td>2011-12</td>
<td></td>
<td></td>
<td>Yes / No</td>
</tr>
</tbody>
</table>
All figures indicated herein are arrived from the Audit Reports of the Bidder duly submitted to the Income Tax Department.

All figures indicated herein are calculated as per the guidelines mentioned in the RFP.

Sincerely yours,

[Official seal of the Chartered Accountant]

Date: [Insert Date]

Place: [Insert Place]

[NOTES:

A. If the audited statement (duly certified by Charted Accountant in practice) for FY 2013-14 is not available, then the unaudited statement for the same year shall be attached by the Bidder as a part of the Bid.

B. 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.

C. All audited/ unaudited statements to be attached by the Bidder as a part of the Bid.]
Appendix 12: 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:
The Dy. General Manager (EL)
Green Energy Development Corporation of Odisha Limited (GEDCOL)
OHPC Corporate Office,
OSPH&W Corporation Building,
Janpath, Bhoinagar, Bhubaneshwar, Odisha -751 022


Dear Sir,
A. With reference to the abovementioned RFP, 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 RFP, meeting all the provisions including but not limited to terms and conditions of the RFP and undertaking the Scope of Work as defined in the RFP.

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 RFP.

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 RFP.

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.]
Appendix 13: Format for Financial Proposal

Date:

To,

The Dy. General Manager (EL)
Green Energy Development Corporation of Odisha Limited ("GEDCOL")
OHPC Corporate Office,
OSPH&W Corporation Building,
Janpath, Bhoinagar, Bhubaneshwar, Odisha-751 022


Dear Sir,
I,______________________________________________________________
present the Financial Proposal for the Bid for “Engineering, Procurement, Construction, Operation and Maintenance of 20MW Solar Photovoltaic Grid-Connected Power Plant using Photovoltaic Technology at Village Rengali, District Angul in the State of Odisha on EPC basis through the Tender Document No. GEDCOL/05, 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, Construction, Operation and Maintenance of Supply & Installation of “Project” at Site. The break-up of taxes considered are also furnished in price bid.

iii. Rates quoted in this Bid are EXCLUSIVE 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 submission of the Bid:
(A) Table 5.A: Price Quote for EPC Contract

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Item</th>
<th>Unit rate/20 MW (without taxes &amp; duties)</th>
<th>Freight and transportation</th>
<th>Duties (if applicable)</th>
<th>Services Tax (if applicable)</th>
<th>CST (if applicable)</th>
<th>VAT (if applicable)</th>
<th>Final rate for each 20 MW SPV Plant (excluding CST/VAT)</th>
<th>Final Rate For each 20 MW SPV Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PV Modules</td>
<td>(A)</td>
<td>(B)</td>
<td>(C)</td>
<td>(D)</td>
<td>(E)</td>
<td>(F)</td>
<td>(G) = (A)+(B)+(C)+(D)</td>
<td>(H) = (A+B+C+D+E+F)</td>
</tr>
<tr>
<td>2</td>
<td>Inverters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Supply of Balance of System includes all equipment, materials, spares, accessories, MMS etc. excluding 1&amp;2 above</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Civil work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>General work including erection, commissioning, testing etc. of entire plant including MMS excluding 4 above</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- (A) = PV Modules
- (B) = Inverters
- (C) = Supply of Balance of System includes all equipment, materials, spares, accessories, MMS etc. excluding 1&2 above
- (D) = Civil work
- (E) = General work including erection, commissioning, testing etc. of entire plant including MMS excluding 4 above
Note:
1. EPC cost without CST/VAT 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.
### Table 5.B: Price Quote for O&M Contract

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Item</th>
<th>Rate (excluding service tax)# (in INR)</th>
<th>NEEGG(^1) (in kWh)</th>
<th>Resultant CUF % =100x NEEGG/87600000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operation and Maintenance of the 20 MW PV Grid Interactive Power Plant for First YEAR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Operation and Maintenance of the 20 MW PV Grid Interactive Power Plant for SECOND YEAR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Operation and Maintenance of the 20 MW PV Grid Interactive Power Plant for THIRD YEAR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Operation and Maintenance of the 20 MW PV Grid Interactive Power Plant for FOURTH YEAR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Operation and Maintenance of the 20 MW PV Grid Interactive Power Plant for FIFTH YEAR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Operation and Maintenance of the 20 MW PV Grid Interactive Power Plant for SIXTH YEAR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Operation and Maintenance of the 20 MW PV Grid Interactive Power Plant for SEVENTH YEAR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Operation and Maintenance of the 20 MW PV Grid Interactive Power Plant for EIGHTH YEAR</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) NEEGG mentioned here shall be same as mentioned in Table 2 of Appendix 4. In case of any discrepancy NEEGG mentioned in Table 5 (B) of Appendix 5 shall prevail.
9. Operation and Maintenance of the 20 MW PV Grid Interactive Power Plant for **NINTH YEAR**

10. Operation and Maintenance of the 20 MW PV Grid Interactive Power Plant for **TENTH YEAR**

# Only applicable service tax and any surcharge or cess thereon only shall be paid by the Company. All other applicable taxes are included in the quoted number.

