NOTICE INVITING TENDER
FOR
DESIGN, ENGINEERING, MANUFACTURE, PROCUREMENT & SUPPLY, ERECTION, TESTING, COMMISSIONING AND COMPREHENSIVE OPERATION & MAINTENANCE FOR 5 (FIVE) YEARS OF
10MW (AC) SOLAR PV PLANT ON TURNKEY BASIS
AT
VILL. BADI SID, TEHSIL – BAP, PHALODI, DISTRICT – JODHPUR, RAJASTHAN

SOLAR ENERGY CORPORATION OF INDIA

(A Government of India Enterprise)

Ist floor, Wing A, Religare Building, D – 3, District Centre, Saket, New Delhi – 17

Tel: 011 – 71989230, Fax: 011 – 71989241

CONTENTS

SECTION – I

INVITATION FOR BIDS (IFB)

(BID DOCUMENT NO. – SECI – SGM10 – 1 – 2015)

SOLAR ENERGY CORPORATION OF INDIA

(A Government of India Enterprise)

I[st] floor, Wing A, Religare Building, D – 3, District Centre, Saket, New Delhi – 17

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DETAILED NOTICE INVITING TENDER

Solar Energy Corporation of India
(A Govt. of India Enterprise)

NOTICE INVITING TENDER FOR
DESIGN, ENGINEERING, MANUFACTURE, PROCUREMENT & SUPPLY, ERECTION, TESTING, COMMISSIONING AND COMPREHENSIVE OPERATION & MAINTENANCE FOR 5 (FIVE) YEARS OF 10MW (AC) SOLAR PV PLANT AT VILL. BADI SID, TEHSIL – BAP, PHALODI, DISTRICT – JODHPUR, RAJASTHAN

NIT No.: SECI–SGM10–1–2015 Date: 12.06.2015

1 Solar Energy Corporation of India (SECI) (hereinafter called as "Employer") invites sealed bids from eligible bidders for Design, Procurement, Construction, Development and comprehensive O&M of 10 MW(AC) Solar Photovoltaic Plant at Vill. Badi Sid, Tehsil – Bap, Phalodi, District - Jodhpur, State of Rajasthan, India, on turnkey basis, as per the Scope of Work mentioned hereinafter – EPC towards successful commissioning plus 1 year of assured performance demonstration from date of commissioning And comprehensive O&M of the plant for 5 (Five) years thereafter.

2 Brief Scope of work

The Brief Scope of Work shall include, but not limited to, the following:

2.1 Design, engineering, manufacturing, procurement & supply, packing and forwarding, transportation, unloading, storage, erection & installation, Testing, commissioning, 1 year assured performance demonstration after commissioning and comprehensive O&M for 5 (Five) years of 10MW(AC) SPV plant thereafter

2.2 Design, Procurement & Supply of the following:

2.2.1. Solar panels

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

2.2.3. Provision to install and setup a communication infrastructure to send telemetry data to the respective state load despatch centre (SLDC).

2.2.4. All associated electrical works and equipment required for interfacing at 33kV line (i.e. transformer(s), breakers, isolators, lightning arrestor(s), panels, protection system, cables,

metering at 33kV level, earthing of transformer etc.) as per technical specifications.

2.2.5. Design, supply, erection, testing & commissioning of 33kV transmission line / Cabling (approx. 5km) and associated switchgear equipment, transformer and metering equipment for connecting into existing 200/132/33kV Substation at Badi Sid as per technical specification and state regulations.

2.2.6. Design and implementation of plant string level monitoring scheme with compatible software and hardware for accessing the SCADA data remotely at a location in SECI, New Delhi.

2.3 All associated civil engineering works including design for:

2.3.1. Earthwork for Site grading, cutting, filling, levelling & compacting in about 80 acres of land.

2.3.2. Construction of foundation & mounting structures for SPV panels, fencing of SPV plant with security gate (s)

2.3.3. Construction of Equipment room and Office cum Control room.

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

2.3.5. Construction of Storm water drainage & sewage network

2.3.6. Construction of Approach Road to plant from main Road and road network within plant for easy access to main locations

2.3.7. Street lighting and area lighting within plant

2.4 Demonstration of performance of the plant as per the tender requirement

2.5 Comprehensive operation & maintenance of the SPV plant for 5 (five) years after successful operation of plant for 1 year after commissioning towards performance demonstration, as detailed in technical specification including supply and storage of all spare parts, consumables, repairs/ replacement of any defective equipment etc.

2.6 Obtaining all associated statutory and regulatory compliances and approvals for successful construction, commissioning and operation of plant.

3 The detailed scope of work is given in Technical specifications:

3.1 Detailed scope of work, Specifications and terms & conditions are given in the bidding documents, which are available on SECI website as per the following schedule:

NIT Document No.	:	SECI-SGM10-1-2015
Document Sale Date & Timing	:	From 15.06.2015 1000hrs (IST) To 15.07.2015 1430 hrs (IST)
Last Date & Time of Bid Receipt:		Up to 15.07.2015 1430 hrs (IST)
Pre – bid meeting Date	:	29.06.2015 at 1100hrs at SECI, New Delhi
Bid Opening Date & Time	:	15.07.2015 at 1530 hrs (IST)
Cost of Bidding Document	:	50,000/- (Rupees Fifty thousand only) per set + 5% VAT

= INR 52,500.

3.2 All bids must be accompanied by

- A **Bid Bond of INR 2,00,00,000/-** [Rupees Two Crores only] in the form as stipulated in the Bidding Documents.
- Bid Document cost of INR 52, 500 [Rupees fifty two thousand and five hundred only] in form of DD drawn in favour of "**Solar Energy corporation of India**" payable at **New Delhi.**

ANY BID NOT ACCOMPANIED BY AN ACCEPTABLE BID BOND IN A SEPARATE SEALED ENVELOPE SHALL BE REJECTED BY THE EMPLOYER AS BEING NON-RESPONSIVE AND RETURNED TO THE BIDDERS WITHOUT BEING OPENED.

4 QUALIFYING REQUIREMENTS FOR BIDDERS

Bidder shall meet the qualifying requirement stipulated hereunder:

4.1 General

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

4.2 Technical Eligibility Criteria

4.2.1. The bidder should have designed, supplied, erected and commissioned solar photovoltaic based grid connected power plant(s) of cumulative installed capacity of 25MW or above, with a minimum megawatt scale of plant.

4.2.2. Minimum two plants of 5MW capacity or above should have been under continuous operation for at least 2 years after commissioning.

4.2.3. Bidder shall submit, in support to the above, the list of projects commissioned along with their work order/ LOI and the commissioning certificates along with the certificate of plant being in operation for minimum 2 years. In case the bidder wants to meet the eligibility criterion through its own power plant, then a certificate from Chartered Accountant to that effect will be required to be submitted.

4.3 FINANCIAL CRITERIA:

4.3.1. The average annual turnover of the Bidder in the preceding three (3) financial years as on the date of bid opening, shall not be less than **INR 100 Crores** (Indian Rupees One hundred Crores only) or in equivalent foreign currency.

4.3.2. The net worth for the last year should be positive, "Net Worth" of the Bidder shall be calculated as follows:

Net Worth	=	Paid up share capital
	Add:	Free Reserves and surplus
	Subtract:	Miscellaneous Expenditures to the extent not written off

and carry forward losses

Subtract: Intangible Assets

Free reserves means reserves created out of profits and securities premium account but does not include reserves created out of revaluation of profits, write back of depreciation and amalgamation or any capital reserve. Securities Premium will be considered to be part of net worth only in those cases where it has been realized/received in the form of cash. However, this may not be applicable in case of listed companies.

4.3.3. The Bidder will provide a copy each of audited annual report of previous three financial years for ascertaining their turnover and Net Worth along with Bank Statements for the purpose of verification.

4.3.4. The Net Worth of the Bidder as on the last day of the preceding financial year shall not be less than 25% of the paid-up share capital.

4.3.5. In case the bidder is not able to furnish its audited financial statements on standalone entity basis, the unaudited unconsolidated financial statements of the bidder can be considered acceptable provided the bidder furnishes the following further documents on substantiation of its qualification:

- Copies of the unaudited unconsolidated financial statements of the bidder along with copies of the audited consolidated financial statements of the Holding Company.
- A Certificate from the CEO/CFO of the Holding Company, stating that the unaudited unconsolidated financial statements form part of the Consolidated Annual Report of the company.

In case where audited results for the last preceding financial year are not available, certification of financial statements from a practicing Chartered Accountant shall also be considered acceptable, provided the bidder provides the detailed Financial Statements certified by the Management of the company.

NOTES:

- Paid up share capital will include
    - Paid up equity share capital
    - Fully, compulsorily and mandatorily convertible preferential shares
    - Fully, compulsorily and mandatorily convertible Debentures
- Share premium will form an integral part of the net worth provided it is realized in cash or cash equivalents
- Other income shall not be considered for arriving at annual turnover.

4.4 Notwithstanding anything stated above, the Employer reserves the right to assess the

capabilities and capacity of the Bidder / his collaborators / associates / subsidiaries / group companies to perform the contract, should the circumstances warrant such assessment in the overall interest of the Employer.

4.5 SECI reserves the right to reject any or all bids or cancel/withdraw the Notice Inviting Tenders without assigning any reason whatsoever and in such case no bidder/intending bidder shall have any claim arising out of such action.

4.6 The bidding documents can be downloaded from www.seci.gov.in and the cost of bidding documents mentioned IFB Clause 3.1 need to be enclosed during bid submission.

Issuance of Bidding Documents to any Bidder shall not construe that such Bidder is considered to be qualified. Bids shall be submitted and opened at the address given below in the presence of Bidder's representatives who choose to attend the bid opening.

5 Address for communication:

Name:	Senior Manager (PV)
Address:	Solar Energy Corporation of India
	Ist floor, A Wing, Religare Building
	D-3, District Centre, Saket, New Delhi – 17
Tel:	011 – 71989230
Fax:	011 – 71989241
Email:	solarpv@seci.gov.in

Note: Bidders are requested to keep themselves updated with the website www.seci.gov.in on regular basis for any Amendment / Clarification / Notification in respect of this NIT. No separate notification or information will be issued in print media or individually. All the information related to this tender shall be updated in the SECI website only.

SECTION – II

INSTRUCTIONS TO BIDDER (ITB)

(BID DOCUMENT NO. – SECI – SGM10 – 1 – 2015)

SOLAR ENERGY CORPORATION OF INDIA

(A Government of India Enterprise)

Ist floor, Wing A, Religare Building, D – 3, District Centre, Saket, New Delhi – 17

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Contents

1 Introduction

1.1. Company

SECI Limited (hereinafter called as "Employer") is a Government of India Enterprise registered under Section-8 (erstwhile section 25 of Companies Act, 1956) of the Companies Act, 2013, under the administrative control of the Ministry of New & Renewable Energy (MNRE). SECI is committed to plan and execute an integrated program on development and deployment of solar energy technologies through commercialisation of R&D. One of the main objectives of the Company is to assist the Ministry and function as the implementing and facilitating arm of the Jawaharlal Nehru National Solar Mission (JNNSM) for development, promotion and commercialization of solar energy technologies in the country.

1.2. Project

1.2.1 SECI intends to install a 10MW (AC) grid connected solar photovoltaic power plant (herein after 'Project' to harness green energy. The project is in accordance with the approval of Ministry of New and Renewable Energy (hereinafter termed as MNRE) for the unallocated capacity under JNNSM phase – I, batch – II, under NVVN bundling mechanism at Vill: Badi Sid, Teh: Bap, Phalodi, and Dist. Jodhpur in Rajasthan State. The proposed solar power project turnkey contract shall include development of land, buildings, plant and machinery, ancillary equipment, material, switchgear, transformers, protection equipment, design & development, procurement, construction, testing, commissioning and comprehensive operation & maintenance for 5 (Five) years after 1 year of successful operation of plant with demonstrated guaranteed performance. The generated power will be supplied to NVVN as per terms and conditions of JNNSM phase – I, batch – II scheme of MNRE. The Employer hereby invites bids for the selection of the turnkey contractor (hereinafter referred as "Contractor") to implement the project.

1.2.2 The details of the facilities, which the Employer requires to be set up in the present instance and for which Bids are hereby invited are described in this Notice Inviting Tender (NIT). The overall responsibility of complete "Scope of Works" as mentioned in this NIT as per the specification mentioned in the technical specifications, and are required for successful installation, commissioning and operation of the project in all respect including those which are not mentioned explicitly in this NIT, rests with the Bidder.

1.2.3 Sealed Bids are invited in the prescribed Bid formats and Performa, for the Scope of Work described in the NIT document. Following are the details:

Item	Description
NIT No.	SECI-SGM10-1-2015

Brief description of the Project	Designing, Engineering, Manufacture, Procurement & Supply, Erection, Testing & Commissioning of 10MW (AC) Grid connected Solar PV Power Plant along with its interconnecting transmission line with the State Grid on turnkey basis, including its O&M contract for 5 (Five) years after 1 year of performance demonstration at Vill: Badi Sid, Teh: Bap, Phalodi, Dist. Jodhpur, Rajasthan.
Date & time of Pre-Bid Meeting and Venue	29.06.2015 at 1100 hrs at SECI, New Delhi
Last date and time for submission of Bids	15.07.2015 at 1430 hrs
Date of opening of Techno-commercial Bid	15.07.2015 at 1530 hrs
Date of opening of Price Bid	Intimated later
Bid validity	180 days from the date of opening of Techno – Commercial bid
Tender document cost	INR 50,000 + 5% VAT i.e., INR 52,500.
Bid Bond	INR 2,00,00,000
Bid Bond validity	180 days from the date of opening of Techno – Commercial Bid
Bank guarantee against Mobilization Advance, if required by the contractor, i. Amount ii. Validity	The Contractor shall furnish within 10 days from the date of issue of Letter of Intent (LOI) an unconditional and irrevocable bank guarantee against mobilization advance, which is interest bearing, the Rate of interest being the SBI base rates prevailing on the 7th day prior to the Date of opening of Techno-commercial Bids, as per Performa attached and which shall be i. For 10% of the total contract value ii. Valid for 180 days from the date of issue of LOI.
Performance bank guarantee for EPC Contract i. Amount ii. Validity	The Contractor shall furnish within 14 days from the date of issue of Letter of Intent (LOI) unconditional and irrevocable bank guarantee for Performance guarantee as per Performa attached and which shall be i. For 10% of the total Contract Value ii. Valid for 24 months from the date of LOI. (**Note**: Total Performance Guarantee is to be submitted in 3 Nos. of Bank Guarantee in the ratio of 20%, 40%, 40%)
O&M Bank Guarantee, to be submitted at the time of Final Acceptance	10% of the quoted Total value of O&M Contract in the form of an unconditional and irrevocable bank guarantee to be submitted at the time of Final Acceptance and shall have a validity of 60 months from the date of Final Acceptance as per the Performa attached.

Address for correspondence	Senior Manager (PV), Solar Energy Corporation of India (SECI), Ist floor, Wing A, Religare Building, D - 3, District Centre, Saket, New Delhi – 110017 TEL: 011- 71989230 FAX: 011- 71989241 Email: solarpv@seci.gov.in

1.3. Local Conditions

1.3.1 The Bidder is advised to visit and examine the site conditions, traffic, location, surroundings, climate, availability of power, water and other utilities for construction, access to site, handling and storage of materials, weather and insolation data, applicable laws and regulations, and obtain for itself on its own responsibility all information, as per their understanding, may be necessary for preparing the Bid and entering into the Contract Agreement. All the expenses of visiting the Site and its associated costs shall be borne by the Bidder.

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

1.3.3 Failure to visit the Site or failure to study the NIT document shall in no way relieve the successful Bidder from furnishing any material or performing any work in accordance with the NIT document.

1.3.4 Unless and otherwise specified, in no case the date of Time for Completion of the project shall be extended.

1.3.5 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 manufacturer to make sure that its equipment is suitable for the available access and the site terrain.

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

(i) Made a complete and careful examination of the NIT document;

(ii) Received all relevant information requested from the Employer;

(iii) Acknowledged and accepted the risk of inadequacy, error or mistake in the information provided in the NIT documents or furnished by or on behalf of the Employer relating to any of the matters referred to in Clause 1.2 above;

(iv) Satisfied itself about all matters, things and information including matters referred to in the Abridged Bid Information, necessary and required for submitting an informed Bid, execution of the Project in accordance with the NIT document and Performance of all of its obligations mentioned there under;

(v) Acknowledged and agreed that inadequacy, lack of completeness or incorrectness of information provided in the NIT document or ignorance of any of the matters referred to in Clause 1.3.2 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 Employer, or a ground for termination of the Contract Agreement; and

(vi) Agreed to be bound by the undertakings provided by it under and in terms hereof.

1.3.7 The Employer 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 NIT document or the Bidding Process, including any error or mistake therein or in any information or data given by the Employer.

1.3.8 Local Regulatory Frame Work:

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

1.3.9 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 the NIT document shall be entertained by the Employer and that neither any change in the time schedule of the Contract nor any financial adjustments arising thereof shall be permitted by the Employer.

2 Instructions to Bidder

2.1 General Instructions

2.1.1 The current document with all annexures and format forms the Notice inviting Tender, which is open to all prospective Bidders, requesting a proposal for implementation of the Project on a fixed price basis. A Contractor would be selected through competitive bidding process for execution of the Project.

2.1.2 The Employer expects Bidders to confirm compliance to NIT 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 NIT.

2.1.3 Bids shall be evaluated based on the information/ documents available in the Bid submitted. 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 NIT are liable to be rejected without any further opportunity.

2.1.4 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.

2.1.5 All Bids must be accompanied by a Tender document cost and BID BOND of value as specified in the ITB Clause no. 1.2.3, in the form and manner as specified in the NIT document and must be delivered along with Bids.

2.1.6 The specification provided with this NIT outlines the functional requirement. The Bidder must submit a Proposal based upon their own design, meeting the functional requirements specified in the tender.

2.1.7 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.

2.1.8 This 'Instructions to Bidders', in original, issued along with NIT document, shall be submitted by the Bidder along with Bid duly signed by the Bidder as token of acceptance. Bids received without the prescribed NIT document and not complying with the terms and conditions of NIT shall be ignored.

2.1.9 Mere submission of bid does not construe that the Bidder has been short-listed or qualified.

2.1.10 This is a ZERO deviation bidding process. The Bidders shall ensure compliance of all provisions of the bid document and submit their bid accordingly. Tenders with any deviation to the bid conditions shall be liable for rejection.

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

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

2.2 Cost of Bidding

The Bidder shall bear all costs in relation to its Bid and consequent bidding process activities. The Employer shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process. The Cost of Tender Document to be submitted along with the Bid shall be in the form of a DD drawn in favour of **"Solar Energy Corporation of India"** payable at New Delhi**.**

2.3 Understanding the NIT document

2.3.1 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, for the proposed Solar Power

System(s), site conditions and all relevant matters & details.

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

2.4 Clarification of NIT document

A Bidder requiring any clarification of the NIT documents may notify the Employer in writing or by facsimile or by e-mail at the Employer's contact details as indicated in this document latest by 14 (fourteen) days before the last date of submission as specified in ITB Clause No. 1.2.3.

2.5 Amendment of NIT Documents

2.5.1 The Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a particular Bidder, modify the NIT documents.

2.5.2 Any amendment, if any, will be notified on website www.seci.gov.in

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

2.6 Not used

2.7 Withdrawal of Invitation to Bid

While the Employer has floated this NIT and has invited prospective Bidders to submit their proposals, the Employer shall always be at the liberty to withdraw this invitation to bid at any time before its acceptance.

2.8 Authorized Representative of Bidder

2.8.1 All the Bidders are requested to mention the name of their authorized representative, if any, with full address in the Bid. Power of attorney (PoA) in the prescribed Performa shall be submitted along with the bid.

2.8.2 In case the representative is changed during the bidding process such changes shall be notified by the Bidder, failing which, Employer shall not accept any responsibility. Any change in name of the authorized signatory shall be accompanied by PoA in proper format only.

2.9 Financial Proposal and Currencies

2.9.1 The Bidders shall quote the prices inclusive of all the taxes, while also providing the breakup of taxes as per formats given under "Appendix 5: Performa for Financial Proposal".

2.9.2 The Bidder shall indicate the price in Financial Proposal in Indian National Rupee (INR) only, in both figure and words.

2.9.3 Arithmetical errors, if any, shall be rectified on the basis described as: If there is any discrepancy found between unit price and mentioned total price, then the unit price will prevail and the total price shall be corrected. The total price will be obtained by multiplying the unit rate and quantity. If there is any discrepancy in the words and figure quoted, price mentioned in words will prevail.

2.10 Bank Guarantees

2.10.1 Bidder shall be required to submit Bid Bond as specified in the ITB Clause No. 1.2.3 .The Bank Guarantee shall be in favour of "**Solar Energy Corporation of India**'' payable at New Delhi from any bank specified in the "Schedule 1: List of Banks". The Employer shall not be liable to pay any interest on the Bid Bond deposit so made and the same shall be interest free.

2.10.2 The Bank Guarantee submitted should have the clear time validity in all respect as specified in respective clause (s). If, by any reason, it is required to extend the Bank Guarantee, bidder shall undertake to renew the Bank Guarantee at least one month before the expiry of the validity failing which SECI will be at liberty to encash the same. SECI shall notify the bidder for submission of renewal of bank guarantee.

2.10.3 A Bid submitted without the tender document cost and Bid Bond shall not be considered and shall be summarily rejected.

2.10.4 The validity of Bid Bond shall be as per ITB Clause 1.2.3

2.10.5 The Bid Bond shall specifically bind the Bidder to keep its Bid valid for acceptance and to abide by all the conditions of the NIT documents in the event of the Employer desiring to award the work to the said Bidder. The Employer shall have an unqualified discretion not to release the Bid Bond and adjust the amount up to the full value there under in the event where such Bidder is chosen as the Successful Bidder and refuses to unconditionally accept Letter of Intent (LOI) and enter into Contract Agreement to carry out the work in accordance with the Bid.

2.10.6 The Employer shall, however, arrange to release the Bid Bond in respect of unsuccessful Bidders, without any interest, only after issue of LOI to the successful bidder and their acknowledgement of the same.

2.10.7 The Bid Bond in respect of the Successful Bidder shall be released on bidders' request after receipt of the Performance Bank Guarantees as per ITB Clause 1.2.3 in the format prescribed under "Section VI: Format for Performance Bank Guarantee" and after receipt of their confirmation from the bank.

2.10.8 The Bidder shall also undertake that the validity of the Bank guarantee for Bid Bond shall be extended suitably until it furnishes to the Employer, a bank guarantee towards mobilization advance bank guarantee, if mobilization advance is required, Performance Bank Guarantee for the specified value in the event of the Bidder becoming the Successful Bidder.

2.10.9 The Bid Bond shall be forfeited by the Employer under the following conditions:

(i) If a Bidder engages in a corrupt practice, fraudulent practice, coercive practice, or restrictive

practice;

(ii) The Bidder withdraws the bid at any stage after submission thereof.

(iii) The Successful Bidder fails to provide following within the specified time limit under ITB clause 1.2.3

a. To sign the Contract Agreement within 21 days from release of LOI and/or

b. To furnish the Performance Bank Guarantee

Successful Bidder shall furnish the Bank Guarantees required as per the ITB Clause No. 1.2.3 upon issue of Letter of Intent (LOI) through the prescribed formats under Section VI: Forms and Formats – "Format of Performance Bank Guarantee" with a validity as specified in ITB Clause No.1.2.3.

(iv) Performance Bank Guarantee for O&M: The Successful Bidder has to do O&M for 5 (five) years w.e.f. date of completion of 1 year of assured performance period after successful commissioning. The Successful Bidder shall submit a Bank Guarantee of amount specified in ITB Clause No. 1.2.3 against the "O&M Performance Guarantee" and which the Contractor has to maintain for the entire period of O&M. The validity of Bank Guarantee shall be 5 years from the date of Final Acceptance. If, by any reason, it is required to extend the Bank Guarantee, bidder shall undertake to renew the Bank Guarantee at least one month before the expiry of the validity failing which SECI will be at liberty to encash the same. SECI shall notify the bidder for submission of renewal of bank guarantee.

2.11 Third Party Inspection Agency

2.11.1 A third party inspection agency ("Third Party Inspectors" or "TPI") may be appointed by the Employer, at its sole discretion, to conduct any kind of inspection regarding procurement, fabrication, installation, hook-up and commissioning during the execution of the Project. The Contractor shall provide necessary access and coordination to conduct such inspections. The extent of third party inspectors' involvement shall be finalized after mutual discussions between the Contractor and the Employer.

2.11.2 All expenses for above inspections whether done by SECI representative (s) or by the third party at manufacturer/ supplier premises or at project site shall be borne by the contractor only. It is the responsibility of the contractor to inform SECI at least 1 month before despatch of the major project equipment.

2.12 Applicability of Labour Laws

2.12.1 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.

2.12.2 The successful Bidder shall obtain license under Contract Labour (Regulation & Abolition) Act 1970 and amendments till date, read with rules framed there under and furnish the same to the

Employer before mobilization, failing which the detailed order of contract may be cancelled/ terminated without any further notice and its Bid Bond and/ or Performance bank guarantee forfeited.

2.12.3 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.

2.13 Right to accept and to reject any or all Bids

2.13.1 Notwithstanding anything contained in this NIT, the Employer 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 there for.

2.13.2 The Employer reserves the right to reject any Bid and forfeit the Bid Bond at any time if a material misrepresentation is made or uncovered.

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

(i) Invite the remaining Bidders to submit Bids; or

(ii) Take any such measure as may be deemed fit in the sole discretion of the Employer, including annulment of the bidding process.

2.13.4 In case, it is found during the evaluation or at any time before signing of the Contract or after its execution and during the period of subsistence thereof, that one or more of the pre-qualification conditions have not been met by the Bidder or the Bidder has made material misrepresentation or has given any materially incorrect or false information, the Bidder shall be disqualified forthwith, if not yet appointed as the Contractor either by issue of the LOI or entering into of the Contract Agreement, or 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 NIT, be liable to be terminated, by a communication in writing by the Employer to the Successful bidder, without the Employer being liable in any manner whatsoever to the Bidder or Contractor, as the case may be. In such an event, the Employer shall forfeit and appropriate the Bid Bond/Performance Bank Guarantee (PBG), without prejudice to any other right or remedy that may be available to the Employer.

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

2.14 Eligibility Criteria /Qualifying Requirements (QR)

Bidders are required to fulfil the qualifying criteria for both technical and financial as specified

the "Section – I: IFB clause 4" of this NIT.

3 Submission of Bids

3.1 General Terms

3.1.1 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.

3.1.2 Notwithstanding anything to the contrary contained in this NIT, 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.

3.1.3 The Bid should be furnished in the formats mentioned in the NIT document which shall be duly signed by the Bidder's authorized signatory, provided that the Financial Proposal will be submitted in separate envelop.

3.1.4 The Bidder should submit a power of attorney as per the format at "Power of Attorney for signing of Bid" authorizing the signatory of the Bidder for signing and submission of the Bid.

3.1.5 As this is zero deviation bidding process, any condition or qualification or any other stipulation contained in the Bid may 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 Employer, 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.

3.1.6 The NIT document and attached documents 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 Employer will not return any Bid or any information provided along therewith.

3.1.7 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.

3.1.8 Bidder to note that Price Bids of those bidders shall be opened who are found technically qualified (as per IFB Clause 4) and are found reasonably responsive to SECI's tender terms and conditions and scope of Works.

3.2 Format and Signing of Bid

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

3.2.2 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.

3.3 Sealing and Marking Of Bid

3.3.1 Each Bid shall consist of four sealed envelopes as follows inside a **Common Envelope**

Envelope - I:	Bid Bond and Tender document cost
Envelope - II:	Duly signed and stamped copy of NIT Document
Envelope - III:	Techno-commercial Enclosures of the Bid
Envelope - IV:	Financial Proposal duly signed and stamped.

3.3.2 Envelope I, II, III, and IV shall be submitted separately in the ***original plus One copy*** and the respective envelopes should be clearly marked as "Original" and "Copy", as the case may be and marking as mentioned under ITB Clause 3.4.3. In case of any discrepancy between the Copy and Original, the set of documents marked as "Original" will prevail.

3.4 Enclosures of the Bid

3.4.1 The documents accompanying the Bid and Technical Proposal, other than the Financial Proposal and BID BOND, shall be placed in Envelope III. These documents shall include:

(i) Cover letter to the Employer from the Bidder in the prescribed format (Appendix 1: Proforma for Bid Letter);
(ii) Details of the Bidder in the prescribed format (Appendix 2: Details of Bidder);
(iii) Details of qualified Technical Staff in the prescribed format (Appendix 6: Details of qualified technical staff);
(iv) Declaration of Compliance in the prescribed format (Appendix 7: Declaration of Compliance);
(v) No deviation certificate in the prescribed format (Appendix 8: No Deviation Certificate);
(vi) Declaration on Bidder's relation to directors of the Employer as per prescribed format (Appendix 9: Declaration on Bidder's relation to Directors);
(vii) Execution Philosophy in the prescribed format (Appendix10: Execution timelines);
(viii) Power of attorney for signing of Bid in the prescribed format (Appendix 15: Power of Attorney for signing of Bid).
(ix) Technical documents with respect to all relevant enclosures mentioned in the Section – V: Technical Specifications.

3.4.2 A true copy of the documents accompanying the Bid, as specified in this Clause shall be placed in spiral binding and the pages shall be numbered serially. Each page thereof shall be signed and sealed in blue ink by the authorized signatory. This copy of the documents shall be placed in a separate envelope and marked "Copy of Documents".

3.4.3 The envelopes specified in Clause 3.3 shall be placed in an outer envelope, which shall be sealed.

(i) The outer envelope shall clearly bear the following identification:

"Tender Bid Document for setting up of 10MW (AC) Grid connected Solar PV Power Plant at Vill: Badi Sid, Teh:Bap, Phalodi, Dist: Jodhpur on Turnkey basis"

(ii) Envelope-I shall bear the following identification:

"**Envelope-I: Bid Bond and Tender document cost of the Bid for 10MW (AC) Grid connected Solar PV Power Plant at Badi Sid, Phalodi, Jodhpur on Turnkey basis"**

(iii) Envelope -II shall bear the following identification:

"Envelope-II: Signed NIT Document for 10MW (AC) Grid connected Solar PV Power Plant at Badi Sid, Phalodi, Jodhpur on Turnkey basis"

(iv) Envelope -III shall bear the following identification:

"Envelope-III: Enclosures of the Bid for 10MW (AC) Grid connected Solar PV Power Plant at Badi Sid, Phalodi, Jodhpur on Turnkey basis".

(v) Envelope -IV shall bear the following identification:

"Envelope-IV: Financial Proposal for EPC and 5 years Comprehensive O&M of 10 MW (AC) Grid connected Solar PV Power Plant at Badi Sid, Phalodi, Jodhpur on Turnkey basis".

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

3.4.4 Each of the envelopes shall be addressed to:

Kind Attn.	Senior Manager (PV)
Address:	Solar Energy Corporation of India 1st Floor, A Wing, Religare building, D-3, District Centre, Saket, New Delhi - 110017 TELE: 011- 71989230 FAX: 011- 71989241
E-mail address:	solarpv@seci.gov.in

3.4.5 If the envelopes are not sealed and marked as instructed above, the Employer assumes no responsibility for the misplacement or premature opening of the contents of the Bid submitted. If bids are found in open condition or not in sealed condition, the bids may be rejected and returned unopened to the bidder.

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

3.5 Bid Due Date/ Last date of submission

3.5.1 Bids should be submitted before the bid due date as specified in ITB Clause No.1.2.3 at the address provided in ITB Clause 1.2.3 in the manner and form as detailed in this NIT.

3.5.2 The Employer may, in its sole discretion, extend the bid due date by issuing an Amendment/ Addendum in accordance with ITB Clause No. 2.5, uniformly for all Bidders.

3.6 Late Bids

Bids received by the Employer after the specified time on the bid due date shall not be eligible for consideration and shall be summarily rejected. In case of an unscheduled holiday being declared on the prescribed closing/opening day of the Bid, the next working day shall be treated as the scheduled prescribed date of closing/opening of the Bid.

3.7 Confidentiality

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 of evaluation and selection or is not a retained professional advisor advising the Employer in relation to or matters arising out of, or concerning the bidding process. The Employer 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 Employer 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 Employer.

3.8 Correspondence with the Bidder

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

3.9 Bid Opening and Evaluation

3.9.1 The Employer shall open, examine and evaluate the Bids in accordance with the provisions set out in this NIT document.

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

3.9.1 After the receipt of Bids the Employer may at its discretion send a team of engineers if necessary to inspect the engineering facilities, to ensure suitability and satisfactory working conditions at the Bidder's works/yards(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. All expenses for such inspections shall be borne by

contractor only.

3.10 Tests of Responsiveness

3.10.1 Prior to evaluation of Bids, the Employer shall determine whether each Bid is responsive to the requirements of the NIT. A Bid shall be considered responsive only if:

(i) The CUF of the Power Plant for first year is provided by the Bidder.

(ii) It is received as per the formats specified in Appendices of the NIT;

(iii) It is received by the bid due date and time including any extension thereof;

(iv) It is signed, stamped, sealed, spiral/ hard bound and marked as stipulated in ITB Clauses 3.3 and 3.4;

(v) it is accompanied by the Tender cost and BID BOND as specified in ITB Clause 1.2.3

(vi) It is accompanied by the power(s) of attorney as specified in Appendices as the case may be;

(vii) It contains all the information (complete in all respects) as requested in this NIT (in formats same as those specified);

(viii) It does not contain any condition or qualification or deviations,;

(ix) It has "No Deviation Certificate" required as per the format (Appendix 8: No Deviation Certificate)

3.10.2 The Employer 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 Employer in respect of such Bid.

3.11 Modification and Withdrawal of Bids

3.11.1 The Bidder may modify or withdraw its Bid after the Bid's submission, provided that written notice of the modification or withdrawal is received by the Employer prior to the deadline prescribed for submission of Bids.

3.11.2 A withdrawal notice may also be sent by fax/Email but followed by a signed confirmation copy by post not later than the deadline for submission of Bids.

3.11.3 No Bid shall be modified at the time of Bid opening or subsequent to opening of Techno-Commercial bid.

3.11.4 No Bid shall be withdrawn in the interval between date of opening of Techno-Commercial bid and the expiration of the period of Bid validity specified by the Bidder. Withdrawal of a Bid during this interval may result in the Bidder's forfeiture of its Bid Bond.

3.12 Evaluation of Bid and selection of Bidder

3.12.1 The Employer 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.

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

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

3.12.4 The Employer will evaluate and compare Bids which have been determined to be substantially responsive.

3.12.5 Following factors shall be required for evaluation of Bid:

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

a. EPC Contract Price

b. NPV of annual O&M Price exclusive of taxes quoted for 5 (five) years as given in Appendix 3: Bid Evaluation criteria.

(ii) The Bid with the lowest Evaluated Bid Value shall be considered as L-1. The bid with next lowest value shall be considered as L-2 and so on.

(iii) For evaluation of Bids, the quoted price ***including CST, VAT, service tax*** and other tax, as applicable, shall be considered.

3.13 Contacts during Bid Evaluation

Bids shall be deemed to be under consideration immediately after they are opened and until such time the Employer 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 Employer and/ or their employees/ representatives on matters related to the Bids under consideration.

3.14 Employment of Officials/ Ex-Official of the Employer

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

3.15 Declaration on Bidder's Relation to Directors

The Bidders are required to certify in prescribed format "Appendix 7: Declaration of Compliance", whether he/they is/are related to any of the Directors/Senior Personnel of the Employer 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.

3.16 Letter of Intent ("LOI") and Notification to Proceed

3.16.1 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 acknowledge the LOI within seven (07) 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 Employer prior to the bid submission date.

3.16.2 On receipt of the acknowledgement of the LOI by the Successful Bidder and compliance with the conditions specified in ITB Clause 3.12, the Employer shall sign the Contract with the Successful Bidder.