Signature: ___________________________  Designation: ___________________________
Name: _______________________________
Address: ____________________________
__________________________________  Seal of the Company / Organization:
__________________________________  Phone: ___________________________
Email: _____________________________________________________________________
Appendix 14: Bid Evaluation Criteria (BEC)

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

i. EPC Contract Price (End cost)

ii. Net Electrical Energy Generation Guarantee (NEEGG) (considering annual de rating factor) NEEGG is considered after auxiliary consumption of solar plant

iii. NPV of O&M Price of Twenty five (25) years after EPC Contract (*considering uniform escalation quoted by bidder over 25 years)

iv. Energy Charges at Rs. 5.45/- per kWh

v. Depreciation @ 6.0% per year for 1 to 10 years and 2.0 % for 11 to 25 years

vi. Loan portion: 70 % of EPC End cost

vii. Interest on Loan: 10.5%

viii. Loan repayment period: 10 years (quarterly repayment)

ix. Discounting factor: 11.08 %

The Net Present Value (NPV) calculated using the above parameters shall be considered for evaluation as given below:

\[
\text{Evaluated Bid Value} = \text{NPV} (\text{NPV of Revenue of the Project based on NEEGG by the Bidder for 25 years and the tariff of Rs. 5.45 per kWh, discounted at 11.08% per annum.}) - \text{NPV of O&M Price quoted by the bidder for 10 years, discounted at 11.08% per annum.)}
\]

Following example will further clarify the methodology for comparison.
As offered by Bidder:

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EPC Contract Price</td>
<td>INR 118.00/- Crore</td>
</tr>
<tr>
<td>2</td>
<td>Guaranteed NEEGG</td>
<td>36.6 MU</td>
</tr>
<tr>
<td>3</td>
<td>Annual de rating factor (Maximum)</td>
<td>1%</td>
</tr>
<tr>
<td>4</td>
<td>Annual O&amp;M charges for first year of O&amp;M (% of EPC Cost offered by bidder)</td>
<td>0.5%</td>
</tr>
<tr>
<td>5</td>
<td>Escalation per year in O&amp;M cost</td>
<td>5.72%</td>
</tr>
</tbody>
</table>

Escalation per year in O&M cost offered in “5” above shall be considered uniformly over 1 to 11 years as well as 12 to 25 years.

The Gross Revenue generated for the year (at a fixed rate Rs 5.45 per kWh) shall be:

\[
\text{Gross Revenue} = \text{NEEGG} \times \text{Rs. 5.45 per unit}
\]

Bidder with highest NPV shall be L-1 and Bidder lower than that shall be the L-2.
Sample Calculation for 20 MW SPV Plant

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Item</th>
<th>Unit rate/ 20 MW (without taxes &amp; duties)</th>
<th>Freight and transportation</th>
<th>Duties (if applicable)</th>
<th>Services Tax (if applicable)</th>
<th>CST (if applicable)</th>
<th>VAT (if applicable)</th>
<th>Final rate for each 20 MW SPV Plant (excluding CST/VAT)</th>
<th>Final Rate For each 20 MW SPV Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(A)</td>
<td>(B)</td>
<td>(C)</td>
<td>(D)</td>
<td>(E)</td>
<td>(F)</td>
<td>(G) = (A)+(B)+(C)+(D)</td>
<td>(H) = (A+B+C+D+E+F)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>PV Modules</td>
<td>xx</td>
<td>Xx</td>
<td>xx</td>
<td>Xx</td>
<td>xx</td>
<td>xx</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Inverters</td>
<td>xx</td>
<td>Xx</td>
<td>xx</td>
<td>Xx</td>
<td>xx</td>
<td>xx</td>
<td>Q</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Supply of Balance of System includes all equipment, materials, spares, accessories, MMS etc. excluding 1&amp;2 above</td>
<td>xx</td>
<td>Xx</td>
<td>xx</td>
<td>Xx</td>
<td>xx</td>
<td>xx</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Civil work</td>
<td>xx</td>
<td>Xx</td>
<td>xx</td>
<td>Xx</td>
<td>xx</td>
<td>xx</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>General work including erection, commissioning, testing etc. of entire</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>Xx</td>
<td>xx</td>
<td>xx</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Value</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>----------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total plant including MMS excluding 4 above</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6= (1+2+3+4+5) Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Words Total Cost (G)</td>
<td>INR One Hundred Eighteen Crores Only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>In Words Total Cost (H)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P+Q+R+S+T=118 Crore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
**Bid Evaluation sample calculation sheet:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Energy Generation MWH (NEEGG)</th>
<th>Gross Revenue Rs. Crores</th>
<th>Interest Rs. Crores</th>
<th>Depreciation Amount Rs. Crores</th>
<th>O&amp;M Charge Rs. Crores</th>
<th>Total Expenditure Rs. Crores</th>
<th>Profit Rs. Crores</th>
<th>Cash Flow Rs. Crores</th>
<th>NPV (Rs. Crores)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7 = 4+5+6</td>
<td>8 = 3-7</td>
<td>9 = 8+5</td>
<td>-118</td>
<td>-118</td>
</tr>
<tr>
<td>2</td>
<td>36424.08</td>
<td>19.85</td>
<td>7.48</td>
<td>7.08</td>
<td>0.62</td>
<td>11.64</td>
<td>8.21</td>
<td>11.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>36059.84</td>
<td>19.65</td>
<td>6.62</td>
<td>7.08</td>
<td>0.66</td>
<td>10.82</td>
<td>8.83</td>
<td>12.37</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>35699.24</td>
<td>19.46</td>
<td>5.74</td>
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<td>0.70</td>
<td>9.98</td>
<td>9.48</td>
<td>13.02</td>
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<td></td>
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<tr>
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<td>35342.25</td>
<td>19.26</td>
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<td>0.74</td>
<td>9.16</td>
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<td>7</td>
<td>34638.94</td>
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<td>6.69</td>
<td>12.00</td>
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<td>9</td>
<td>33949.62</td>
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<td>1.4</td>
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<td>5.86</td>
<td>12.64</td>
<td>16.18</td>
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<tr>
<td>10</td>
<td>33610.13</td>
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<td>7.08</td>
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<td>5.05</td>
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<td>11</td>
<td>33274.03</td>
<td>18.13</td>
<td></td>
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<td>1.03</td>
<td>2.21</td>
<td>15.93</td>
<td>17.11</td>
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</tr>
<tr>
<td>12</td>
<td>32941.29</td>
<td>17.95</td>
<td></td>
<td>2.36</td>
<td>1.09</td>
<td>2.27</td>
<td>15.69</td>
<td>16.87</td>
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<td></td>
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<tr>
<td>13</td>
<td>32611.87</td>
<td>17.77</td>
<td></td>
<td>2.36</td>
<td>1.15</td>
<td>2.33</td>
<td>15.44</td>
<td>16.62</td>
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</tr>
<tr>
<td>14</td>
<td>32285.75</td>
<td>17.60</td>
<td></td>
<td>2.36</td>
<td>1.22</td>
<td>2.40</td>
<td>15.20</td>
<td>16.38</td>
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<td></td>
</tr>
<tr>
<td>15</td>
<td>31962.90</td>
<td>17.42</td>
<td></td>
<td>2.36</td>
<td>1.29</td>
<td>2.47</td>
<td>14.95</td>
<td>16.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>31643.27</td>
<td>17.25</td>
<td></td>
<td>2.36</td>
<td>1.36</td>
<td>2.54</td>
<td>14.71</td>
<td>15.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>31326.83</td>
<td>17.07</td>
<td></td>
<td>2.36</td>
<td>1.44</td>
<td>2.62</td>
<td>14.46</td>
<td>15.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>31013.57</td>
<td>16.90</td>
<td></td>
<td>2.36</td>
<td>1.52</td>
<td>2.70</td>
<td>14.20</td>
<td>15.38</td>
<td></td>
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<tr>
<td>19</td>
<td>30703.43</td>
<td>16.73</td>
<td></td>
<td>2.36</td>
<td>1.61</td>
<td>2.79</td>
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<tr>
<td>20</td>
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<td>1.70</td>
<td>2.88</td>
<td>13.69</td>
<td>14.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
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<td>16.40</td>
<td></td>
<td>2.36</td>
<td>1.79</td>
<td>2.97</td>
<td>13.43</td>
<td>14.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>29791.51</td>
<td>16.24</td>
<td></td>
<td>2.36</td>
<td>1.90</td>
<td>3.08</td>
<td>13.16</td>
<td>14.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>29493.59</td>
<td>16.07</td>
<td></td>
<td>2.36</td>
<td>2.01</td>
<td>3.19</td>
<td>12.89</td>
<td>14.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>29198.66</td>
<td>15.91</td>
<td></td>
<td>2.36</td>
<td>2.12</td>
<td>3.30</td>
<td>12.61</td>
<td>13.79</td>
<td></td>
<td></td>
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<td>25</td>
<td>28906.67</td>
<td>15.75</td>
<td></td>
<td>2.36</td>
<td>2.24</td>
<td>3.42</td>
<td>12.33</td>
<td>13.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These cells are not to be filled by the Bidder. They are fixed value and will remain same for the Bidder. It is being used only for calculation purpose.
Note: NEEGG is considered after auxiliary consumption of the solar power plan at the meter used for accounting purpose of the energy.
Appendix 15: Procedure for Performance Testing

Part A:

1. The Contractor shall furnish performance guarantees for the Solar PV modules for O&M period as given below:

   **Table 1: Solar PV module performance guarantees**

<table>
<thead>
<tr>
<th>Particulars</th>
<th>% of the specified actual capacity or requisite capacity of the PV panel (whichever is lower)</th>
<th>Applicable Test Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum annual degradation in any year during entire operation period</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degradation at the end of the 10th year of operation from the date of take over</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degradation at the end of the 25th year of operation from the date of take over</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part B: Solar PV power plant Net power generation

2. The below quoted NEEGG for any year shall be permitted with maximum 1% degradation factor in previous year generation.

3. Also the NEEGG quoted by the Contractor should not be lower than guaranteed resultant CUF.

4. The NEEGG declared by the Contractor at any point shall not be less than (-) 15% and (+) 10% of the guaranteed value of annual CUF for first 10 years and within +10% and -20% of guaranteed value of the annual CUF thereafter till the end duration of 25 years. The guaranteed NEEGG shall in no case result in to Capacity Utilization Factor of less than the Guaranteed Value. Bids failing to fulfil the
conditions stated in point above can be rejected by the Company for further evaluation.

5. The Contractor shall fill the ‘Net Electrical Energy Generation Guarantee’ for annual basis considering the Reference Global Average Radiation indicated in this RFP.

6. The NEEGG for 10 years shall be filled in the Financial Proposal.

7. The same will be used for the calculating CUF.

8. The Bidder shall clearly mention the technology used fixed, tilt or seasonal or (please specify) in Table 2. Selection of more than one Technology will disqualify the Bidder from the Bidding Process.

**Table 2: Technology used for the Solar PV Plant**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Technology Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fixed</td>
</tr>
<tr>
<td>2.</td>
<td>Manual Seasonal</td>
</tr>
<tr>
<td>3.</td>
<td>Automatic Daily</td>
</tr>
<tr>
<td>4.</td>
<td>Other (Pl. specify):</td>
</tr>
</tbody>
</table>

**Part C: The procedure for Final Acceptance test shall be as follows:**

9. A weather station with a calibrated pyranometer shall be installed by the Contractor at the location mutually agreed by the Contractor and the Company. The test report for the calibration shall be submitted by the Contractor for approval by the Company. The calibration should be traceable to a national/international laboratory. The output of this pyranometer for shall be logged in the SCADA system.

10. 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 the Company. However, for the dispute period for which such error has occurred and until the instrument is recalibrated to the satisfaction of the Company, data from any one of the following list of sources shall be considered in order:
i. Common pyranometer installed by site authority, if available

ii. Average of two closest solar power projects, as identified by the Company, within the site

iii. Nearest MNRE weather station

iv. Actual delivered energy from the plant supplied by the Contractor shall be noted for every month and summed up for entire year and capacity utilization factor (CUF). For this purpose, the net delivered energy at the metering point shall be taken into account.