3.17 Performance Bank Guarantee

3.17.1 The Successful Bidder shall, within fourteen (14) days of the issue of LOI, submit the Bank Guarantees as per ITB Clause 1.2.3 for the Project. The Performance Guarantee of the Successful Bidder should be submitted to the Employer in the form of a bank guarantee as prescribed in "Appendix 12(b): Format of Bank Guarantee for Security Deposit/ Performance Bank Guarantee", as specified in ITB Clause 1.2.3

3.17.2 The bank guarantee by the Contractor will be given from bank specified in "Schedule 1: Specified list of banks" only.

3.18 Fraudulent Practices

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

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

Section – III

General Conditions of Contract

(BID DOCUMENT NO.: SECI – SGM10 – 1 – 2015)

SOLAR ENERGY CORPORATION OF INDIA

(A Government of India Enterprise)

Ist floor, Wing A, Religare Building, D – 3, District Centre, Saket, New Delhi – 17

Tel: 011 – 71989224, Fax: 011 – 71989241

Contents

A. CONTRACT AND INTERPRETATAION

1. Definitions and Abbreviations

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

"**Adjudicator**" means the person or persons named as such in the SCC to make a decision on or to settle any dispute or difference between the Employer and the Contractor.

"**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.

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

"**Bid**" shall mean the Techno Commercial and the Financial Proposal submitted by the Bidder along with all documents/credentials/attachments annexure etc., in response to this NIT, in accordance with the terms and conditions hereof.

"**Bidder**" shall mean Bidding Company submitting the Bid including its successors, executors and permitted assigns.

"**CEA**" shall mean Central Electricity Authority.

"**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;

"**Commissioning**" A project shall be considered commissioned if all equipment as per rated capacity has been installed and energy has flown into grid.

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

"**Contract**" means the Contract Agreement entered into between the Employer and the

Contractor, together with the Contract Documents referred to therein; they shall constitute the Contract, and the term "the Contract" shall in all such documents be construed accordingly.

"**Contract Documents**" means the documents listed in the Form of Contract Agreement.

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

"**Contractor**" means the person(s) whose bid to perform the Contract has been accepted by the Employer and is named as such in the Contract Agreement, and includes the legal successors or permitted assigns of the Contractor.

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

"**Contractor's Representative**" means any person nominated by the Contractor and approved by the Employer to perform the duties delegated by the Contractor.

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

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

"Defect Liability Period" means the period of validity of the warranties given by the Contractor commencing at Completion of the Facilities or a part thereof, during which the Contractor is responsible for defects with respect to the Facilities (or the relevant part thereof).

"Effective Date" means the date of issue of LOI/ NTP from which the Time for Completion shall be determined.

"**Employer**" means Solar Energy Corporation of India (SECI), New Delhi and includes the legal successors or permitted assigns of the Employer.

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

"**Final Acceptance**" means acceptance of Facilities by the Employer at the end of one year from the date of Commissioning or demonstration of minimum annual CUF whichever comes later. O&M period shall commence after Final Acceptance of the Facilities by the Employer

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

"**GHI**" means Global Horizontal Irradiance

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

"IEC" means International Electro-technical Commission

"Installation Services" means all those services ancillary to the supply of the Plant and Equipment for the Facilities, to be provided by the Contractor under the Contract; e.g., transportation and provision of marine or other similar insurance, inspection, expediting, Site preparation works (including the provision and use of Contractor's Equipment and the supply of all use structural and construction materials required), installation including civil and allied works etc., testing, pre-commissioning, commissioning, operations, maintenance, the provision of operations and maintenance manuals, training of Employer's Personnel etc.

"**kWh**" means Kilo-Watt-hour.

"**MWp**" means Mega-Watt Peak.

"NIT" means Notice inviting Tender.

"NTP" means Notice to Proceed.

"O&M" means Operation and Maintenance of the Facilities

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

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

"**PR**" means Performance Ratio

"Pre-commissioning" means the testing, checking and other requirements specified in the Technical Specifications that are to be carried out by the Contractor in preparation for Commissioning.

"**Project Manager/Engineer-in-Charge**" means the person appointed by the Employer to

perform the duties delegated by the Employer.

"**SCC"** means the Special Conditions of Contract.

"SECI" shall mean Solar Energy Corporation of India

"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.

"**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.

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

2. Use of Contract Documents & Information

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

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

2.3 The Contractor shall provide/ submit, free of cost to the Employer all the engineering data, drawings and descriptive materials with the bid, in at least two (2) copies to form a part of the Contract immediately after Notification of Award.

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

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

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

3. Interpretation

3.1 Language

The bid prepared by the Bidder and all correspondence and documents related to the bid

exchanged between the Bidder and the Employer shall be written in English language, provided that any printed literature furnished by the Bidder may be written in another language, as long as such literature is accompanied by a translation of its pertinent passages in English language in which case, for purposes of interpretation of the bid, the translation shall govern.

3.2 Singular and Plural

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

3.3 Headings

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

3.4 Persons

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

3.5 Entire Agreement

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

3.6 Amendment

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

3.7 Independent Contractor

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

3.7.2 Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed. All employees, representatives or 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 Employer. Nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives or Subcontractors and the Employer.

3.7.3 Under no circumstances the sub-contractor shall claim or shall put any binding to the Employer and at all times the sub-contractor must be managed by the Contractor. The

Employer shall not be responsible for any claims at any time by the Contractor in relation to the sub-contractor.

3.8 Joint Venture or Consortium

If the Contractor is a joint venture or consortium of two or more firms, all such firms shall be jointly and severally bound to the Employer for the fulfilment of the provisions of the Contract and shall designate one of such firms to act as a leader as per the IFB clause 4, with authority to bind the joint venture or consortium. The composition or the constitution of the joint venture or consortium shall not be altered without the prior consent of the Employer.

3.9 Non-Waiver

3.9.1 Subject to GCC Clause 3.9.2 below, no relaxation, forbearance, delay or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect or restrict the rights of that party under the Contract, nor shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

3.9.2 Any waiver of a party's rights, powers or remedies under the Contract must be in writing, must be dated and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

3.10 Severability

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

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

3.11 Country of Origin

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

4. Notices

4.1 Unless otherwise stated in the Contract, all notices to be given under the Contract shall be in writing, and shall be sent by personal delivery, airmail post, special courier, facsimile or e-mail to the address of the relevant party by the authorized representative of the party set out in contract coordination procedure to be finalized and mutually agreed for the execution of the

contract and all the communication pertaining to project shall be in accordance with the procedure with the following provisions.

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

4.1.2 Any notice sent by facsimile or e-mail shall be deemed to have been delivered on date of its dispatch and personal delivery deemed to have been delivered on date of delivery.

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

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

5. Governing Laws

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

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

6. Settlement of Disputes

6.1 Adjudicator

6.1.1 If any dispute of any kind whatsoever shall arise between the Employer and the Contractor in connection with or arising out of the Contract, including without prejudice to the generality of the foregoing, any question regarding its existence, validity or termination, or the execution of the facilities-whether during the progress of the facilities or after their completion and whether before or after the termination, abandonment or breach of the contract-parties shall seek to resolve such a dispute or difference by mutual consultation. If the parties fail to resolve such a dispute or difference by mutual consultation, then the dispute shall be referred in writing by either party to the Adjudicator, with a copy to the other party.

6.1.2 The dispute adjudication board (DAB) shall consists of either one or three suitably qualified member ("the Members").

6.1.3 If the DAB consists of three members, each party shall nominate one member for the approval of the other party. The parties shall consult both the members and shall agree upon third member, who shall be appointed as chairman of DAB.

6.1.4 The Adjudicator shall give its decision in writing to both parties within twenty-eight (28) days of a dispute being referred to it. If the Adjudicator has done so, and no notice of intention to commence arbitration has been given by either the Employer or the Contractor within fifty – six (56) days of such reference, the decision shall become final and binding upon the

Employer and the Contractor. Any decision that has become final and binding shall be implemented by the parties forthwith.

6.1.5 Should the Adjudicator resign or die, or should the Employer and the Contractor agree that the Adjudicator is not fulfilling its functions in accordance with the provisions of the contract, a new Adjudicator shall be jointly appointed by the Employer and the Contractor. Failing agreement between the two within twenty eight (28) days, the new Adjudicator shall be appointed at the request of either party or by the Appointing Authority specified in SCC. The adjudicator shall be paid fee plus reasonable expenditures incurred in the execution of its duties as adjudicator under the contract. This cost shall be divided equally between the Employer and the Contractor.

6.2 Arbitration

6.2.1 If either the Employer or the Contractor is dissatisfied with the Adjudicator's decision, or if the Adjudicator fails to give a decision within twenty-eight (28) days of a dispute being referred to it, then either the Employer or the Contractor may, within fifty-six (56) days of such reference, give notice to the other party, of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.

6.2.2 Any dispute in respect of which a notice of intention to commence arbitration has been given, in accordance with GCC Sub-Clause 6.2, shall be finally settled by arbitration. Arbitration may be commenced prior to or after completion of the Facilities.

In case the Contractor is a Public Sector Enterprise or a Government Department:

6.2.3 In case the Contractor is a Public Sector Enterprise or a Government Department, the dispute shall be referred for resolution in Permanent Machinery for Arbitration (PMA) of the Department of Public Enterprise, Government of India. Such dispute or difference shall be referred by either party for Arbitration to the sole Arbitrator in the Department of Public Enterprise to be nominated by the Secretary to the Government of India in-charge of the Department of Public Enterprises. The award of the Arbitrator shall be binding upon the parties to the dispute, provided, however, any party aggrieved by such award may make a further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs, Ministry of Law & Justice, Government of India. Upon such reference the dispute shall be decided by the Law Secretary or the Special Secretary / Additional Secretary, when so authorized by the Law Secretary, whose decision, shall bind the Parties finally and conclusively. The Parties to the dispute will share equally the cost of arbitration as intimated by the Arbitrator.

In case the contractor is not a Public Sector Enterprise or a Government Department:

6.2.4 Any dispute submitted by a party to arbitration shall be heard by an arbitration panel

composed of three arbitrators, in accordance with the provisions set forth below.

6.2.4.1 The Employer and the Contractor shall each appoint one arbitrator, and these two arbitrators shall jointly appoint a third arbitrator, who shall chair the arbitration panel. If the two arbitrators do not succeed in appointing a third arbitrator within twenty-eight (28) days after the latter of the two arbitrators has been appointed, the third arbitrator shall, at the request of either party, be appointed by the Appointing Authority for arbitrator designated in the SCC.

6.2.4.2 If one party fails to appoint its arbitrator within forty-two (42) days after the other party has named its arbitrator, the party which has named an arbitrator may request the Appointing Authority to appoint the second arbitrator.

6.2.4.3 If for any reason an arbitrator is unable to perform its function, the mandate of the Arbitrator shall terminate in accordance with the provisions of applicable laws as mentioned in GCC Clause 5 (Governing Law) and a substitute shall be appointed in the same manner as the original arbitrator.

6.2.4.4 Arbitration proceedings shall be conducted in accordance with the Arbitration and Conciliation Act, 1996. The venue of arbitration shall be New Delhi.

6.2.4.5 The decision of a majority of the arbitrators (or of the third arbitrator chairing the arbitration, if there is no such majority) shall be final and binding and shall be enforceable in any court of competent jurisdiction as decree of the court. The parties thereby waive any objections to or claims of immunity from such enforcement.

6.2.4.6 The arbitrator(s) shall give reasoned award.

6.3 Reference to arbitration

Notwithstanding any reference to the arbitration herein,

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

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

B. Subject Matter of Contract:

7. Scope of Facility

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

7.1.1 Design, engineering, manufacturing, procurement & supply, packing and forwarding, transportation, unloading, storage, erection & installation, Testing, commissioning, Performance demonstration and comprehensive O&M for 5 (Five) years of SPV plant for the capacity mentioned in SCC.

7.1.2 Procurement of associated material/ equipment including solar panels, inverters, transformers, cables etc. for complete Solar PV Power Plant.

7.1.3 All associated civil engineering works including design for:

- Earthwork for Site grading, cutting, filling, levelling & compacting of land
- Construction of foundation & mounting structures for SPV panels
- Fencing of SPV plant with security gate (s)
- Installation of Fire safety equipment.
- Construction of Equipment room and Office cum Control room.
- Arrangement of permanent water supply for module washing and daily usage.
- Construction of Storm water drainage & sewage network
- Construction of Approach Road to plant from main Road and road network within plant for easy access to main locations for O&M.
- Street lighting and area lighting within plant

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

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

7.1.6 All associated electrical works required for interfacing at grid network voltage prescribed (i.e. transformer(s), breakers, isolators, lightning arrestor(s), panels, protection system, cables, metering, earthing of transformer etc.) as per technical specifications.

7.1.7 Design, supply, erection, testing & commissioning of transmission line / Cabling and associated switchgear equipment, transformer and metering equipment for connecting into existing nearby Switchyard as per technical specification and state regulations.

7.1.8 Design and implementation of plant monitoring scheme with compatible software and hardware for accessing the SCADA data remotely at a location in SECI, Delhi.

7.1.9 Demonstration of plant Performance over a defined period

7.1.10 Comprehensive operation & maintenance of the SPV plant as detailed in technical specification including supply and storage of all spare parts, consumables, repairs/ replacement of any defective equipment etc.

7.1.11 Obtaining all associated statutory and regulatory compliances and approvals for successful construction and operation of plant.

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

7.1.13 Scrap disposal and waste management including removal of debris and other non-usable

material.

7.2 Unless otherwise expressly mentioned, the specification mentioned under the technical specification shall be final and binding.

7.3 Unless otherwise expressly limited in the Technical Specifications, the Contractor's obligations cover the provision of all Plant and Equipment including spares and the Performance of all services required for the design, the manufacture (including procurement, quality assurance, construction, installation, associated civil, structural and other construction works, Pre-commissioning and delivery) of the Plant and Equipment and the installation, commissioning, completion of facilities and carrying out guarantee tests for the Facilities in accordance with the plans, procedures, specifications, drawings, codes and any other documents as specified in the Technical Specifications. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labor, materials, equipment, spare parts (as specified in GCC Sub-Clause 7.4 below) and accessories; Contractor's Equipment; construction utilities and supplies; temporary materials, structures and facilities; transportation (including, without limitation, loading, unloading and hauling to, from and at the Site); insurance and storage, except for those supplies, works and services that will be provided or performed by the Employer, as set forth in GCC Clause 9.

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

7.5 In addition to the supply of Mandatory Spare Parts included in the Contract, the Contractor agrees to supply spare parts, recommended or otherwise required for the operation and maintenance of the Facilities. However, the identity, specifications and quantities of such spare parts and the terms and conditions relating to the supply thereof are to be agreed between the Employer and the Contractor based on the recommendation of OEM, and the price of such spare parts shall be that given as part of Appendix 5: Proforma for Financial Proposal, which shall be added to the Contract Price. The price of such spare parts shall include the purchase price therefor and other costs and expenses (including the Contractor's fees) relating to the supply of spare parts. The prices of spares covered under the Appendix 5 shall be kept valid for a period as specified in SCC. Contractor shall maintain the minimum required spares mandatory or recommended or otherwise at any time during the O&M period.

8. Contractor's responsibility

8.1 The Contractor shall design, procure, manufacture (including associated purchases and/or subcontracting), install, commission and complete the Facilities, carry out the Guarantee tests with due care and diligence in accordance with the Contract including the O&M for the

prescribed period.

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

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

8.4 The Contractor shall acquire in its name all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located that are necessary for the Performance of the Contract, including, but not limited to, the right of way for the access to site and for erection of transmission lines as applicable, visas for the Contractor's and Subcontractor's personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals and/or licenses that are not the responsibility of the Employer under GCC Sub-Clause 9 hereof and that are necessary for the Performance of the Contract.

8.5 Contractor shall also seek for any exemption applicable for the project as per the orders released from GOI time to time. In this regard, contractor shall be responsible to take all necessary certificates as a proof of exemptions on behalf of Employer. However, all the documents required from Employer, as needed for the process, will be provided by Employer. The demand of such documents shall be made to the Employer in at least 10 days advance.

8.6 The Contractor shall comply with all laws in force at the place, where the Facilities are installed and where the Installation Services are carried out. The laws will include all national, provincial, municipal or other laws that affect the Performance of the Contract and binding upon the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including

the Subcontractors and their personnel, but without prejudice to GCC Sub-Clause 9.1 hereof.

8.7 Any plant, material, spares & spares inventory and services that will be incorporated in or be required for the facilities and other supplies shall have their origin as defined under GCC Clause 3.11 (Country of Origin)

8.8 Unless otherwise specified in the Contract or agreed upon by the Employer and the Contractor, the Contractor shall provide/ deploy sufficient, properly qualified operating and maintenance personnel; shall supply and make available all raw materials, spares, other materials and facilities; and shall perform all work and services of whatsoever nature, to properly carry out Pre-commissioning, Commissioning and Guarantee Tests, all in accordance with the provisions of "Scope of Works and Supply by the Employer" to the Contract Agreement at or before the time specified in the program furnished by the Contractor under GCC Clause 18 hereof and in the manner thereupon specified or as otherwise agreed upon by the Employer and the Contractor.

9. Employers' responsibility

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

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

9.3 The Employer shall pay fees for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located for the plant establishment, which such authorities or undertakings require the Employer to obtain them in the Employer's name, are necessary for the execution of the Contract (they include those required for the Performance by both the Contractor and the Employer of their respective obligations under the Contract), including those specified in "Scope of Works and Supply by the Employer" at the Contract Agreement on providing the proper demand note letter. However, such demand notes must be provided to the Employer at least 7 days prior to the submission.

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

9.5 The Employer shall be responsible for the operation of the Facilities after Completion and proper hand over of the site by contractor, in accordance with GCC Clause 26 and 27. However, the Contractor, undergo the O&M Contract, shall be responsible for the care and custody of the facility as per GCC Clause 26.9.

C. Payments

10. Contract Price

10.1 The contract price mentioned under Appendix 5: Proforma for Financial proposal shall be firm and shall not change after the award of contract.

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

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

11. Terms of Payment

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

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

12. Bank Guarantees

12.1 Issuance of Bank Guarantees

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

12.2 Mobilization Advance Bank Guarantee

12.2.1 The Contractor shall, if required, within 10 (ten) days from the date of Issue of LOI, provide a Bank Guarantee in an amount equal to the advance mobilization payment calculated in accordance with ITB Clause 1.2.3 of this NIT, and in the currency mentioned in ITB Clause 2.9.2, with an initial validity of up to 180 days from the date of issue of LOI for the Facilities in accordance with GCC Clause 26. However, in case of delay in completion of facilities under the package, the validity of the security shall be extended by the period of such delay.

12.2.2 The security shall be in the form of an unconditional and irrevocable bank guarantee as per the Performa provided in “Appendix 18: Mobilization Advance against Bank Guarantee”. The Mobilization Advance shall be interest bearing, the rate of interest being the SBI base rates prevailing on the 7th day prior to the Date of opening of Techno-commercial Bids. The Mobilization Advance against Bank Guarantee shall be reduced pro-rata from every Running Account Bill/ Stage Payment under the Contract based on the value of equipment/ facilities

received. The total amount of mobilization advance, including the interest levied, shall deemed to be adjusted from the running bills on pro – rata basis till the commissioning of the Project as specified in Clause 14 of the SCC. It should be clearly understood that adjustment in the value of Bank Guarantee for Mobilization Advance shall not in any way dilute the Contractor's responsibility and liabilities under the Contract including in respect of the Facilities for which the adjustment in the value of Bank Guarantee is allowed.

12.3 Performance Bank Guarantee

12.3.1 The Contractor shall, within fourteen (14) days of the issue of LOI, provide Bank Guarantees for the due Performance of the Contract for ten percent (10%) of the Contract Value as per the ITB Clause 1.2.3, with an initial validity up to twenty four (24) months from the issue of LOI to the Contractor. However, in case of delay in demonstration of the Performance Test (PR test) and Final Acceptance, the validity of all the contract Performance Bank Guarantees shall be extended by the period of such delay plus ninety days.

12.3.2 The Performance Bank Guarantee shall be denominated in the currency as mentioned in the ITB Clause 2.9.2 of this NIT and shall be in the form of unconditional and irrevocable bank guarantee in the prescribed Proforma provided in Appendix 12(b): Format of bank guarantee for Performance under Section-VI: Forms and formats.

12.3.3 The Bank Guarantee submitted against Mobilization Advance and the Performance Bank Guarantee shall be essentially from any of the Banks listed at Schedule – 1: Special Conditions of Contract of the Bidding Documents. The Mobilization Advance shall be interest bearing, the rate of interest being the SBI Base Rate as on the 7th day prior to bid opening.

13. Taxes and Duties

13.1 Except as otherwise specifically provided in the Contract, the Contractor shall bear and pay all taxes, duties, levies and charges assessed on the Contractor, its Sub-contractor or their employees by all municipal, state or national government authorities in connection with the Facilities in and outside of the country where the Site is located.

13.2 Notwithstanding GCC Sub-Clauses 13.1 above, the Employer shall bear and pay/reimburse to the Contractor Excise Duty, Sales Tax (but not the surcharge in lieu of Sales Tax), Local Tax including Entry Tax/ Octroi and other levies in respect of direct transactions between the Employer and the Contractor, if imposed on the Plant and Equipment including Mandatory Spares to be incorporated in the Facilities, by the laws of India on submission of proper documentary evidence.

13.3 If specified as such in SCC, Employer will issue the requisite sales tax declaration form(s) in order to get the benefit of any concession in the rate of sales tax. Further, in case of all

components, equipment and materials identified by the Contractor and Employer to be dispatched directly from the sub- vendor's work to Employer site in a state different from the state wherein sub-vendor's works are located, the Contractor will effect sale in transit. For effecting the sale in transit, the contractor shall ensure that his sub vendor raises invoices and obtains GR/LR/RR in the name of Contractor (and not in the name of Employer). The Contractor shall further ensure that he endorses the GR/LR/RR in the name of Employer during transit of the equipment before the delivery of equipment is taken by Employer.

13.4 All taxes, duties and levies on Works Contract, if any, shall be to the contractor's account and no separate claim in this regard will be entertained by the Employer.

13.5 If any rates of taxes, duties, levies and charges (hereinafter called "TAX" in GCC sub-clause 13) are increased or decreased, a new Tax is introduced or an existing Tax is abolished after the date seven (7) days prior to date of bid opening, an appropriate adjustment of the Contract Price shall be made to fully take into account any such change by addition/deduction to the Contract Price. However these adjustments would not be applicable on procurement of raw materials, intermediary components etc. by the Contractor and also not applicable on the bought out items dispatched directly from sub- vendor's works to site and any other transaction(s) between the contractor and his sub-contractor/ suppliers.

D. Intellectual Property

14. Copyright & Patent

14.1 The copyright in all drawings, documents and other materials containing data and information furnished to the Employer by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Employer directly or through the Contractor by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party. The Employer shall however be free to reproduce all drawings, documents, specification and other material furnished to the Employer for the purpose of the contract including, if required, for operation and maintenance of the facilities.

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

15. Confidential Information

15.1 The Employer and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Subcontractor(s)

such documents, data and other information it receives from the Employer 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 GCC Clause 15.

15.2 The Employer shall not use such documents, data and other information received from the Contractor for any purpose other than the operation and maintenance of the Facilities. Similarly, the Contractor shall not use such documents, data and other information received from the Employer for any purpose other than the design, procurement of Plant and Equipment, construction or such other work and services as are required for the Performance of the Contract.

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

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

15.3.2 Can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party hereto.

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

15.5 The above provisions of this GCC Clause 15 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Facilities or any part thereof.

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

16. Geological discoveries

All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the site where the services are performed, be deem to be the absolute property of the Employer. The Contractor shall take reasonable precautions to prevent the personnel or any other persons from removing or damaging any such article or thing and shall immediately upon the discovery thereof and, before removal, acquaint the Employer of such discovery any carry out, at the expense of the Employer, the Employer's orders as to the disposal of the same.

17. Representatives

17.1 Project Manager/ Engineer- In -Charge:

If the Project Manager is not named in the Contract, then within seven (07) days of the Effective Date, the Employer shall appoint and notify the Contractor in writing of the name of the Project Manager. The Employer may from time to time appoint some other person as

the Project Manager in place of the person previously so appointed, and shall give a notice of the name of such other person to the Contractor without delay. The Employer shall take reasonable care, unless unavoidable to see that no such appointment is made at such a time or in such a manner as to impede the progress of work on the Facilities. The Project Manager shall represent and act for the Employer at all times during the currency of the Contract. All notices, instructions, orders, certificates, approvals and all other communications under the Contract shall be given by the Project Manager, except as herein otherwise provided.

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

17.2 Contractor's Representative & Construction Manager

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

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

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

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

17.2.5 The Contractor's Representative may, subject to the approval of the Employer (which shall not be unreasonably withheld), at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Contractor's Representative, and shall specify the powers, functions and authorities

thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Employer and the Project Manager.

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

17.2.7 Notwithstanding anything stated in GCC Sub-clause 17.1 and 17.2.1 above, for the purpose of execution of contract, the Employer and the Contractor shall finalize and agree to a Contract Co-ordination Procedure and all the communication under the Contract shall be in accordance with such Contract Co-ordination Procedure.

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

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

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

18. Project Implementation

18.1 Work Schedule

Within fourteen (14) days after the date of Issue of LOI, the Contractor shall prepare and submit to the Project Manager a detailed program of Performance of the Contract, made in the form of PERT Chart and showing the sequence in which it proposes to design, manufacture, transport, assemble, install and pre-commission the Facilities. The program so submitted by the Contractor shall accord with the Time Schedule indicated in SCC and any other dates and periods specified in the Contract. The Contractor shall update and revise the program as and when appropriate or when required by the Project Manager, but without modification in the Time for Completion given in the SCC and any extension granted in

accordance with clause for extension of time, and shall submit all such revisions to the Project Manager.

18.2 Progress Report

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

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

18.3 Maintenance of Records of Weekly Progress Review Meeting at Site

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

19. Subcontracting

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

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

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

20. Design and Engineering

20.1 Specifications and Drawings

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

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

20.1.3 The Contractor shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designated by or on behalf of the Employer, by giving a notice of such disclaimer to the Project Manager.

20.2 Codes and Standards

Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date of bid submission shall apply unless otherwise specified.

20.3 Approval / Review of Technical Documents by Project Manager

The Contractor shall prepare list of documents as per technical specifications and furnish to the Project Manager for Approval of the same and Review of work schedule.

Any part of the Facilities covered by or related to the documents to be approved by the Project Manager shall be executed only after the Project Manager's approval thereof.

20.3.1 Within ten (10) days after receipt by the Project Manager of any document requiring the Project Manager's approval, the Project Manager shall either return one copy thereof to the Contractor with its approval endorsed thereon or shall notify the Contractor in writing of its disapproval thereof and the reasons therefor and the modifications that the Project Manager proposes.

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

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

20.3.4 The procedure for submission of the documents by the Contractor and their approval by

the Project Manager shall be as per the Contract Co-ordination procedure.

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

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

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

20.3.8 If the Project Manager requests any change in any already approved document and/or in any document based thereon, generally shall be taken care by the contractor if the change is not causing any major financial impact.

21. Procurement

21.1 Plant and Equipment

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

21.2 Transportation

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

21.3 Packing and Marking

21.3.1 The Contractor shall be responsible for securely protecting and packing the plant &

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

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

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

22. Materials and Workmanship

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

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

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

23. Installation

23.1 Tools & Tackles

The Contractor shall provide technically suitable tools and tackles for installation & erection

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

23.2 Setting up/Supervision/Labor

23.2.1 Bench Mark:

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

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

23.2.2 Contractor's Supervision:

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

23.2.3 Labor:

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

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

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

The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous or disorderly conduct or behavior by or amongst its employees and the labor of its Subcontractors.

The Contractor shall, in all dealings with its labor and the labor of its Subcontractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the

employment of labor.

23.3 Contractor's Equipment

23.2.4 All equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the Project Manager's consent that such Contractor's Equipment is no longer required for the execution of the Contract.

23.2.5 Unless otherwise specified in the Contract, upon completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor onto the Site.

23.4 Site Regulations and Safety

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

23.5 Site Clearance

23.5.1 Site Clearance in Course of Performance

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

23.5.2 Site Clearance after Completion

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

23.5.3 Disposal of Scrap

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

The ownership of such Scrap shall vest with the Contractor except in cases where the items have been issued by the Employer from its stores for their installation only without any adjustment to the Contract Price. The removal of scrap shall be subject to the Contractor

producing the necessary clearance from the relevant authorities (Custom, Excise etc.), if required by the law, in respect of disposal of the scrap. The liability for the payment of the applicable taxes/duties shall be that of the Contractor.

The Contractor shall also indemnify to keep the Employer harmless from any act of omission or negligence on the part of the Contractor in following the statutory requirements with regard to removal/disposal of scrap. The Indemnity Bond shall be furnished by contractor as per Proforma enclosed as *Appendix 16 of Section- VI: Forms and Formats*). Further, in case the laws require the Employer to take prior permission of the relevant Authorities before handing over the scrap to the Contractor, the same shall be obtained by the Contractor on behalf of the Employer.

23.5.4 Watching and Lighting

The Contractor shall provide and maintain at its own expense all lighting, fencing, watch and ward wherever necessary for the proper execution and the protection of the Facilities, or for the safety of the owners and occupiers of adjacent property and for the safety of the public.

24. Inspection & Testing

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

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

24.3 The Contractor shall issue request letter to the Employer or its authorized representative for testing of any component of the plant, which is ready for testing at least 07 days in advance from the date of actual date of testing at the premises of the Contractor or elsewhere. However, the Employer at its own discretion may waive the inspection and testing in writing under very special circumstances. In such case, the Contractor may proceed with the tests which shall be deemed to have been made in the Employer presence, and it shall forthwith forward two sets of duly certified copies of test results and certificates to the Employer for approval. The Contractor, on receipt of written acceptance from the Employer, may dispatch the equipment for erection & installation.

24.4 For all tests to be carried out, whether in the premises of the Contractor or any Sub-

Contractor, the Contractor, shall provide labor, materials, electricity, fuel, water, stores, apparatus and instruments etc. free of charge as may reasonably be demanded to carry out such tests of the plant in accordance with the Contract. The Contractor shall provide all facilities to the Employer or its authorized representative to accomplish such testing.

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

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

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

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

25. Authorized Test Centers for test certificates

The PV modules/ inverters/ cables and other Balance of system equipment deployed in the solar PV power plant shall have valid test certificates for their qualification as per above specified IEC/ IS Standards by one of the NABL Accredited Test Centers in India. In case of module types/ equipment for which such Test facilities may not exist in India, test certificates from reputed ILAC Member body accredited Labs abroad (with proper proof of accreditation) will be acceptable.

26. Commissioning and Completion of the Facilities

26.1 As soon as installation of the Facilities has, in the opinion of the Contractor, been completed as specified in the Technical Specifications, excluding minor items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify the Employer (Project Manager) in writing to witness the pre- commissioning of the facility.

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

26.3 Commissioning of the Facilities shall be completed by the Contractor as per procedures detailed in the Technical Specifications and in the presence of the Project Manager or the representatives of the employer.

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

26.5 If the Project Manager is satisfied that the Facilities have reached Completion, the Project Manager shall, within seven (7) days after receipt of the Contractor's repeated notice, issue a Completion Certificate stating that the Facilities have reached Completion as at the date of the Contractor's repeated notice.

26.6 If the Project Manager is not so satisfied, then it shall notify the Contractor in writing of any defects and/or deficiencies within seven (7) days after receipt of the Contractor's repeated notice, and the above procedure shall be repeated.

26.7 If the Project Manager fails to issue the Completion Certificate and fails to inform the Contractor of any defects and/or deficiencies within fourteen (14) days after receipt of the Contractor's notice under GCC Sub-Clause 26.2 or within seven (7) days after receipt of the Contractor's repeated notice under GCC Sub-Clause 26.3, or if the Employer makes use of the Facilities, then the Facilities shall be deemed to have reached Completion as of the date of the Contractor's notice or repeated notice, or as of the Employer's use of the Facilities, as the case may be.

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

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

27. Guarantee Test and Operational Acceptance

27.1 Functional Guarantees

27.1.1 The Contractor guarantees that during the Guarantee Test, the Facilities and all parts thereof shall attain the Functional Guarantees specified under Technical Specifications, subject to and upon the conditions therein specified.

27.1.2 If, for reasons attributable to the Contractor, the guaranteed level of the Functional Guarantees specified under Technical Specifications are not met either in whole or in part, the Contractor shall, within a mutually agreed time, at its cost and expense make such changes, modifications and/ or additions to the Plant or any part thereof as may be

necessary to meet such Guarantees. The Contractor shall notify the Employer upon completion of the necessary changes, modifications and/or additions, and shall seek the Employer's consent to repeat the Guarantee Test. If the level of the specified Functional Guarantee parameters, as demonstrated even during repeat of the Guarantee Test(s), are outside the acceptable shortfall limit, the Employer may at its option, either

- Reject the Equipment and Advise immediate replacement with equipment to suit the provisions of Technical Specification without any additional cost
- Reject the Equipment and recover the payments already made, or
- Terminate the Contract and recover the payments already made, or
- Accept the equipment after levy of liquidated damages in accordance with the provisions specified.

27.2 Plant Performance Guarantee Test

The plant Performance Guarantee (as mentioned in SCC) Test shall be conducted by the Contractor after Commissioning of the Facilities to ascertain whether the Facilities or the relevant part(s) can attain the Functional Guarantees specified in the Contract Documents. The Contractor's and Project Manager's advisory personnel shall attend the Guarantee Test. The Employer shall promptly provide the Contractor with such information as the Contractor may reasonably require in relation to the conduct and results of the Guarantee Test (and any repeats thereof). The detailed procedure for Performance Guarantee Test shall be carried out as per procedure laid down in Section V – Technical Specifications.

27.3 Operational Acceptance and Final Acceptance

27.3.1 Operational Acceptance shall occur in respect of the Facilities when:

- The Plant Performance Guarantee Test in accordance with the procedure specified in Section V – Technical Specifications has been successfully completed and the Functional Guarantees are met; or
- The Contractor has paid the liquidated damages specified in GCC Clause 34 hereof;

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

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

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

27.3.5 Subsequent to Final Acceptance of the Facilities by the Employer and within 10 days of the commencement of the O&M period, the Contractor shall furnish an Indemnity Bond as per Appendix 17 of Section VI: Forms and Formats which is to be executed by the contractor for the plant handed over by SECI for performance of its O&M Contract (Entire Solar Photo Voltaic Plant).

28. Inter-changeability

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

29. Power to Vary or Omit Work

29.1 No alterations, amendments, omissions, additions, subtractions, or variations of the work (hereinafter referred to as "variation") under the contract shall be made by the Contractor except as directed by the Employer.

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

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

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

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

29.6 In any case, if the Contractor deviates from the design or specification as defined in the NIT

document, the Contractor has to submit the deviation sheet along with the Bid.

30. Negligence

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

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

31. Statutory Responsibility

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

32. Insolvency and Breach of Contract

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

If the Contractor 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 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.

33. Delay in Execution or Failure to Supply

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

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

34. Liquidated Damages

34.1 The project is scheduled to be commissioned within 180 days from the date of issue of LOI/ NTP.

34.2 In case the Contractor fails to achieve successful commissioning of plant by the due date indicated in Timeline, the Employer shall levy Liquidated Damages on the Contractor at the following rate: (partial/ part commissioning shall not be accepted)

34.2.1 Delay up to 1 Month: - SECI will encash 20% of the total Performance bank guarantee

34.2.2 Delay of more than one month and up to two months: - SECI will encash another 40% of the total Performance bank guarantee.

34.2.3 Delay of more than two month and up to three months: – SECI will encash the balance 40% of the total Performance bank guarantee

34.2.4 The maximum time period allowed (with LD) for commissioning of the project shall be 09 months from the date of LOI. In case of delay for more than 09 months, the Employer shall get the project complete by other suitable agency at risk and cost of Contractor. For calculation of liquidated damages, the month shall be considered consisting of 30 days and date of LOI as reference date.

35. Defect Liability

35.1 The Contractor must warrant that the Facilities shall be free from defects in the design, engineering, materials and workmanship of the Plant and Equipment supplied and of the work executed.