11. Net Electrical Energy Guaranteed Generation “NEEGG” for the month is a generation quoted by the Contractor in the table below. The Contractor shall share the monthly “NEEGG” and annual CUF with the Company together with the details of the panels, inverters, the magnitude of all the losses anticipated, IAM factor, and all other factors necessary for the Company to corroborate the estimate. The Company has the right to reject the Contractor’s CUF. For the purpose of calculating guaranteed CUF Contractor shall use following global horizontal radiation values “Reference Radiation” given in Annexure 1.

12. The measured value of energy at step (ii) shall be compared with Base NEEGG and hence with base CUF value. “Base CUF” for a month is calculated CUF by using the NEEGG by the Contractor in the Technical datasheet adjusted with a correction factor to take into account the actual average global solar radiation measured by the calibrated pyranometer for that year.

13. Further, if the plant is not able to achieve the calculated Base CUF during the PG test period and there is a shortfall in energy generation, then the Contractor shall be penalized as per relevant clause of the RFP.

Following factors shall be considered for computing the Base CUF:

14. Effect due to variation of meteorological parameters e.g. ambient temperature, wind speed, humidity etc. shall not be considered.

15. 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 the Final Acceptance Test.
Appendix 16: List of Banks (for Bank Guarantee)

Bank Guarantee from the following Banks will be acceptable.

<table>
<thead>
<tr>
<th>1. SCHEDULED COMMERCIAL BANKS</th>
<th>3. OTHER PUBLIC SECTOR BANKS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SBI AND ASSOCIATES</strong></td>
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<tr>
<td>1. State Bank of India</td>
<td>1. IDBI Bank Ltd.</td>
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<td>2. State Bank of Hyderabad</td>
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<td><strong>2. NATIONALISED BANKS</strong></td>
<td>4. SCHEDULED PRIVATE BANKS</td>
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<tr>
<td>1. Allahabad Bank</td>
<td>1. HDFC Bank Ltd.</td>
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<td>2. Andhra Bank</td>
<td>2. Karnataka Bank</td>
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<td>5. Canara Bank</td>
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<td>6. Central Bank of India</td>
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<td>7. Indian Overseas Bank</td>
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<td>8. Punjab National Bank</td>
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<td>10. Syndicate Bank</td>
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<td>11. Union Bank of India</td>
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<td>12. United Bank of India</td>
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<tr>
<td>13. Bank of Baroda</td>
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</tbody>
</table>
18. UCO Bank

- 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 GEDCOL will be at liberty to encash the same.
Appendix 17: Format of Earnest Money Deposit

[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. Foreign entities submitting Bid are required to follow the applicable law in their country]

Ref: No.: ___________________  Bank Guarantee No.: ___________________

Date: __________________________

To,

Green Energy Development Corporation of Odisha Ltd
(100% subsidiary of OHPC Ltd.)
Odisha State Police Housing & Welfare Corporation Building
VaniVihar Chowk, Janpath.
Bhubaneswar- 751022.

Dear Sir,

In accordance with your Notice Inviting Tender for Engineering, Procurement, Construction, Operation and Maintenance of 20 MW Grid-Connected Solar Photovoltaic Power Plant at Village: Rengali, District Angul, Odisha under your Tender Document No. GEDCOL/ 05 dated 28 April, 2014 M/s. ________________________________________________________________________________________________ (Name & full address of the firm), hereinafter called the Tenderer, hereby submits the Bank Guarantee:

Whereas to participate in the said Tender for the Scope of Work specified in Clause 5 of the Tender Document, it is a condition in the Tender Documents that the Tenderer has to deposit Earnest Money amounting to Rupees One Crore Fifty Lakhs Only (Rs.1,50,00,000/-) in respect to the Tender, with M/s Green Energy Development Corporation of Odisha Ltd., (100% subsidiary of OHPC Ltd., a Government of Odisha PSU company) registered under the
Companies Act, 1956 having its registered office at Odisha State Police Housing & Welfare Corporation Building, Vani Vihar Chowk, Janpath, Bhubaneswar-751022, hereinafter called the “Company” (which expression shall include its successors in business and assigns) by a Bank Guarantee from a Nationalized Bank irrevocable and operative for a period of six (6) months from the Bid Submission Deadline (i.e. 217 days from the date of floating of this Tender) for the like amount which amount is likely to be forfeited on the happening of contingencies mentioned in the clause 3.13.10 of the Tender Document.

And whereas the Tenderer agrees to submit the same, following the clauses from 3.13.1 to 3.13.10 of the referred Tender Document.

Now, therefore, we ________________Bank, hereinafter referred to as "the Bank" and ______________________________________ (name and address of the branch Office at Bhubaneswar), hereinafter referred to as the “Guarantor” do hereby undertake and agree to pay forthwith on demand in writing by the Company of the said guaranteed amount without any demur, reservation or recourse.

We, the aforesaid Bank, further agree that the Company shall be the sole judge of and as to whether the Tenderer has committed any breach or breaches of any of the terms, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by the Company on account thereof to the extent of the Earnest Money required to be deposited by the Tenderer in respect of the said Tender Document and the decision of the Company that the Tenderer has committed such breach or breaches and as to the amount or amounts of loss, damage, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by the Company shall be final and binding on us.

We, the said Bank further agree that the Guarantee herein contained shall remain in full force and effect until it is released by the Company and it is further declared that it shall not be necessary for the Company to proceed against the Tenderer before proceeding against the Bank and the Guarantee herein contained shall be invoked against the Bank, notwithstanding...
any security which the Company may have obtained or shall be obtained from the Tenderer at any time when proceedings are taken against the Bank for whatever amount that may be outstanding or unrealized under the Guarantee.

The right of the Company to recover the said amount of **Rupees One Crore Fifty Lakhs Only (Rs.1,50,00,000/-)** from us in manner aforesaid will not be precluded/affected, even if, disputes have been raised by the said M/s _________________________________(Tenderer) and/or dispute or disputes are pending before any authority, officer, tribunal, arbitrator(s) etc.