35.2 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 in this regard shall be final and binding.

35.3 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.

35.4 The Defect Liability Period shall be twelve (12) months from the date of successful commissioning of the project ("Defects Liability Period").

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

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

- Improper operation or maintenance of the Facilities by the Contractor during operation and maintenance of the Facility; and
- Operation of the Facilities outside specifications of the Facilities.

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

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

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

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

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

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

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

36. Termination for Default

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

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

36.3 In the event the Employer terminates the contract in whole or in part, pursuant to above, the

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

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

37. Breach & Cancellation of the Contract

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

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

- If the Contractor fails to deliver any or all of the Goods within the period(s) specified in the Contract; or
- If the Contractor fails to perform any of their obligations(s) under the Contract, and
- If the Contractor, in either of the above circumstances does not rectify his failure within a period of 30 (Thirty) days (or such longer period as the SECI may authorize in writing) after receipt of the default notice from the Employer

38. Force Majeure

38.1 A 'Force Majeure' means any event or circumstance or combination of events those stated below that wholly or partly prevents or unavoidably delays an Affected Party in the performance of its obligations under this Agreement, but only if and to the extent that such events or circumstances are not within the reasonable control, directly or indirectly, of the Affected Party and could not have been avoided if the Affected Party had taken reasonable care or complied with Prudent Utility Practices:

a) Act of God, including, but not limited to lightning, drought, fire and explosion (to the extent originating from a source external to the site), earthquake, volcanic eruption, landslide, flood, cyclone, typhoon or tornado;

b) Any act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot, insurrection, terrorist or military action; or

c) Radioactive contamination or ionising radiation originating from a source in India or resulting from another Force Majeure Event mentioned above excluding circumstances where the source or cause of contamination or radiation is brought or has been brought into or near the

Power Project by the Affected Party or those employed or engaged by the Affected Party.

d) An event of Force Majeure identified under SECI-NVVN PPA, thereby affecting delivery of power from SPD to DISCOM.

38.2 Force Majeure Exclusions

Force Majeure shall not include (i) any event or circumstance which is within the reasonable control of the Parties and (ii) the following conditions, except to the extent that they are consequences of an event of Force Majeure:

a). Unavailability, late delivery, or changes in cost of the plant, machinery, equipment, materials, spare parts or consumables for the Power Project;

b). Delay in the performance of any contractor, sub-contractor or their agents;

c). Non-performance resulting from normal wear and tear typically experienced in power generation materials and equipment;

d). Strikes at the facilities of the Affected Party;

e). Insufficiency of finances or funds or the agreement becoming onerous to perform; and

f). Non-performance caused by, or connected with, the Affected Party's:

i. Negligent or intentional acts, errors or omissions;
ii. Failure to comply with an Indian Law; or
iii. Breach of, or default under this Contract Agreement.

38.3 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 last.

38.4 Upon occurrence of such causes, the party alleging that it has been rendered unable as aforesaid, thereby, shall notify the other party in writing by registered notice within 48 (forty eight) hours of the alleged beginning thereof giving full particulars and satisfactory evidence in support of its claim. Further, within 7 (seven) days, the Contractor will furnish a detailed Contingency Plan to overcome the effects of the incident and bring the project on its schedule after cessation of the effect of Force Majeure.

38.5 The Affected Party shall give notice to the other Party of (i) the cessation of the relevant event of Force Majeure; and (ii) the cessation of the effects of such event of Force Majeure on the performance of its rights or obligations under this Agreement, as soon as practicable after becoming aware of each of these cessations.

38.6 Time for Performance of the relative obligation suspended by the force majeure shall stand extended by the period for which such clause lasts.

38.7 If works are suspended by Force Majeure conditions lasting for more than two months, the Employer shall have the option of cancelling this Contract in whole or part thereof, at its discretion.

38.8 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.

39. Insurance

39.1 During the Contract period 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 and delivery in such a manner that Employer shall not incur any financial loss, as long as the plant continues to remain under the custody of the Contractor.

39.2 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.

39.3 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 Employer shall be rested upon the Contractor.

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

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

39.6 All other insurance like, Contractor All Risk, Erection All Risk, insurance against theft and acts of GOD, as required for the construction and O&M of the plant and to indemnify the employer/ equipment/ material and resources shall be borne by the contractor. Fire insurance is to be arranged by the Contractor up to the years of O&M of the Contract.

39.7 The insurance are suitably taken for the activity/ act which is required to cover all the risk associated to the activity / act. The contractor shall be responsible to take suitable insurance till the completion of the O&M contract and indemnify the Employer from all associated risks.

40. Statutory Acts, Rules and Standards

The work shall be executed in conformity with the relevant standard of Bureau of Indian

Specification (or equivalent International Standard), Indian Electricity Act 2003, Indian Electricity Rules 2005 (as amended up to date), Explosive Act 1948, Petroleum Act 1934, National Building Code, hazardous waste management rules 2009, e – waste (Management & Handling) rules 2011 and relevant Rules/ acts in vogue at the time of execution including operation & maintenance period.

41. Hazardous Material

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

42. Stoppage of Work

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

43. Hindrance Register

The Contractor may also maintain a Hindrance Register where reasons for delay may be recorded from time to time and at the time of occurrence of the hindrance and get it duly certified by the Project Manager or his authorized representative.

44. Manuals

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.

45. Delivery of Equipment

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

45.2 Notification of delivery or dispatch in regard to each and every consignment shall be made to the Employer immediately after dispatch or delivery from the manufacturing works. The Contractor shall supply to the consignee Invoice in triplicate and packing account of all stores delivered or dispatched by him.

45.3 In case of any occurrence of loss or damage in transit, it shall be the liability of the Contractor

to initiate or pursue the claim with insurance Employer. It should take immediate steps to repair the damaged apparatus or replacement there to.

46. Liabilities during Transit

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

47. Deduction from Contract Price

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

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

48. Warranty / Guarantee

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

48.2 The modules shall be warranted for at least 5 years for failures due to material defects and workmanship.

48.3 The mechanical structures, electrical works and overall workmanship of the grid connected solar power plant must be warranted for a minimum of 10 years.

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

48.5 The warranty / guarantee period shall be as follows:

48.5.1 Solar PV Modules: Modules shall be warranted for a minimum period of 25 years in the

Bidder's detailed Warranty / Guarantee certificate. Same should be furnished with its Bid.

48.5.2 Power Conditioning Units (PCU)/ Inverters: PCUs shall be warranted for the guarantee period provided by the original equipment manufacturer. Same should be furnished with its Bid.

48.5.3 Transformers, associated switch gear and others: Bidder must furnish in detail its warranties / guarantees for these items.

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

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

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

49. Final Bill

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

49.2 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 &Maintenance shall have two distinct components as described below:

49.2.1 Preventive / Routine Maintenance:

This shall be done by the Contractor regularly and shall include activities such as cleaning and checking the health of the Solar PV system, cleaning of module surface, tightening of all electrical connections, and any other activity including the associated civil works, as mentioned in GCC clause 7, wear and tear that may be required for proper functioning of the Solar PV system as a whole. Necessary maintenance activities, Preventive and Routine for Transformers and associated switch gears also shall be included.

49.2.2 Breakdown / Corrective maintenance:

Whenever a fault has occurred, the Contractor has to attend to rectify the fault & the fault must be rectified within 24 hrs time from the time of occurrence of fault, failing which the Contractor will be liable for additional liquidated damages as per terms & conditions under Performance Guarantee and under Warranty mentioned in SCC.

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

50. Risk Purchase

If the Contractor fails, on 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 Employer shall have the liberty to get the work done through other agency at the contractor's own risk and additional cost if any has to be borne by the Contractor. If the situation, so warrants, to compel the Employer to cancel the LOI placed on the Contractor, it shall be liable to compensate the loss or damage, which the Employer may sustain due to reasons of failure on contractor's part to execute the work in time.

51. Unforeseen Conditions

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

work or using additional Plant and Equipment or Contractor's Equipment, notify the Project Manager in writing of

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

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

iii) The extent of the anticipated delay

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

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

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

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

52. Change in Laws and Regulations

If, after the date seven (7) days prior to the date of Bid submission, in the country where the Site is located, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the Performance of any of its obligations under the Contract. However, these adjustments would be restricted to direct transactions between the Employer and the Contractor/assignee of Foreign Contractor (if applicable). This adjustment shall not be applicable on procurement of raw materials, intermediary components etc. by the Contractor and shall also not be applicable on bought out items dispatched directly from sub- vendor works to site. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same

has already been accounted for in the price adjustment provisions where applicable.

53. Extension of Time for Completion

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

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

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

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

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

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

54. Care of Facilities

The Contractor shall be responsible for the care and custody of the Facilities or any part thereof until the date of Completion of the Facilities pursuant to GCC Clause 18 or, where the Contract provides for Completion of the Facilities in parts, until the date of Completion of the

relevant part, and shall make good at its own cost any loss or damage that may occur to the Facilities or the relevant part thereof from any cause whatsoever during such period. The Contractor shall also be responsible for any loss or damage to the Facilities caused by the Contractor or its Subcontractors in the course of any work carried out, pursuant to GCC Clause 35 (Defect Liability).

55. Contractor Performance & Feedback and Evaluation System

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

- Financial Status
- Project Execution and Project Management Capability
- Engineering & QA Capability
- Claims & Disputes

56. Fraud Prevention Policy

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

Section – IV

Special Conditions of Contract

(BID DOCUMENT NO. – SECI-SGM10-1-2015)

SOLAR ENERGY CORPORATION OF INDIA

(A Government of India Enterprise)

Ist floor, Wing A, Religare Building, D – 3, District Centre, Saket, New Delhi – 17

Tel: 011 – 71989224, Fax: 011 – 71989241

Contents

1. Project description

The main objective of this project is Design, engineering, manufacture, procure, supply, erection, testing and commissioning of 10MW (AC) Grid-Connected Solar Photovoltaic Power Plant with all associated infrastructure and with associated 5 (five) years operation & maintenance after the 1 year of performance demonstration of the same with effect from date of commissioning on turnkey basis at Project Site.

2. Project Site

Project site shall be Vill: Badi Sid, Teh: Bap, Phalodi, Dist: Jodhpur, State: Rajasthan. Details of the Project Site are mentioned under Section V: Technical Specifications.

3. Appointing Authority

Appointing Authority of Adjudicator and arbitrator is **The Managing Director, SECI.**

4. Project Manager/ Engineer in - Charge

Project Manager/ Engineer in - Charge will be appointed and will be intimated after award of the contract.

5. Scope of Services

Supply, installation and commissioning of the all the equipment related to the project along with accessories and recommended & mandatory spares including, but not limited to that of mentioned in the Section V: Technical Specifications, Transportation, unloading, receiving and storage at site.

- Arranging to repair and/or re-order and supply all damaged or short-supply items.
- Final check-up of equipment and pre – commissioning, commissioning and putting the system into successful operation for performance demonstration while feeding power to the grid while keeping the plant up for 100%
- 1 year of performance demonstration including final acceptance
- Comprehensive Operation and Maintenance of the plants for 5 (Five) years thereafter

6. Training of Employer's Personnel

On successful commissioning of the plant, the Bidder shall provide training on Plant operations and maintenance to a team of 5-10 personnel (Engineers and Technician/Operators) as nominated by SECI.

7. Performance Guarantee

7.1. The plant performance will be evaluated through Performance ratio test as per IEC 61724 and Capacity Utilization Factor calculation as per the formulas and procedures mentioned under Clause 7 of Section V: Technical Specification.

7.2. The minimum acceptable PR of the plant is 0.78 and CUF shall be 19% against installed DC

capacity at STC.

7.3. As the PR of the Plant is dependent on the quality of plant equipment and optimum design of the plant, the bidders shall demonstrate the PR of 0.78 as per the procedure mentioned at Clause 7.1 of SCC for Operational Acceptance of the plant.

7.4. The initial acceptance of the plant will be evaluated during commissioning by measuring PR for continuous 7 days. However, contractor must demonstrate the PR for a period of 30 days as per the PR test procedure specified in Section V – Technical Specifications.

7.5. The final acceptance of plant will be evaluated based on minimum CUF demonstrated at the end of one year from the date commissioning. During this period, the contractor shall operate and maintain the plant with full reliability and up keep.

7.6. During O&M contract, the plant performance will be evaluated based on annual Capacity Utilization Factor. The Capacity Utilization Factor will be determined based on annual radiation measured at the plant and the guaranteed PR by the bidder. Second year onwards plant deration factor also will be considered to evaluate the CUF.

7.7. During the performance demonstration period after the commissioning of the plant and during the O&M period, the bidders need to maintain 100% uptime of the plant to achieve the proposed CUF at the end of each year. Any repair, replacement, overhauling, etc., are to be performed during night times so that no generation loss will be there in day time.

7.8. Bidders are expected to make their own study of solar profile and other related parameters of the area & make sound commercial judgment about the Performance ratio. 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 before giving commitments of PR and CUF of the proposed Project.

7.9. The Contractor shall be responsible for achieving PR and CUF. For any shortfall in achieving PR and CUF, compensation shall be recovered from the Contractor as per SCC Clause 25.

8. Project Time lines:

The time lines for execution of the contract is 180 days from the date of award of LOI and as per the indicative milestones mentioned below.

Timelines for Scope of work

S. No.	Stage	Reference from D
1	Issue of LOI/ NTP	Zero Date (D)
2	Site Development Work	D+30
3	Approval of Major drawings	D+60
4	Completion of Civil work	D+75

5	Completion of supply of major equipment like SPV Modules (including structure for the above), Power Conditioning Units, transformers etc.	D+90
6	Installation of all major equipment	D+135
7	Interconnection of all major equipment and completion of installation	D+155
8	Completion, testing and commissioning of Solar PV power plant	D+180
9	Operational Acceptance (PR test demonstration)	D+210

9. Mode of Execution

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

10. Programme of Work

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.

11. Starting of Work

The Contractor shall be required to start the work within 15 (fifteen) days from the date of issue of Letter of Intent (LOI) and shall thereof, report to the SECI accordingly.

12. Completion Schedule

12.1. The time of completion for the construction activities is 180 days from the date of issue of LOI. Thereafter, 5 years of O&M Contract from the date of Final Acceptance of the plant.

12.2. The Contractor shall inform the Employer through advance information at least 30 days in advance in written notice, and a final notice 7days in advance to enable the employer inform the commissioning committee of the date on which it intends to synchronize the Power Project to the Grid System.

12.3. The Contractor shall prepare the completion schedule accordingly and inconformity with provisions of technical specifications and carry out the work as per this schedule subject to “Force Majeure” conditions. The Contractor shall mobilize resources keeping in view, the above scheduled completion period.

13. Site Inspection & Basis of Bid

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 Employer. In case of any defects arising in the building during guarantee period, the Contractor shall have to rectify the same at its own cost.

14. Terms of Payment

14.1. SECI shall pay the Contractor in the following manner and at the following time:

S. No	Payment Milestones	Amount*
1	Mobilisation Advance against Bank Guarantee, if required, as per as per ITB Clause 1.2.3 under format given in Appendix 17: Mobilization Advance against bank guarantee.	10% of ECV
2	Upon the completion of all drawings and deliverables required for the construction of plant	10% of ECV
3	Upon delivery and acceptance of all modules at site	20% of ECV (plus 10% of ECV if Mobilization Advance not availed)
4	Upon complete delivery of Balance of Systems including PCUs, transformers, MMS etc. at site	20% of ECV
5	Upon Commissioning of the Facility	20% of ECV
6	Operation Acceptance of the Facility pursuant to successful Guarantee Tests and demonstration of PR and submission of all As – build documentation	10% of ECV
7	Demonstration of CUF for the successful first year operation.	10% of ECV
8	On successful Operation and Maintenance of the Solar Power Plant on yearly basis for each year till 5 years	Year 1: OM-1
		Year 2: OM-2
		Year 3: OM-3
		Year 4: OM-4
		Year 5: OM-5

* Taxes and duties shall be payable as per actuals on the production of documentation.

14.2. Mobilisation Payment shall be payable against submission of unconditional and irrevocable Mobilization advance payment bank guarantee of equivalent amount of mobilisation payment as per format in Appendix 17 of Section VI: Forms and Formats as issued by the bank as enlisted

at Schedule-1. This bank guarantee shall be valid till 180 days from the date of issue of LOI. The recovery of the mobilization advance shall be made in accordance with GCC Clause 12.2

14.3. ECV indicates the EPC Contract Value quoted by the Successful Bidder in its Financial Proposal.

14.4. 'OM' indicates the O&M Contract Value quoted by the Successful Bidder for each individual year in its Financial Proposal.

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

14.5.1 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.

14.5.2 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.

14.5.3 All taxes and deductions shall be applicable as per prevailing income tax, Works Contract Tax and other statutory rules and provisions in force. SECI will not issue any C – Form etc. in order to get sales tax concession.

14.5.4 The Contractor, while submitting the Invoices, shall provide the breakup of Supply, Services & other Works and applicable taxes separately.

15. Price Escalation

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

16. Taxes and Duties:

16.1. The price quoted shall be inclusive of all applicable taxes, duties, levies as applicable, which shall be paid on production of proper documentary evidences for the same.

16.2. Bidder have to quote the rates of taxes & duties based on the concessional exemption in the same that can be availed by the bidder on its own. 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 SECI 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 SECI or SECI 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

SECI, the provisions of (A) above shall apply.

ii. If reasons for extension of contractual completion period is attributable to Bidder, then:

(a) Increase in taxes and duties due to statutory variation, shall not be admissible. However, taxes and duties at the rate prevailing original contract completion period will be payable.

(b) If any decrease takes place in taxes and duties due to statutory variation, the same shall be passed on to SECI or SECI shall admit the decreased rate of taxes and duties while making the payment.

(C) Variation on account of foreign exchange rate will not be payable. Also, no statutory variation shall be payable on the input items i.e., raw materials etc.

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

(E) Notwithstanding anything contained in this document at any other place, all the taxes on account of bought out items or any other transaction between the Contractor and his sub-Contractor/supplier, will be to the account of the Contractor. SECI will not be liable for any other taxes on this account.

17. Procurement of Materials

The Contractor shall procure all necessary material required for the project work and arrange to store them properly. Test certificate in accordance with the specifications are to be furnished by the Contractor to the Employer for approval in respect of the materials procured by the Contractor. Contractor shall furnish all the documents related including GR/LR/RR along with the supplier invoices as a proof of the purchase along with the bill / invoice raised by the contractor.

18. Samples

Apart from adhering to special provision made in the specification regarding submission of samples, the Contractor shall within 10 days of its receipt of Letter of Intent, provide to the Employer 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 Employer shall check the samples and give his comments and/or approval to the same.

19. Notice of Operation

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

20. Rejection of Materials

The Project Manager'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.

21. Construction Power & Water Supply

21.1. The Contractor has to arrange Construction Power and water at the site for construction purpose at its own cost.

21.2. Cost of electricity required during construction shall be payable by the bidder. For construction, temporary connection for construction power from DISCOM shall be arranged by the bidder as per applicable tariff.

21.3. The Employer shall not provide facility for storage of material, and accommodation for labours at site. The Contractor shall make his own arrangement for the above.

22. Labour Engagement

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 & 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.

The contractor is encouraged to use local manpower as per the local statutory (labour) requirement, if any.

23. Handing Over –Taking Over

The work shall be taken over by the Employer 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 NIT. During handing over complete project work, the Contractor shall submit the following for considering final payment:

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

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

23.3. Bill of material.

23.4. Inventory of recommended and mandatory spares at project Site.

23.5. Immediately after taking over of complete facilities (s), the same will be handed over to the Contractor for Operation & Maintenance for a period of as mentioned in the SCC Clause 5.

24. Liquidated Damages

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

25. Liquidated Damages for PR and CUF deviations

27.1. During the Operational Acceptance any shortfall in the Performance Ration (PR) as determined through the PR Test Procedure specified in Clause 7 of Section V: Technical Specification will attract imposition of liquidated damages. For every 0.01 shortfall in PR below 0.78 by the bidder, a penalty of 1% of the Contract Value shall be levied. In case the Plant PR below 0.05 below 0.78, the performance bank guarantee submitted by the bidder will be encashed. In case the Performance guarantee has already been encashed on account of delays, the Final Instalment of the EPC payable at the end of the first year (as per the Terms of Payment specified in Clause 14.1 of SCC)

27.2. In case of any defect in the system after commission, the Contractor shall repair it within 48 hours. Otherwise LD shall be charged and the same shall be deducted from the Bank guarantee submitted to the Employer.

27.3. Liquidity Damages shall be charged at a rate of:
Difference in units derived from committed and achieved CUF x Rs. [*Tariff as per SECI's PPA*] for period after commissioning till the O&M contract closure.

27.4. In case the Project fails to generate any power continuously for 1 month any time during the O&M period, it shall be considered as "an event of default". In the case of default the entire O&M Bank Guarantee will be encashed.

26. Miscellaneous

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

28.2. The Contractor shall continue to provide all the monitoring services, licenses, software, access to all information (real-time or stored) that were been used during the O&M to the Employer.

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

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

28.5. GCC clause 13.3: SECI will not issue any C – Form in order to get benefit from the sales tax. Bidder has to take not of the same while quoting the bids.

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

Schedule 1: List of Banks

1. SCHEDULED COMMERCIAL BANKS	2. OTHER PUBLIC SECTOR BANKS
SBI AND ASSOCIATES	1. IDBI Bank Ltd.
1. State Bank of India	3. FOREIGN BANKS
2. State Bank of Bikaner & Jaipur	1. Bank of America NA
3. State Bank of Hyderabad	2. Bank of Tokyo Mitsubishi UFJ Ltd.
4. State Bank of Indore	3. BNP Paribas
5. State Bank of Mysore	4. Calyon Bank
6. State Bank of Patiala	5. Citi Bank N.A.
7. State Bank of Travancore	6. Deutsche Bank A.G
NATIONALISED BANKS	7. The HongKong and Shanghai Banking Corpn. Ltd.
1. Allahabad Bank	8. Standard Chartered Bank
2. Andhra Bank	9. Societe Generale
3. Bank of India	10. Barclays Bank
4. Bank of Maharashtra	11. ABN Amro Bank N.V.
5. Canara Bank	12. Bank of Nova Scotia
6. Central Bank of India	13. Development Bank of Singapore (DBS, Bank Ltd.)
7. Corporation Bank	4. SCHEDULED PRIVATE BANKS
8. Dena Bank	1. Federal Bank Ltd.
9. Indian Bank	2. ING Vysya Bank Ltd.
10. Indian Overseas Bank	3. Axis Bank Ltd.
11. Oriental Bank of Commerce	4. ICICI Bank Ltd.
12. Punjab National Bank	5. HDFC Bank Ltd.
13. Punjab & Sind Bank	6. Yes Bank Ltd.
14. Syndicate Bank	
15. Union Bank of India	
16. United Bank of India	
17. UCO Bank	
18. Vijaya Bank	
19. Bank of Baroda	

SECTION – V

TECHNICAL SPECIFICATIONS

(BID DOCUMENT NO. – SECI – SGM10 – 1 – 2015)

SOLAR ENERGY CORPORATION OF INDIA

(A Government of India Enterprise)

Ist floor, Wing A, Religare Building, D – 3, District Centre, Saket, New Delhi – 17

Tel: 011 – 71989230, Fax: 011 – 71989241

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DISCLAMIER:

1. Though adequate care has been taken while preparing the NIT document, the Bidders/Applicants shall satisfy themselves that the document is complete in all respects. Intimation of any discrepancy shall be given to this office immediately. If no intimation is received from any Bidder within twenty (20) days from the date of notification of NIT/Issue of the NIT documents, it shall be considered that the NIT document is complete in all respects and has been received by the Bidder.
2. Solar Energy Corporation of India (SECI), The Employer, reserves the right to modify, amend or supplement this NIT document including all formats and Annexures.
3. While this NIT has been prepared in good faith, neither SECI nor their employees or advisors make any representation or warranty, express or implied, or accept any responsibility or liability, whatsoever, in respect of any statements or omissions herein, or the accuracy, completeness or reliability of information, and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of this NIT, even if any loss or damage is caused by any act or omission on their part.
4. The specification mentioned for all the equipment viz., Solar modules, PCU, combiner boxes, DC cables, module mounting structures, transformer, CT, PT, LT/ HT cables, interfacing panels, switch gears and other associated equipment to complete the power generation and evacuation to the designated substation, in the present tender document is for the **reference** only. It is subjected to change/ alter as per the design/ planning from the tenderer. It is advised that the tenderer must satisfy himself with the prevailing site conditions before design/ plan. The design must be optimized for the site conditions and directed to achieve the maximum output form the installed capacity at all times. Moreover, the components not mentioned, but are required to complete the plant for operation is also included in the scope of bidder and shall be vetted by SECI.

Place:

(Signature)

Date: Name and Designation of bidder

A. Introduction

1. Site Description

1.1 The land for the proposed project is located at Vill: Badi Sid, Teh: Bap, Phalodi, Dist: Jodhpur, State: Rajasthan and nearly 132km from Bikaner on NH - 15. Jodhpur district is situated in the western part of the Rajasthan, It is bound in the North by Bikaner and Nagaur, in South by Barmer and Pali, Jaisalmer in the West.

1.2 Proposed Land Details:

Particulars	Description
Details of proposed capacity of the solar power plant	11MWp (DC)/ 10MW (AC) SPV (Mono/ Multi crystalline/ thin film) SPV plant
Village	Badi Sid
Tehsil	Bap, Phalodi
District	Jodhpur
State	Rajasthan
Location	Badi Sid
Nearest Substation Details	220/ 132/ 33kV GSS, Badi Sid
Transmission Line	5 km (approx.)
Latitude	27º28' N
Longitude	72º 23' E
Altitude	204m
Estimated life of PV Power plant	25 Years
Land Available	80 Acres (approx.)
Plot No./ Khasara No.	As per annexure
Type of Land	Govt. land
Details of land in possession	Land leased in name of SECI, will be handed over to Contractor
Nearest Urban Area	Bikaner (132km)
Nearest Highway	NH 15 (5km)
Nearest Railway Station	Bap (2km) & Bikaner (133km)
Nearest Domestic Airport	Jodhpur (182km)
Minimum values of performance ratio and Capacity Utilization Factor of the plant after netting off the auxiliary consumption.	PR : 0.78 (against installed DC capacity at STC) CUF : 19% (against installed DC capacity at STC)
Water and Power for Construction	To be arranged by the Contractor

B. System Design and Philosophy

2. Design Philosophy

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

2.1.1 Technology: Solar PV Mono/ multi-crystalline modules (>14.5 Multi, >16% mono) of high efficiency and the cells/ modules should be manufactured in India

Or

Thin film solar modules with module efficiency more than 13%.

2.1.2 Adequate capacity of SPV module, PCUs, Junction boxes etc. to ensure generation of power as per design estimates. This to be done by applying liberal de-rating factors for the array and recognizing the efficiency parameters of PCUs, transformers, conductor loss etc.

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

2.1.4 Selection of the equipment and adoption of a plant layout to ensure ease of maintenance.

2.1.5 Strict compliance with the approved and proven quality assurance norms and procedures during the different phases of the project.

2.1.6 Proper monitoring in the synchronizations which ensures the availability of power to the grid.

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

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

2.1.9 Generation voltage of 230-415V has to be stepped up to 33kV to connect it to the grid at the point of interconnection.

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

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

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

2.2.1 Plant layout to ensure optimum availability for generation during the day time without any shading.

2.2.2 High DC system voltage and low current handling requirements.

2.2.3 Selection of PCUs with proven performance and ready availability of requisite spares.

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

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

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

2.2.7 Flat plate SPV arrays which are held fixed at an optimum tilted angle and face towards the equator, are most common. The angle of tilt should be approximately equal to the angle of latitude for the site. A steeper angle increases the output in winter; while a shallower angle more output in summer. It should be arranged in such a manner that optimum generation is achieved.

2.3 The specifications provided with this bid document are a functional ones; any design provided in this document is only meant as an example. **The Bidder must submit a proposal based upon their own design. Bidder must optimize their own design for Solar Photovoltaic (SPV) system with proven technology so that it shall best meet to guarantee the performance factors as it is a part of the acceptance criteria given in this bid document**. The bidders are advised to visit the site before designing the plant.

2.4 The minimum array capacity at STC shall be determined to have 11MWp output at the time of installation and after stabilized operation of first year this capacity will be measured and the capacity of plant shall be minimum 11MWp. If the bidder anticipates any degradation of the modules during the first year, it shall be taken care of to provide additional capacity to achieve minimum 11MWp of array at the end of first year to meet guaranteed generation to avoid liquidated damages/compensation on account of Performance Guaranteed Generation.

2.5 This Bid document specifically cover the rest of the requirements for Grid Connected 10MW (AC) Solar Power Plant along with their associated equipment. The capacity of the plant shall be determined to attain minimum of 10MW (AC) at the point of evacuation.

2.6 Successful Bidder (Contractor) shall prepare the detailed project report & design basis report and submit a copy to SECI for evaluation within 2 weeks from the date of issue of LOI.

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

2.8 Bidder shall design the equipment and plant in order to have sustained life of 25 years with minimum maintenance efforts.

2.9 The supply, erection, commissioning and all other allied works for 10MW (AC) SPV Power Plant shall be completed within 6 months from the date of order/ LOI/ NTP.

C. Scope of Supply and Work

3. Detailed Scope of Work

3.1 Scope of Supply & Work includes all design, engineering, manufacture, procurement & supply of equipment and materials, testing at manufacturers works, inspection, packing and forwarding, supply, receipt and unloading at site, associated civil works, services, permits, licences, installation and incidentals, insurance at all stages, erection, testing and commissioning of 10MW (AC) Grid Interactive Solar PV Power Plant and performance demonstration with associated equipment and materials on turnkey basis at Vill: Badi Sid, Teh: Bap, Phalodi, Dist: Jodhpur, State: Rajasthan and 05 (five) years comprehensive operation and maintenance after 1 year of performance demonstration from the date of commissioning.

3.2 The equipment and materials for 10MW (AC) Grid Interactive Solar PV Power Plant with associated system (Typical) shall include but not be limited to the receipt, unloading, storage, erection, testing and commissioning of all supplied material for the following:

3.2.1 Solar PV modules of suitable rating, in array totalling minimum of 11MWp including mounting frames, structures, fasteners, array foundation and module interconnection.

3.2.2 Array Junction boxes, distribution boxes and Fuse boxes. MCBs, Surge Arrestors with string monitoring capabilities.

3.2.3 Power Conditioning Units (PCU) with SCADA compatibility, common AC power evacuation panel with bus bars and circuit breakers LT & HT Power Interfacing Panels, Plant Monitoring Desk, AC & DC Distribution boards.

3.2.4 415V / 33kV step up transformers.

3.2.5 33kV / 415V auxiliary transformer.

3.2.6 Metering and protection system along with battery system.

3.2.7 LT Power and Control Cables including end terminations and other required accessories for both AC & DC power

3.2.8 Internal 415V interconnection & Indoor feeder panels to cater auxiliary needs of plant

3.2.9 33kV indoor/ outdoor panels having incoming and outgoing feeders with VCBs, CTs, PTs, Bus bars, cables terminals kits and Bus coupler having Main and transfer Bus. Each bay shall consist of VCB, CT, Isolators with earth switch, LAs and PT's etc.

3.2.10 ABT meters (Main and Check) with all necessary metering rated CT's and PT's at the plant take off point as well as at the substation.

3.2.11 Data acquisition system with remote monitoring facilities. Provision for specific data transfer to the State Load Dispatch Centre (SLDC) shall also be provided.

3.2.12 Lightning arrestors for entire plant area.

3.2.13 PVC pipes, cable trays and accessories/trenches.

3.2.14 Earthing of the entire plant as per relevant standards.

3.2.15 Control room equipment related to solar system etc.

3.2.16 Testing, maintenance and monitoring of equipment.

3.2.17 Mandatory spares & consumables for 6 years.

3.2.18 CCTV cameras at Main Entrance and at Main Control room.

3.2.19 Fire protection system in buildings and fire extinguishers.

3.2.20 One Solar Observatory including testing facilities. The Solar Observatory with associated systems shall include but not be limited to the following:

- Pyranometers.
- Ultrasonic Anemometer.
- Temperature Sensor – Ambient and module surface
- Power source to the all sensors
- Data Logger
- Desktop and Printer

3.2.21 Construction of suitable structures for termination of 33kV line for taking off and receipt of lines through 33kV transmission lines from plant end and GSS respectively.

3.2.22 Design & construction of nearly 5 km of 33kV Transmission line from plant take off point to the Badi Sid substation including right of way.

3.2.23 Design of 10MW (AC) Grid Interactive Solar Power Plant and its associated civil, structural, electrical & mechanical auxiliary systems includes preparation of single line diagrams and installation drawings, electrical lay outs, erection key diagrams, electrical and physical clearance diagrams, design calculations for Earth- mat, Bus Bar & Spacers indoor and outdoor lighting/illumination etc. design memorandum, GTP and GA drawings for the major equipment, design basis & calculation sheets, and other relevant drawings and documents required for engineering of all facilities within the fencing to be provided under this contract, are covered under Bidders scope of work.

3.2.24 In addition to above, the Bidder is required to measure the Solar Radiation and other climatic conditions relevant to measure the plant performance. This is necessary to study Solar Level and Guaranteed Performance of the Solar Power Plant. The satellite based analysis is to be combined with direct ground based measurement equipment in order to achieve the necessary accuracy and level of detail in the assessment of solar levels and climatic conditions.

3.2.25 Estimation and determination of the plant generation on daily basis in form of look ahead scheduling power output.

3.2.26 Any other equipment / material required to complete the 11MWp (DC)/ 10MW (AC) Solar Power Plant.

3.3 During the O&M period, the Contractor shall keep the measured daily data at regular interval and provide the same to SECI in electronic form compatible in CSV format. The right to use the data shall remain with SECI.

3.4 Materials and accessories, which are necessary or usual for satisfactory and trouble-free operation and maintenance of the above equipment.

3.5 Availability of vehicles for O&M staff and for inspection by SECI as per requirement may be ensured, failing which SECI shall have full right for alternate arrangement at the risk & cost of contractor.

3.6 Bidders shall design suitable power evacuation system including design and construction of a suitable transmission line from power plant boundary to inject power from Solar Photovoltaic Power Plant to Badi Sid substation.

3.7 The items of civil construction work shall include all works required for solar PV project and should be performed specifically with respect to following but not limited to:

3.7.1 Conducting contour survey of the Solar Photovoltaic Power Plant for the total area identified for 11MWp (DC)/ 10MW (AC) Solar Photovoltaic capacity & complete soil investigation with bore hole details

3.7.2 Earthwork for Site grading, cutting, filling, levelling & compacting of land.

3.7.3 Construction and erection of perimeter fence/boundary wall and main/ security gate(s).

3.7.4 Construction of foundation & mounting structures for SPV panels.

3.7.5 Civil foundation work of transformers, switchgears, etc.

3.7.6 Construction of 10m wide motorable approach road from main road for easy access to site & 3.75m wide internal roads with 0.5m wide well compacted shoulders on each side with WBM base to carry safe and easy transportation of equipment and material at the project site during and after construction.

3.7.7 Construction of Equipment room with necessary illumination system and finishing as required.

3.7.8 Office cum stores cum control room building with Supervisor room, pantry, wash room, conference room etc. along with requisite furniture, workstations, air conditioning, internal and external illumination, other equipment as per the specifications.

3.7.9 Security cabin at strategic locations inside the plant.

3.7.10 A suitable arrangement of water shall be ensured to cater the day-to-day requirement of drinking water and permanent water supply for module cleaning and other needs of SPV power Plant during entire O&M period.

3.7.11 Suitable Communication System for SCADA with remote monitoring capabilities.

3.7.12 Construction of Storm water drainage & sewage network. Rain water harvesting system should also be explored.

3.7.13 Perimeter lighting Fabrication, supply & erection along with required GI junction boxes, support, brackets and accessories as required.