This Guarantee shall not be determined or affected by the liquidation or winding up, dissolution or change of constitution or insolvency of Tenderer and the Bank, but shall in all respects and/or for all purposes be binding and operative on "the Bank" until payment of all moneys payable by Tenderer in terms thereof.

Not withstanding anything contained herein above:

i. Our liability under this guarantee shall not exceed **Rupees One Crore Fifty Lakhs Only (Rs.1,50,00,000/-)**,

ii. This Bank Guarantee shall be valid up to and including 217 days from the 28th April, 2014 to 26th November, 2014; and

iii. We the _______________________ Bank through our local branch office at ________________________________________________________________ (Name & Address of the Local Branch at Bhubaneswar) are liable to pay the guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand any day within **45 days** from the date of expiry of this guarantee i.e. on or before **10th January, 2015**.

IN WITNESS whereof, the _______________________ Bank, through its authorized Officer, has set its hand and stamp on this _______ day of ________________ at ________________.
For, _____________________ Bank,

Signature: _________________________________
Name: _________________________________
Designation___________________________
Address: _______________________________
_____________________________________
Power of Attorney No.: ____________________

______________________________

Banker’s Stamp and Full address.

Dated this ____________ day of ______________, 2014
Appendix 18: Format of Advance Bank Guarantee

Ref.: ___________________  Advance Payment Guarantee No: ___________________

Date: ____________________________

To,

Green Energy Development Corporation of Odisha Ltd

(100% subsidiary of OHPC Ltd.)

Odisha State Police Housing & Welfare Corporation Building

VaniVihar Chowk, Janpath,

Bhubaneswar-751022, Odisha

In consideration of M/s Green Energy Development Corporation of Odisha Limited, (100% subsidiary of OHPC Ltd.a Government of Odisha PSU company) registered under the Companies Act,1956, having its registered office at Odisha State Police Housing & Welfare Corporation Building, VaniVihar Chowk, Janpath, Bhubaneswar-751022, hereinafter called the “Corporation” (which expression shall include its successors in business and assigns thereof) having awarded the Contract to M/s ____________________________ a partnership firm/Sole Proprietor/a company registered under the Companies Act,1956, having its office at _______________________ (complete address) ____________, hereinafter called the “Contractor” (which expression shall include its successors in business and assigns thereof) vide the “Contract Agreement” dated ____________ for the Scope of Work mentioned in clause 5 of the Tender Document and any alterations/ amendments made in the same before the date of submission of Tender for Engineering, Procurement, Construction, Operation and Maintenance of 20 MW Grid-Connected Solar Photovoltaic Power Plant at Village: Rengali, District Angul, State: Odisha and having agreed to pay the Contractor as and by way of advance up to a sum of Rupees __________________ being 10% of the Contract Price.
We, _______________ Bank, hereinafter referred to as "the Bank", do at the request and on behalf of the Contractor hereby agree to pay to the Corporation without any demur on first demand an amount not exceeding Rs. _________________________ (in words) against any loss or damage, costs, to or suffered by the Corporation by reason of any breach on the part of the Contractor of any of the terms and conditions of the Contract Agreement.

We, _______________ Bank, further agree that the Corporation shall be the sole judge whether the said Contractor has committed breach of any of the terms and conditions of the Contract Agreement and the extent of loss, damage, cost, charges and expenses suffered or incurred or would be suffered or incurred by the Corporation on account thereof and we waive in favour of the Corporation all the rights and defences to which we as Guarantors and/or the Contractor may be entitled to.

We, _______________ Bank, further agree that the amount demanded by the Corporation as such shall be final and binding on the Bank as to the Bank's liability to pay the amount demanded and the Bank undertake to pay the Corporation the amount so demanded on first demand without any demur notwithstanding any dispute raised by the Contractor or any suit or other legal proceedings including arbitration pending before any court, tribunal or arbitrator relating thereto, our liability under this Guarantee being absolute and unconditional.

We, _______________ Bank, further agree that the Guarantee herein contained shall remain in full force and continue to have full effect so long as the said amount remains unadjusted.

We, _______________ Bank, further agree with the Corporation shall have the fullest liberty without any consent and without affecting in any manner our obligations hereunder to vary any of the terms and condition of the said Contract Agreement or to extended time of performance by the Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the Corporation against the Contractor and to forbear to enforce any of the terms and conditions relating to the Contract Agreement and we shall not be relieved from our liability by reason of any such variation or extension being granted to the Corporation or for any forbearance, act or omission of
the Contractor or any such matter of things, whatsoever which under the law relating to sureties would, but for these provisions, have the effect of relieving us.

We, ________________ Bank, hereby lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Corporation in writing.

Notwithstanding anything contained herein above:

i. Our liability under this guarantee shall not exceed Rs. ________________ (10% of the Contract Price),

ii. This Bank Guarantee shall be valid up to and including ____ (date)____ (Nine months from the date of signing of Contract Agreement),

iii. We the ____________ Bank through our local branch office at ______________________________ (Name & Address of the Local Branch at Bhubaneswar) are liable to pay the Guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand within forty five (45) days from the date of expiry of this Guarantee.

This guarantee shall not be determined or affected by the liquidation or winding up, dissolution or change of constitution or insolvency of "the Supplier" and the Bank, but shall in all respects and/or for all purposes be binding and operative on "the Bank" until payment of all moneys payable by "the Supplier" in terms thereof.

IN WITNESS whereof, the Bank__________, through its authorized Officer, has set its hand and stamp on this _________________________ day of _________________________ at ______________________________.

For, ____________ Bank,
Signature: ______________________________

Name: ________________________________

Designation: __________________________

Address: ______________________________

_____________________________________

Power of Attorney No.: ________________

_____________________________________

Banker’s Stamp and Full address.