3.7.14 Galvanized steel rigid/ high density flexible conduits and their accessories and Hume pipes for crossings.

3.7.15 Supply of ferrules, lugs, glands, terminal blocks, galvanized sheet steel junction boxes with powder coating paint for internal fixtures, cable fixing clamps, nuts and bolts etc. of appropriate sizes as required in the plant.

3.7.16 Power Cables laying underground / over ground with proper cable tray arrangements

3.7.17 Entire GI cable tray with proper support and accessories inside equipment room and control room building and other locations as required.

3.7.18 Laying of transmission line, fabrication and erection of structure to support transmission line conductors from take-off point at plant to the delivery point at STU substation.

3.8 Obtaining statutory approvals / clearances on behalf of the employer from Government Departments, not limited to, the following-

3.8.1 Airport authority clearance if required.

3.8.2 Pollution control board clearance, if required.

3.8.3 Mining Department.

3.8.4 Forest Department

3.8.5 All other approval, as necessary for setting up of a solar power plant including CEIG, connectivity, power evacuation, PTCC etc. as per the suggested guidelines

3.8.6 All other statutory approvals and permissions not mentioned specifically but are required to carry out hassle free construction and operation of the plant

3.9 The Bidder shall arrange deployment of qualified and suitable manpower and required necessary consumables during commissioning.

3.10 Construction Power & construction Water as required for construction and completion of this contract are to be arranged by the Bidder.

3.11 Total Operation & Maintenance of Solar Photovoltaic Power Plant for the 5 year's period including deployment of engineering personnel, technicians and security personnel.

3.12 All approvals, equipment, item and works which are not specifically mentioned in this document but are required for completion of work including construction, commissioning, operation & maintenance of Solar Photovoltaic Power Plant in every respect and for safe and efficient construction & erection, operation and guaranteed performance are included in the scope of this bid.

3.13 Submission of following documents, drawings, data design, and engineering information to SECI or its authorized representative for review and approval in hard copy and soft copy from time to time as per project schedule.

3.13.1 Contour plan and soil investigation data for the area

3.13.2 GA drawings of the entire project including roads, drains, storm water drainage, sewage networks, equipment rooms, office cum control room, security gate, fire protection system etc.

3.13.3 Design basis criteria along with relevant standards

3.13.4 Solar insolation data and basis for generation data.

3.13.5 Design calculations and sheets.

3.13.6 Detailed technical specifications of all the equipment.

3.13.7 General arrangement and assembly drawings.

3.13.8 Schematic diagram for entire electric system.

3.13.9 GTP & G.A. drawings for all types of structures/ components, 33kV switchgears & other interfacing panels.

3.13.10 Relay setting charts.

3.13.11 Quality assurance plans including manufacturing quality plan and field quality plans.

3.13.12 Detailed site EHS plan, fire safety & evacuation plan and disaster management plan.

3.13.13 Detailed risk assessment and mitigation plan.

3.13.14 Test reports (for type, acceptance, and routine tests).

3.13.15 O&M Instruction's manuals and its drawings.

3.13.16 As-built drawings / documents and deviation list from good for construction (GFC).

3.13.17 O&M plans, schedules and operational manuals for all equipment etc.

3.14 All drawings shall be fully corrected to agree with the actual "as built" site conditions and submitted to SECI after commissioning of the project for record purpose. All as-built drawings must include the Good for Construction deviation list.

3.15 The contractor shall forward the following to SECI within two weeks from issue of LOI:

3.15.1 Schedule for various activities in the form of PERT Chart within a week from the date of issue of LOI/ NTP.

3.15.2 Daily/ Weekly site work progress report with catch-up plan(s), as necessary to monitor actual timelines of the project during construction period along with the real time snap shots during the time of construction.

3.15.3 Weekly/ Monthly O&M reports after commissioning of the project.

3.16 Providing a detailed training plan for all operation, maintenance procedures, which shall after approval by SECI form the basis of the training program. The contractor, shall also provide training to SECI's nominated staff.

3.17 Employ and coordinate the training of contractors' personnel who will be qualified and experienced to operate and monitor the facility and to coordinate operations of the facility with the grid system.

3.18 Establishing a system to maintain an inventory of spare parts, tools, equipment, consumables and other supplies required for the facility's hassle free operation.

3.19 Adequate insurance coverage during EPC and O&M period to cater all risks related to construction and O&M of plant to indemnify the employer.

3.20 Maintain at the facility accurate and up-to-date operating logs, records and monthly reports regarding the Operation & Maintenance of facility.

3.21 Perform or contract for and oversee the performance of periodic overhauls or maintenance required for the facility in accordance with the recommendations of the original equipment manufacturer (OEM).

3.22 Procurement for spares parts, overhaul parts, tools, equipment, consumables, etc. required to operate and maintain the project in accordance with the prudent utility practices and having regarded to warranty recommendations.

3.23 Handover the system to maintain an inventory of spare parts, tools, equipment, consumables and supplies for the facility's operation along-with required inventory to maintain the facility for two year on the basis of average requirement at the time of conclusion of O&M period.

3.24 Maintain and keep all administrative offices, roads, tool room, stores room, equipment, clean, green and in workable conditions.

3.25 Discharge obligations relating to retirement/ Superannuating benefits to employees or any other benefit accruing to them in the nature of compensation, profit in lieu / in addition to salary, etc. for the period of service with the contractor, irrespective continuance of employees with the project as employees of Contractor, after conclusion of O&M period.

3.26 **Operation and Maintenance**

3.26.1 SECI wishes to entrust the total O&M activities of the 10MW (AC) Solar Photovoltaic Power Plant to the contractor for the 5 (five) years after completion of 1 year of performance demonstration w.e.f. from the date of commissioning.

3.26.2 The Turnkey contractor shall be responsible for all the required activities for the successful running, committed energy generation & maintenance of the Solar Photovoltaic Power Plant covering:

- Deputation of qualified and experienced engineers and technicians
- Deputation of Security personnel for the complete security of plant
- Successful running of Solar Power Plant for committed energy generation.
- Co-ordination with STU/SLDC/other statutory organizations as per the requirement on behalf of Employer for Joint Metering Report(JMR), furnishing generations schedules as per requirement, revising schedules as necessary and complying with grid requirements.
- Monitoring, controlling, troubleshooting maintaining of logs & records, registers.
- Supply of all spares, consumables and fixing / application as required.
- Supply & use of consumables such as grease, oil etc. throughout the maintenance period as per recommendations of the equipment manufacturers.
- Conducting periodical checking, testing, overhauling and preventive action.
- General up keeping of all equipment, building, roads, Solar PV modules, inverter etc.
- Submission of periodical reports to SECI on the energy generation & operating conditions of the power plant.

- Furnishing generation data monthly to Employer by 1st week of every month for the previous month to enable Employer raise commercial bills on consumers.
- Replacement of Modules, Invertors/PCU's and other equipment as and when required

3.26.3 Continuous monitoring the performance of the Solar Power Plant and regular maintenance of the whole system including Modules, PCU's, transformers, overhead line, outdoor/indoor panels/ kiosks etc. are necessary for extracting and maintaining the maximum energy output from the Solar Power Plant.

3.26.4 Corrective and preventive O&M of the Solar Photovoltaic Power Plant including supply of spares, consumables, wear and tear, overhauling, replacement of damaged modules, invertors, PCU's and insurance covering all risks (Fire & allied perils, earth quake, terrorists, burglary and others) as required, for a period of 5 (five) years from the date of start of O&M of the project shall be carried out at fixed annual cost.

3.26.5 The period of Operation and Maintenance will be deemed to commence from the date of completion of performance demonstration/final acceptance and successively the complete Solar Photovoltaic Power Plant to be handed over to the O&M contractor for operation and maintenance of the same. O&M contract shall further be extended on the mutually agreed terms and conditions for the period of minimum 5 years.

3.26.6 All the equipment required for Testing, Commissioning, O&M and for the healthy operation of the Plant must be calibrated, time to time, from the NABL accredited labs and the certificate of calibration must be provided prior to its deployment.

3.27 Operation and Performance Monitoring

3.27.1 Operation part consists of deputing necessary manpower necessary to operate the Solar Photovoltaic Power Plant at the full capacity. Operation procedures such as preparation to starting, running, routine operations with safety precautions, monitoring etc., shall be carried out as per the manufacturer's instructions to have trouble free operation of the complete system.

3.27.2 Daily work of the operation and maintenance in the Solar Photovoltaic Power Plant involves periodic cleaning of Modules, logging the voltage, current, power factor, power and energy output of the Plant at different levels. The operator shall also note down time/failures, interruption in supply and tripping of different relays, reason for such tripping, duration of such interruption etc. The other task of the operators is to check battery voltage-specific gravity and temperature. The operator shall record monthly energy output, down time, etc.

3.28 Maintenance

3.28.1 The contractor shall carry out the periodical/plant maintenance as given in the manufacturer's service manual and perform operations to achieve committed generation.

3.28.2 Regular periodic checks of the Modules, PCU's and other switchgears shall be carried out as a part of routine corrective & preventive maintenance. In order to meet the maintenance requirements stock of consumables are to be maintained as well as various spare as recommended by the manufacturer at least for 5 years to be kept for usage.

3.28.3 Maintenance of other major equipment involved in Solar Photovoltaic Power Plant are step up transformers, overhead line equipment, indoor / outdoor 33kV VCB / SF6 kiosk, associated switchgears, other fixtures & components and metering panel. Particular care shall be taken for outdoor equipment to prevent corrosion. Cleaning of the insulators and applying Vaseline on insulators shall also be carried out at regular intervals. Earth resistivity of Plant as well as individual earth pit is to be measured and recorded every month. If the earth resistance is high suitable action is to be taken to bring down the same.

3.28.4 According to the recommendations stock of special tools and tackles shall be maintained for Modules, PCU's, switchgears and other major electrical equipment.

3.28.5 A maintenance record is to be maintained by the operator/engineer-in-charge to record the regular maintenance work carried out as well as any breakdown maintenance along with the date of maintenance reasons for the breakdowns steps have taken to attend the breakdown duration of the breakdown etc.

3.28.6 The Schedules will be drawn such that some of the jobs other than breakdown, which may require comparatively long stoppage of the Power Plant, shall be carried out preferably during the non-sunny days. An information shall be provided to Engineer-in-charge for such operation prior to start.

3.28.7 The Contractor shall deploy enough manpower at Solar Photovoltaic Power Plant site to carryout work instructions and preventive maintenance schedules as specified. The contractor shall keep at least one skilled and experienced supervisor at site on permanent basis to supervise the jobs that are being carried out at site.

3.28.8 The Contractor will attend to any breakdown jobs immediately for repair/replacement /adjustments and complete at the earliest working round the clock. During breakdowns (not attributable to normal wear and tear) at O&M period, the Contractor shall immediately report the accidents, if any, to the Engineer In-charge showing the circumstances under which it happened and the extent of damage and or injury caused.

3.28.9 The Contractor shall comply with the provision of all relevant acts of Central or State Governments including payment of Wages Act 1936, Minimum Wages Act 1948, Employer's Liability Act 1938, Workmen's Compensation Act 1923, Industrial Dispute Act 1947, Maturity Benefit Act 1961, Mines Act 1952, Employees State Insurance Act 1948, Contract Labour (Regulations & Abolishment) Act 1970, Electricity Act 2003, Grid Code, Metering Code, MNRE guidelines or any modification thereof or any other law relating whereto and rules made there under from time to time.

3.28.10 The contractor shall at his own expense provide all amenities to his workmen as per applicable laws and rules.

3.28.11 The Contractor shall ensure that all safety measures are taken at the site to avoid accidents to his or his sub-contractor or SECI's Workmen.

3.28.12 If negligence / mal operation of the contractor's operator results in failure of equipment such equipment should be repaired replaced by contractor at free of cost.

3.28.13 If any jobs covered in O&M Scope as per O&M Plan are not carried out by the contractor during the O&M period, the Engineer-In-Charge can issue a notice to the Contractor. Repetition of such instances may lead to the Termination of the O&M Contract by the Employer.

3.29 Quality Spares & Consumables

In order to ensure longevity and safety of the core equipment and optimum performance of the system the contractor should use only genuine spares of high quality standards.

3.30 Testing Equipment, Tools and Tackles

The Contractor shall arrange for all the necessary testing equipment, tools and tackles for carrying out all the construction, operation and maintenance work covered under this contract.

3.31 Security services

The contractor has to arrange proper security system including deputation of security personnel at his own cost for the check vigil for the Solar Power Plant. The security staff may be organized to work on suitable shift system; proper checking & recording of all incoming & outgoing materials vehicles shall be maintained. Any occurrence of unlawful activities shall be informed to SECI immediately. A monthly report shall be sent to SECI on the security aspects.

D. Technical Specification of Solar power plant

4. Bill of Material:

The equipment and material for 10MW (AC) Grid Interactive Solar Photovoltaic Power Plant with associate system (typical) shall include, but not limited to the following:

Item Details	**Unit**
PV Modules	Nos.
Module Mounting Structures	Set
Main Junction Boxes with monitoring capabilities	Lot
Solar module array to Junction box Interconnection cable (Cu)	RM
Junction box to Inverter Interconnection Cable	RM
Connection accessories – lugs, ferrules, glands etc.	Lot
DC cables & AC (LT/ HT) Cable of appropriate sizes	RM
Power Conditioning Units/ Inverters	Nos.
Meteorological station with sensors and data logger	Lot
String level monitoring system (SCADA) and ancillaries	Set
Transformers (Power and Auxiliary)	Set
Circuit breakers, CT and PT (at 33KV) set	Set
33kV Indoor/ outdoor interfacing panels with CT, VCB, PT, Relays etc.	Set
33kV XLPE Outgoing feeder cable and supports	Set
AC & DC distribution panels/ boards	Lot
Control and Relay Panel	Lot
Lightning Arresters of suitable ratings	Nos.

Earth mat for switch yard, DC field array and equipment	Lot
Control and power cables	Lot
Surge Protection devices and Fuses	Set
Earth cables, flats and earthing pits	Lot
Equipment and Control cum office Building	Lot
Rubber Mats for specific kV ratings	Lot
Foam type Fire extinguisher	Lot
CO_2 Extinguisher	Lot
Sand Buckets	Lot
Discharge Rods	Lot
Transmission line with suitable conductor with H – poles, towers etc.	Lot
Power efficient peripheral lighting arrangement for the plant safety	Nos.
Fire – fighting automation and signboards in buildings	Lot
Metering Equipment (Meters, and associated CT and PT's)	Set
Protection Equipment	Set
Solar Observatory with remote monitoring assistance	Set
Module cleaning system	Lot
CCTV cameras	Lot
Danger sign plates, anti-climbing, bird protection etc.	Lot

All the information shown here is indicative only and may vary as per design and planning by the bidder. The bidder must provide the BOM of the plant as per the design during the time of bidding. The technical features of major equipment are described hereunder.

5. Photovoltaic Modules

Total capacity of PV Modules to be supplied for the 10MW (AC) project is of 11MWp which is the cumulative rated capacity of all solar PV module under supply as per relevant IEC standards under Standard Temperature Condition (STC). The Project shall consist of poly-crystalline silicon photovoltaic modules as per the specifications given below.

5.1 The solar photovoltaic modules with efficiency more than 14.5% for multi-crystalline, 16% for mono-crystalline Silicon based modules and more 13% for thin film solar modules with positive tolerance only.

5.2 The glass used to make the crystalline silicon modules shall be toughened low iron glass with minimum thickness of 4.0 mm for 72 cell module and 3.2 mm for 60 cell module. The glass used shall have transmittance of above 90% and with bending less than 0.3% to meet the specifications.

5.3 The back sheet used in the crystalline silicon based modules shall be of 3 layered structure. Outer layer of fluoropolymer, middle layer of Polyester (PET) based and Inner layer of fluoropolymer or UV resistant polymer. Back sheet with additional layer of Aluminium also will be considered. The thickness of back sheet should be of minimum 300 microns with water vapour transmission rate less than 3g/m2/day. The Back sheet shall have voltage tolerance of more than 1000 V.

5.4 The EVA used for the modules should be of UV resistant in nature. No yellowing of the back sheet with prolonged exposure shall occur.

5.5 The sealant used for edge sealing of PV modules shall have excellent moisture ingress protection with good electrical insulation (Break down voltage >15 kV/mm) and with good adhesion strength.

5.6 The junction box used in the modules shall have protective bypass diodes to prevent hot spots in case of cell mismatch or shading. The material used for junction box shall be made with UV resistant material to avoid degradation during module life and the Junction sealing shall comply IP65 degree of protection.

5.7 The crystalline silicon based modules supplied should be of Potential Induced Degradation (PID) free modules and the test certificate from third party lab complying with the same shall be provided.

5.8 The rated output of the modules shall have positive tolerance of 3-5 % and no negative tolerance is allowed.

5.9 Modules should have rugged design to withstand tough environmental conditions and high wind speeds (minimum up to 180 km/h).

5.10 Modules shall perform satisfactorily in relative humidity up to 95% and temperature between -10^{o}C and 85^{o}C (module temperature).

5.11 PV modules must be warranted for their output peak watt capacity, which should not be less than 90% of the initial value at the end of 10 years and 80% of the initial value at the end of 25 years.

5.12 The modules shall be warranted for minimum of 5 years against all material/manufacturing defects and workmanship.

5.13 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)
- IEC 61646 (for thin film modules)
- Test certificate from NABL approved or /ILAC member body certified labs shall be provided.

5.14 For modules to be used in a highly corrosive environment throughout their lifetime they must qualify for IEC 61701.

5.15 The developer shall arrange for the details of the materials along with specifications sheets of from the manufacturers of the various components used in solar modules along with those used in the modules sent for certification. The Bill of materials (BOM) used for modules shall not differ in any case from the ones submitted for certification of modules.

5.16 The I-V characteristics of all modules as per specifications to be used in the systems are required to be submitted at the time of supply.

5.17 Each module used in the Project shall use a RFID tag bearing the following details:

- Name of manufacturer, name of manufacturer of solar cells symbol of bidder;
- Country of Origin (separately for cells and modules)
  - Unique model number;
  - Unique Serial number;
- Month and Year of manufacture (separately for cells and module).
- Date and Year of obtaining IEC PV module qualification certificate.
- Name of Test Lab issuing IEC certificate.
- Other relevant information on traceability of solar cells and module as per ISO 9000.
  - Polarity of terminals or leads (colour coding is permissible).
  - Maximum system voltage for which the module is suitable.
  - Date & place of manufacture.
  - I-V Curve for the module at standard test condition (1000 W/sq m, AM 1.5, 25 °C).
  - Wattage, Imp, Vmp & FF for the module.