Dated this_________ day of ____________, 2014
Appendix 19: 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. Foreign entities submitting Bid are required to follow the applicable law in their country]

Ref.: _________________________ Bank Guarantee No.: _________________________

Date: _____________________________

To,

M/s Green Energy Development Corporation of Odisha Ltd,

(100% subsidiary of OHPC Ltd.)

Odisha Police Housing Corporation Buildings,

Vani Vihar Chowk, Bhubaneswar-751022

Khurda District, Odisha

In consideration of M/s Green Energy Development Corporation of Odisha Limited (100% subsidiary of OHPC Ltd., a Government of Odisha PSU company) registered under the Companies Act, 1956, having its registered office at Odisha State Police Housing & Welfare Corporation Building, Vani Vihar Chowk, Janpath, Bhubaneswar-751022, herein after called the “Corporation” (which expression shall include its successors in business and assigns thereof) having awarded the work to M/s ________________________________ a partnership firm/Sole Proprietor/a company registered under the Companies Act, 1956, having its office at ________________________________ (complete address), hereinafter called the “Contractor” which expression shall include its successors in business and assigns thereof) vide “Contract Agreement” dated _________________________ for the Scope of Work specified in clause 5 of the Tender Document for Engineering, Procurement, Construction, Operation and Maintenance of 20 MW Grid-Connected Solar Photovoltaic Power Plant at Village: Rengali, District Angul, State: Odisha, which shall include any amendments/alterations made in the Tender Document thereto before the date of submission of the Tender by the Corporation and the corporation having agreed:

(Sign and Seal of Bidder)
i. Not to insist upon immediate payment of security deposit for the fulfillment and performance of the Scope of Work.

ii. That the Contractor shall furnish a security for the performance of the Contractor’s obligations and/or discharge of the Contractor’s liability in connection with the Contract Agreement and the Corporation having agreed with the Contractor to accept a composite Bank Guarantee for the security deposit and performance guarantee.

We, __________________ Bank having office at _________________________________
_________________________________________________, hereinafter referred to as the "Bank" (which expression shall include its successors and assigns) at the request and on behalf of the Contractor hereby agree to pay to the Corporation without any demur on first demand an amount not exceeding Rupees _____(in words)______ only (Rs. ___(in numbers)____) being 10% of the Contract Price, against any loss or damage, costs, changes and expenses caused to or suffered by Corporation by reason of non-performance and fulfillment or for any breach on the part of the Contractor of any of the terms and conditions of the referred Tender Document.

We, ________________ Bank, further agree that the Corporation shall be the sole judge whether the said Contractor has failed to perform or fulfill the guaranteed performance and the extent of loss, damage, cost, charges and expenses suffered or incurred or would be suffered or incurred by the Corporation on account thereof and we waive in favour of the Corporation all the rights and defences to which we as guarantors and/or the Contractor may be entitled to.

We, ________________ Bank, further agree that the amount demanded by the Corporation as such shall be final and binding on the Bank as to the Bank’s liability to pay the amount demanded and the Bank undertake to pay the Corporation the amount so demanded on first demand without any demur notwithstanding any dispute raised by the Contractor or any suit or other legal proceedings including arbitration pending before any court, tribunal or
arbitrator relating thereto, our liability under this guarantee being absolute, unconditional and irrevocable.

We, _________________________ Bank, further agree with the corporation that the Corporation shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the Contract Agreement/or to extend time of performance by the Contractor from time to time or to postpone for any time to time any of the powers exercisable by the Corporation against the Contractor and to forbear to enforce any of the terms and conditions to Contract Agreement and we shall not be relieved from our liability by reason of any forbearance, act or omission on the part of the Corporation or any indulgence by the Corporation to the Contractor or by any such matter or things whatsoever which under the law relating to sureties would but for this provision have the effect of relieving us.

However, it has been agreed between the Contractor and the Corporation that there shall be only one composite Bank Guarantee for both the Security Deposit and Performance Guarantee valid for a period of twenty four (24) months from the date of signing of the Contract Agreement as per the terms of the referred Tender Document.

We, _________________________ Bank, hereby lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Corporation in writing.

Notwithstanding anything contained herein above:

i. Our liability under this Guarantee shall not exceed Rs. ________________________ (10% of the Contract Price),

ii. This Bank Guarantee shall be valid up to and including ____________________ (24 months from the date of signing of Contract Agreement),

iii. We the _____________________ Bank through our local branch office at ___________________________________________________________________________ (Name & Address of the Local Branch at Bhubaneswar) are liable to pay the Guarantee amount or any part thereof under this Bank Guarantee only and only if you
serve upon us a written claim or demand on or before forty five (45) days from the
date of expiry of this Guarantee.

This guarantee shall not be determined or affected by the liquidation or winding up,
dissolution or change of constitution or insolvency of the Contractor and the Bank, but shall
in all respects and/or all purposes be binding and operative on the Bank until payment of all
moneys payable by the Contractor in terms thereof.

IN WITNESS whereof, the ____________________ Bank through its authorized Officer, has
set its hand and stamp on this ______ day of ____________ at
_____________________

For, ____________________ Bank,

Signature: ______________________________
Name: ______________________________
Designation: ______________________________
Address: ___________________________________
___________________________________________
Power of Attorney No._______________________

_________________________________________
Banker’s Stamp and Full address

Dated this___________day of _____________, 2014
Appendix 20: 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. Foreign entities submitting Bid are required to follow the applicable law in their country]

Ref.: ______________________  Bank Guarantee No.: ________________
Date: _______________________  

To,
M/s Green Energy Development Corporation of Odisha Ltd,
(100% subsidiary of OHPC Ltd.)
Odisha Police Housing Corporation Buildings,
Vani Vihar Chowk, Bhubaneswar-751022
Khurda District, Odisha

In consideration of M/s Green Energy Development Corporation of Odisha Limited (100% subsidiary of OHPC Ltd., a Government of Odisha PSU company) registered under the Companies Act,1956, having its registered office at Odisha State Police Housing & Welfare Corporation Building, Vani Vihar Chowk, Janpath, Bhubaneswar-751022, herein after called the “Corporation” (which expression shall include its successors in business and assigns thereof) having awarded the O&M Contract to M/s ________________________________ a partnership firm/Sole Proprietor/a company registered under the Companies Act, 1956, having its office at 

________________________________ (complete address), hereinafter called the “Contractor” (which expression shall include its successors in business and assigns thereof) through the “Contract Agreement” date __________ for the Operation and Maintenance of the 20 MW Grid-Connected Solar Photovoltaic Power Plant at Village: Rengali, District Angul, State: Odisha:
We, __________________ Bank having office at ________________________________, hereinafter referred to as the "Bank" (which expression shall include its successors and assigns) at the request and on behalf of the Contractor hereby agree to pay to the Corporation without any demur on first demand an amount not exceeding Rupees _____(in words)______ only (Rs. ___(in numbers)_____ ) being 10% of the Contract Price, against any loss or damage, costs, charges and expenses caused to or suffered by Corporation by reason of non-performance and fulfillment 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 Corporation shall be the sole judge whether the said Contractor has failed to perform or fulfill 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 Corporation on account thereof and we waive in favour of the Corporation all the rights and defenses to which we as Guarantors and/or the Contractor may be entitled to.

We, _____________________ Bank, further agree that the amount demanded by the Corporation as such shall be final and binding on the Bank as to the Bank's liability to pay the amount demanded and the Bank undertake to pay the Corporation the amount so demanded on first demand without any demur notwithstanding any dispute raised by the Contractor or any suit or other legal proceedings including arbitration pending before any court, tribunal or arbitrator relating thereto, our liability under this Guarantee being absolute, unconditional and irrevocable.

We, ______________________Bank, further agree with the Corporation that the Corporation shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the Contract Agreement /or to extend time of performance by the Contractor from time to time or to postpone for any time to time any of the powers exercisable by the Corporation against the Contractor and to forbear to enforce any of the terms and conditions to Contract Agreement
and we shall not be relieved from our liability by reason of any forbearance, act or omission on the part of the Corporation or any indulgence by the Corporation to the Contractor or by any such matter or things whatsoever which under the law relating to sureties would but for this provision have the effect of relieving us.

However, the Bank Guarantee shall be valid for a period of one (01) year from the date final Performance Acceptance Test as per clauses 3.13.14, 3.13.15 and 3.13.16 of the Tender Document.

We, __________________ Bank, hereby lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the Corporation in writing.

Notwithstanding anything contained herein above:

i. Our liability under this guarantee shall not exceed Rs. __________________________
   (10% of the Contract Price),

ii. This Bank Guarantee shall be valid up to and including __________________________ (One year from the date of final Performance Acceptance Test),

iii. We the __________________ Bank through our local branch office at _______________________
    (Name & Address of the Local Branch at Bhubaneswar) are liable to pay the Guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand within forty five (45) days from the date of expiry of this Guarantee.

iv. This guarantee shall not be determined or affected by the liquidation or winding up, dissolution or change of constitution or insolvency of the Contractor and the Bank, but shall in all respects and/or for all purposes be binding and operative on the Bank until payment of all moneys payable by the Contractor in terms thereof.

IN WITNESS whereof, the __________________ Bank through its authorized Officer, has set its hand and stamp on this ______ day of ______________ at _______________________.

(Sign and Seal of Bidder)
For, _______________________ Bank,

Signature: ________________________________
Name: ________________________________
Designation: ____________________________
Address: ________________________________

_________________________________________
Power of Attorney No._______________________

_________________________________________
Banker’s Stamp and Full address

Dated this___________day of ______________, 2014
Appendix 21: Format of Agreement between the GEDCOL and the Contractor

This agreement is made at BHUBANESHWAR 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 Green Energy Corporation of Odisha Limited. having their Head Office at OHPC Corporate Office, OSPH&W Corporation Building, Janpath, Bhojanagar, Bhubaneshwar, Odisha -751 022 (hereinafter called “The GEDCOL” which expression shall unless excluded by or repugnant to the context include its successors or assigns) of the other part.

WHEREAS the aforesaid GEDCOL has accepted the tender of the aforesaid contractors for ---------------------------------------------as per GEDCOL’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 the GEDCOL 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 THE GEDCOL 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 therefrom respectively or are reasonably necessary for the completion of the works as mentioned and at the times, in the manner and subject to the terms, conditions and stipulations contained in this contract, and in consideration of the due provision, executions, construction and completion of the works agreed to by the contractors as aforesaid, the GEDCOL doth 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 the GEDCOL to enforce penalty for delays and / or any other rights whatsoever including the right to reject and cancel on default or breach by the contractors of the conditions and the covenants as stipulated in the general conditions, specifications, forms, or tender schedule, drawing, etc., attached with GEDCOL’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.
2.
3.
4.
5.
6.
7.
8.

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

1. Signed, Sealed and delivered by:

(Signature with Name, Designation & official seal)

for and on behalf of M/s.________________

[ ]

In the presence of name, Full Address & Signatures:
   i).

   ii).

2. Signed, Sealed and Delivered by:

(Signature with Name, Designation & official seal)

   For and on behalf of Green Energy Corporation of Odisha Ltd.,
   OHPC Corporate Office, OSPH&W Corporation Building, Janpath, Bhoisagar, Bhubaneswar, Odisha -751 022

In the presence of Name, Full Address & Signature:
   i)

   ------------------------------
   ii) ------------------------------
Annexure 1: Details of Site

Site Location:

The proposed power project shall be located at Plant at Village: Rengali, District: Angul, Odisha in the State of Odisha.

The site is located at Latitude 21°16.21’N and Longitude 85°01.08’E.

The nearest urban area from the site is Talcher which is located approximately at a distance of 65 kms.

Access to Site: The access to the Site is indicated in the schematic provided.

The site is accessible by service road and are 55 km away from national highway NH-200 and nearest railway station is Kulie Railway Station.

The nearest international airport from the site is at Bhubaneshwar, which is at a distance of about 200 km from the site.

Land

The land for the proposed Project has been acquired.

The land compromising the Project Site is available for use for this Project.

The preliminary topographical survey and soil survey has to be carried out by the agency i.e EPC contractor. The site for proposed project is uneven and requires considerable cutting and filling before starting the construction work. The scope of works shall also include making necessary approaches and measures to minimize soiling and dusting.

The technical report of geotechnical investigation (Soil Test Report) of the site is attached as Annexure 4 for initial guidance of the Bidder. However the agency has to carry out soil investigation through Govt. Approved laboratory for designing of the civil foundations, structures, control room building, inverter building etc.
Geology:

- Geotechnical status:

  i. The Site is a largely flat land with slight undulation and is located at the altitude of 115 m from the mean sea level (MSL). The land area is having mild slope from North to South which makes it favourable for SPV development since the movement of sun is from east to west, slightly inclined towards south. Moreover, solar modules in the power plants are always south facing tilted at latitude angle of the location hence south inclination is favourable for SPV power project. Upper layer of soil is observed to be murum and rocky, hence civil work for foundation will be easier. Two 33 kV
lines are passing over the site; hence 9 m corridor needs to be left for each line for operation and maintenance of the lines.

ii. At the site, rocky outcrops have been witnessed in the south and south west direction whereas alluvial thickness increases towards the North.

B. Drainage:
   a. The site does not have any perennial drainage system.

There are couple of seasonal nalah is traversing the site in from the mountains in north-south direction sloping towards the mainland.

Weather Condition:

The climatology data of nearby station Angul has been obtained from the IMD data book. As per IMD (30 years average) data of Angul, annual average maximum and minimum temperatures are 32.60°C and 21.00°C with the highest temperature recorded at 44.40°C and lowest temperature recorded at 9.70°C. The annual average relative humidity is 74%, minimum 54% in summer and maximum 83% in the monsoon. Annual clear sky days are 134. For 130 days/year the visibility is 10-20 km. Average annual wind speed is 6.7 km/h. No hailstorm is reported. On an average, the area experiences 33 days of thunder storm, 4 foggy days and 1 dust storm day. As regard storm, maximum wind speed is reported to be less than 62 km/hr. There are only 4 days in a year that experiences moderately high wind speeds of 20-61 km/hr. Hence, the area has moderate wind speed on an average in the year, which will not adversely affect the strength of structures. Other climatic parameters are in general favourable for solar power generation.

Ideally, actual measurement of solar radiation at the site is desirable for estimating the projected power output since solar energy is the raw material for power generation. It may be noted that the annual average solar radiation measurement even for 1-2 years is not sufficient. World over, an average radiation value for at least 8-10 years is used for solar power project designing since climatic variations are quite wide year-to-year. Under such a situation, the prevailing practice world over is to develop software which uses satellite measured solar radiation and matches it with the actual ground measured data for the particular site where
actual data has been obtained for many years. Thus, a co-relation between satellite data and actually measured ground data is developed through the software, which helps in deriving the radiation values for unknown sites where actual ground measured data are not available. In the present study, the well known software of METEONORM has been used for deriving radiation data for the given sites.

For the photovoltaic solar applications the cell absorbs both direct and diffused sunlight hence, GHI is an important parameter, which is the measurement of total solar radiation including direct and diffused radiation on horizontal surfaces usually measured using Pyranometer. However, the SPV modules in power projects are typically placed at the latitude angle from the ground surface for getting optimum power generation. Therefore, GTI (Global Irradiance on Tilted surface) become more relevant. Hence, GTI monthly values have been derived using METEONORM software (20 years average data) for the tilt angle equal to latitude of given location. The derived values are tabulated below:

Reference DATA:

The GTI values around 2000 kWh/m2/year are ideally suited for developing SPV power project. It is for Bidders reference only.

IMD data of the Site

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Zone</td>
<td>4.5-5.0 kWh/sq.m</td>
</tr>
<tr>
<td>Annual Average Temperature</td>
<td>25°</td>
</tr>
<tr>
<td>Annual Average Daily Maximum Temperature</td>
<td>25.2°</td>
</tr>
<tr>
<td>Maximum Temperature (recorded for Bhubneshwar)</td>
<td>42.2°</td>
</tr>
<tr>
<td>Annual Average Highest Temperature</td>
<td>29.2°</td>
</tr>
<tr>
<td>Annual Average Lowest Temperature</td>
<td>21.4°</td>
</tr>
<tr>
<td>Annual Average Rainfall</td>
<td>3.74 cm</td>
</tr>
<tr>
<td>Annual rainfall</td>
<td>44.81 cm</td>
</tr>
</tbody>
</table>
i) Water Supply:

Surface Water:

- Water level depth at both the sites in winter is in the range of 2-5 m in winter and 5-10 m during summer. It has been reported by OHPC officials that sufficient potable water will be available by constructing a tube-well at site. Water table level map of angul district is given below:

![Water table level map of angul district](image)

FIGURE 2.5: Water table level map of angul district

- Nearest source of water is Samal Dam and Reservoir and Brahmani River is 15 to 20 km away from the identified site.
Rainwater:

- At the given site, rainfall is one of the major sources of water which is primarily used for cultivation.

Ground Water:

- Ground water level ranges between 05 to 10 m.

- Ground water in the region is easily available at a depth of 5m to 10 m.

**Plot Details of site at Rengali, Odisha:**

![Plot Details of site at Rengali, Odisha](image)
Annexure 2: Topographical Survey Report

It will be provided later on.
Annexure 3: Soil Investigation Report

It will be provided later on.
Annexure 4: Water Test Report

It will be provided later on.