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

5.19 The temperature co-efficient of power for the modules shall not be more than 0.50% / °C.

5.20 The module mismatch of the modules connected to an inverter should be less than 2%.

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

5.22 The module frame shall be made of corrosion resistant material, which shall be electrically compatible with the structural material used for mounting the modules. In case of metal frames for modules, it is required to have provision for earthing.

5.23 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.

5.24 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 -10°C to +85°C (cell) and shall withstand adverse climatic conditions, such as high speed wind, blow with dust, sand particles, saline climatic / soil conditions and for wind 180 km/hr on the surface of the panel.

5.25 Modules only with the same rating and manufacturer shall be connected to any single inverter.

5.26 Bidder shall provide data sheet for Solar PV Module (Under STC) along with their offer as per Guarantee Technical Particular Data Sheet- 1. Also, the bidder must provide the commercial data sheet indicating the exact power of the module, if the data sheet consists of a range of modules with varying output power.

5.27 The Employer or its authorized representative reserves the right to inspect the modules at the manufacturer's site prior to dispatch.

5.28 The Bidder is advised to check and ensure the availability of complete capacity of modules prior to submitting the NIT document.

5.29 Entire drawings, detailed test & flash reports and compliance certificates of the offered modules should be submitted for approval of SECI within 15 days from the date of placement of order and supply should start thereafter.

6. PV Array Configurations

The Solar array shall be configured in multiple numbers of sub-arrays, providing optimum DC power to auditable number of sub arrays. The bidder shall submit their own design indicating configuration of PCU and respective sub arrays and bill of material.

6.1 **Module Mounting Structure (Fixed/Single Axis/Double Axis)**:

6.1.1 The structure design shall be appropriate and innovative. It must follow the existing land profile.

6.1.2 The structure shall be designed to allow easy replacement of any module and shall be in line with the site requirements.

6.1.3 Design drawings with material selected and their standards shall be submitted for prior approval of SECI within 21 days of NTP.

6.1.4 The support structure design & foundation shall be designed with reference to the existing soil conditions in order to withstand wind speed applicable for the zone (Site Location) or 180kmph, whichever is higher, using relevant Indian wind load codes. The structures and foundations shall also conform to the seismic conditions pertaining to the zone using relevant Standards and codes.

6.1.5 The structure must be designed with considering appropriate factor of safety. The bidder must provide the detail design and calculation for the structure design.

6.1.6 The structure shall be designed for simple mechanical and electrical installation. It shall support SPV modules at a given orientation & tilt, absorb and transfer the mechanical loads to the ground properly. Welding of structure at site shall not be allowed.

6.1.7 The array structure shall be made of hot dipped galvanized steel of suitable size. The thickness of galvanization should be as per the relevant standards for galvanization but minimum of 80 microns. It is to ensure that before galvanization the steel surface shall be thoroughly cleaned of any paint, grease, rust, scale, acid or alkali or such foreign material as are likely to interfere with the galvanization process. The bidder should ensure that inner side should also be galvanized.

6.1.8 The array structure shall be so designed that it will occupy minimum space without sacrificing the output from SPV panels at the same time.

6.1.9 Nut & bolts, supporting structures including Module Mounting Structures shall have to be adequately protected from atmosphere and weather prevailing in the area.

6.1.10 All fasteners shall be of stainless steel of grade SS 316 and must sustain the adverse climatic conditions. Two numbers of anti-theft fasteners of stainless steel on two diagonally opposite corners for each module shall be provided. If any lower grade stainless steel (SS 304, SS 302 or equivalent) fasteners are used they must have must have protective coating to ensure the life of 25 years.

6.1.11 Modules shall be clamped / bolted with the structure properly. The material of construction shall be GI / Al / Steel. Clamps / bolts shall use EPDM rubber and shall be designed in such a way so as not to cast any shadow on the active part of a module.

6.1.12 The array structure shall be grounded properly using maintenance free earthing kit.

6.1.13 The bidder/manufacturer shall specify installation details of the PV modules and the support structures with appropriate diagram and drawings.

6.1.14 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) 600 mm.

6.1.15 For multiple module mounting structures located in a single row, the alignment of all modules shall be within an error limit of maximum 10mm.

6.1.16 Civil foundation design for Module Mounting Structures (MMS) as well as control room, and equipment room shall be made in accordance with the Indian Standard Codes and prevailing soil conditions with the help of Chartered Structural Designer having substantial experience in similar work. The Successful Bidder shall submit the detailed foundation & structural design analysis along with calculations and basis/ standards in the Bid duly certified by a chartered structural engineer.

6.1.17 Cable should pass from Pipes and Cable-ties shall be used to hold and guide the Pipes (cables/wires) from the modules to inverters or junction boxes. All the cables were aesthetically tied to module mounting structure.

6.1.18 Bidder must submit the all the quality test documents and test certificates complying with the requirement of the structure.

6.1.19 Every major Component of the Plant should be suitably named/numbered for easy traceability, identification and maintenance.

6.2 **Junction Box/ Combiner Box**:

6.2.1 All junction/ combiner boxes including the string junction box, array junction box and main junction box/ combiner box should be equipped with appropriate functionality, safety (including fuses, grounding, contacts etc.) and protection.

6.2.2 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 UV resistant cable ferrules will be fitted at the cable termination points for identification.

6.2.3 The Junction Boxes shall have suitable arrangement for the followings:

- Strings are required to be connected to the bus bar through individual fuses.
- Provide arrangement for disconnection for each of the groups.
- Provide a test point for each sub-group for quick fault location and to provide group array isolation.
- Suitable space for workability and natural cooling

6.2.4 The rating of all component of JB's shall be suitable with adequate factor of safety to inter connect the Solar PV array.

6.2.5 The junction boxes shall be dust, vermin, and waterproof and made of thermoplastic/ metallic in compliance with IEC 62208, which should be sunlight/ UV resistive as well as fire retardant & must have minimum protection to IP65 (Outdoor)/ IP21 (indoor) and Protection Class II.

6.2.6 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). The maintenance free earthing shall be done as per the relevant standards.

6.2.7 Each Array Junction Box will have suitable Reverse Blocking Diodes of maximum DC blocking voltage of 1000V with suitable arrangement for its connecting. The bypass & reverse blocking diodes should work for temperature extremes and should have efficiency of 99.98%, confirmed by appropriate IEC standards.

6.2.8 Adequate capacity solar DC fuses & isolating miniature circuit breakers should be provided if required.

6.2.9 Details of junction box specifications and data sheet, including all components, shall be provided in the Bid document.

6.2.10 Bidder shall provide all the test reports/ test certificates and compliance certificates before installation at site.

6.3 Power Conditioning Unit (PCU)

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

6.3.2 **The rated power/name plate capacity of the inverters shall be the AC output of the inverter at 50°C.** Any inverters with AC output at 50°C, below the name plate/rated power of the inverter shall not be allowed.

6.3.3 The **inverter supplied shall have minimum of 10% additional DC input Capacity. (E.g. Inverter is supplied with rated capacity of 500 kW (AC) shall accept at least 550 kW of DC power.)**

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

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

6.3.6 Only those PCUs/ Inverters which are commissioned for more than 50 MW capacity solar PV projects till date in India shall be considered for this project. Bidder has to provide sufficient information to the satisfaction of the Employer before placing the final order for PCUs/Inverters.

6.3.7 The minimum European efficiency of the inverter shall be 98% load as per IEC 61683 standard 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.

6.3.8 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 as per the recommendations of OEM to achieve desired performance and life expectancy.

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

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

6.3.11 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.

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

6.3.13 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 (PWM) technology. This should be capable of synchronize maximum within 1 Minute.

6.4 Operational Requirements for Inverter/ PCU

6.4.1 The PCU must have the feature to work in tandem with other similar PCU's and be able to be successively switched "ON" and "OFF" automatically based on solar radiation variations during the day.

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

6.4.3 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 unit shall confirm to IEC 62093 for design qualification.

6.4.4 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.

6.4.5 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.

6.4.6 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.

6.4.7 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.

6.4.8 PCU shall have provisions/features to allow interfacing with monitoring software and hardware devices.

6.5 Protection against faults for PCU

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.

6.5.1 Grounding Leakage Faults: The PCU shall have the required protection arrangements against grounding leakage faults.

6.5.2 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).

6.5.3 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.

6.5.4 Galvanic Isolation: The PCU inverter shall have provision for galvanic isolation.

6.5.5 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.

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

6.5.7 Unequal Phases: The system shall tend to balance unequal phase voltage (with 3-phase systems).

6.5.8 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.

6.5.9 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.

6.5.10 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. Fuses & Circuit breakers used in the DC lines must be rated suitably.

6.6 Standards & Compliances

6.6.1 PCU shall confirm to the following standards and appropriately certified by the labs:

- Efficiency measurement: IEC 61683
- Environmental Testing: IEC 60068-2 or IEC 62093
- EMC, harmonics, etc.: IEC 61000 series, 6-2, 6-4 and other relevant Standards.
- Electrical safety: IEC 62109 (1&2), EN 50178 or equivalent

- Recommended practice for PV – Utility interconnections: IEEE standard 929 – 2000 or equivalent
- Protection against islanding of grid: IEEE1547/ UL1741/ IEC 62116 ore equivalent
- Grid Connectivity: Relevant CEA/ CERC regulation and grid code (amended up to date)
- Reliability test standard: IEC 62093 or equivalent

6.6.2 The Bidder should select the inverter (Central) as per its own system design so as to optimize the power output.

6.6.3 Desired Technical Specifications of PCU.

- Sinusoidal current modulation with excellent dynamic response.
- Compact and weather proof housing (indoor/ outdoor)
- Comprehensive network management functions (including the LVRT and capability to inject reactive power to the grid)
- No load loss < 1% of rated power and maximum loss in sleep mode shall be less than 0.05%
- Optional VAR control
- Unit wise & integrated Data logging
- Dedicated Prefabs / Ethernet for networking

6.6.4 Inverter/ Power Condition unit must provide protection against:

- Over current
- Sync loss
- Over temperature
- DC bus over voltage
- Cooling Fan failure (If provided)
- Short circuit
- Lightning
- Earth fault
- Surge voltage induced at output due to external source
- Power regulation in the event of thermal overloading
- Set point pre-selection for VAR control
- Bus communication via -interface for integration
- Remote control via telephone modem or mini web server
- Integrated protection in the DC and three phase system

- Insulation monitoring of the PV array with sequential fault location

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

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

6.6.7 The power conditioner must be entirely self-managing and stable in operation.

6.6.8 A self-diagnostic system check should occur on start up. Functions should include a test of key parameters on start up.

6.6.9 PCU/inverter front panel shall be provided with display (LCD or equivalent) to monitor, but not limited to, 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

6.6.10 Documentary Requirements & Inspection

- The bill of materials associated with PCU's should be clearly indicated while delivering the equipment.
- The Contractor shall provide to the Employer, data sheet containing detailed technical specifications of all the inverters and PCUs. Operation & Maintenance manual should be furnished by the Bidder before dispatch of PCUs.
- The Employer or its authorized representative reserves the right to inspect the PCUs/ Inverters at the manufacturer's site prior to dispatch.

6.7 Cable and Wires

6.7.1 All cables and connectors for use for installation of solar field must be of solar grade which can withstand harsh environment conditions including High temperatures, UV radiation, rain, humidity, dirt, burial and attack by moss and microbes 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/ TUV 2PfG 1169/09.07 for service life expectancy of 25 years)

6.7.2 Insulation: Outer sheath of cables shall be electron beam cross-linked XLPO type and black in colour. In addition, Cable drum no. / Batch no. to be embossed/ printed at every one meter. Cable Jacket should also be electron beam cross-linked XLPO, flame retardant, UV resistant and black in colour.

6.7.3 Wires with sufficient amp city 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). Successful Bidder shall provide voltage drop calculations in excel sheet.

6.7.4 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 compliant with IEC 60228, Class 5 of reputed make shall be used.

6.7.5 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.

6.7.6 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.

6.7.7 All cable/wires shall be provided with UV resistant printed ferrules for DC side however, for HT cables, punched/ embossed aluminium tags are required. 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.

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

6.8 Switchboard box / DC Distribution Box (DCDB) / AC Distribution Box (ACDB) panels

6.8.1 Successful Bidder shall provide sufficient no. of switchboards / DCDB / ACDB wherever required.

6.8.2 All boxes/ panels should be equipped with appropriate functionality, safety (including fuses, grounding, etc.) and protection.

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

6.8.4 Adequate rating fuses & isolating miniature circuit breakers should be provided

6.8.5 The panels/ boxes shall have suitable arrangement for the followings:

- Provide arrangement for disconnection
- Provide a test point for quick fault location
- To provide isolation
- The current carrying rating of the boxes/ panels shall be suitable with adequate safety factor
- The rating of the boxes/ panels shall be suitable with adequate safety factor to inter connect to the local/ internal grid
- Thermal/ heat dissipation arrangement/ Vent for safe operation.

6.8.6 The boxes/ panels shall be dust, vermin, and waterproof and made of thermoplastic/ metallic in compliance with IEC 62208, which should be sunlight/ UV resistive as well as fire retardant & must have minimum protection to IP 65(Outdoor)/ IP 20(indoor) and Protection Class II.

6.8.7 All panels/ boxes shall be provided with adequately rated 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.

6.8.8 The boxes/ panels must be grounded properly to ensure all safety related measures for safe operation.

6.8.9 All the Panels to be manufactured with sufficient space for working and must have temperature suitability up to 85^{o} C with separate cable and bus bar alley.

6.9 Lightning Protection for PV Array

6.9.1 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 safe level before it reaches the PV or other sub-system components as per IEC 60099-4:2014 / IS: 2309 – 1989 (Reaffirmed – 2005), Edition 3.1 (2006-01).

6.9.2 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.

6.9.3 The Bidder shall submit the drawings, calculations and detailed specifications of the PV array lightning protection equipment to Employer for approval before installation of system.

6.9.4 The lightning conductor shall be earthed through flats and connected to the grounding mats as per applicable Indian Standards with earth pits. Three earth pits shall be provided for each lightning 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.

6.10 Solar Photovoltaic Power Plant Electrical System

The technical requirements of design, manufacture, testing at works, supply, installation testing & commissioning of all electrical equipment required for the Solar Photovoltaic Power Plant starting from the local control panel of Plant and up to the Grid tie up with the State grid including all control protection, metering equipment, step up generator voltage transform, 33kV indoor/ outdoor switchgears and balance of equipment complete in all respect shall be of high standard and quality meeting the requirement of respective Indian standard (following table). All the Type test Reports along with material despatch Clearance Certificate (MDCC) for all equipment and cables are to be submitted by the Contractor prior to the despatch of the same. The brief particulars and requirement of equipment is as under-

IS/IEC Reference	Specification
IEC-298	A.C. Metal – enclosed and control gear for rated voltages above 1KV and including 72.5KV
IS-3427	A.C. Metal – enclosed and control gear for rated voltages above 1KV and including 52KV.
IS-8623	Specification for Low Voltage Switchgear and Control gear assemblies.
IS-13118/ IEC-56	Specification for High Voltage AC Circuit Breakers.
IEC-529	Degrees of Protection.
IS-5578 & 11353	Making and arrangement for switchgear bus bar main connections and auxiliary wiring.
IS-325	Specification for 3 Phase Induction motors.
IS-2629	Recommended practice for not dip galvanizing of iron and steel.
IEC-137	Bushing for AC Voltages.
IS-3347	Porcelain Transformer Bushings.
IS-5561	Terminal Connectors
IS-3156	Voltage Transformers
IS-2705	Current Transformers
IS-3231	Electric relays for power protection.
IS-13010	Watt hour meters

IS-13779	Static Energy Meters
IS-8686	Static Protection Relays
IS-1248	Electrical measuring instruments
IS-2099	High Voltage Porcelain Bushings.
IS-10118	Minimum clearances for Outdoor Switchgear.
IEC-694	Common Clauses for High Voltage Switchgear and Control gear
IEC-60255 & IEC-61330	Numerical Relays

6.11 Step-Up Transformer

6.11.1 The transformer shall be copper wound, 3 phase, natural cooled, core type construction, oil immersed and shall be suitable for outdoor applications.

6.11.2 The Bidder shall provide the complete turnkey design, supply, erection, testing and commissioning of transformers and transformer substation to step-up the output of the inverter to 33kV at the location of the inverter. The power from different inverter rooms shall be collected at a common location from where it shall be transmitted to the STU through overhead transmission line. However, the detailed scheme of design lies with the bidder and must submit the same to SECI for approval prior to construction.

6.11.3 Power Transformers utilized shall be 3 phase, Oil Filled, 33kV, 50 Hz, Dyn11 and associated Switchgear of approved make. RTCC panel, as per design, shall provide in control room.

6.11.4 All the transformers shall be suitable for outdoor installation with 3 phase 50Hz 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%.

6.11.5 Cumulative loss in the system shall be within than 1.5%.

6.11.6 General requirement for the transformers shall be as per below:

Standards	**Relevance**
IS: 2026 (Part 1 to 4)	Specifications for Power Transformer
IS: 2099	Bushings for alternating voltage above 1000 V
IS: 3639	Fittings and accessories for power transformer
IEC: 60076 (Part 1 to 5)	Specifications for Power Transformer
IS: 9921 Part 1 to 5	Alternating currents dis connectors (isolators) and earthing switches rating, design, construction, tests etc.
IS: 2705 Part 1 to 4 & IEC: 185	Current transformer
IS: 3156 Part 1 to 4	Voltage Transformer
IS: 3070 part 1 to 3	Lightning arrestors
IS: 2544	Porcelain insulators for system above 1000 V

IS: 5350	Part III – post insulator units for systems greater than 1000V
IS: 5621	Hollow Insulators for use in electrical equipment
IS: 5556	Serrated lock washers – specification

6.12 General Standards

6.12.1 The equipment and accessories covered by this specification shall be designed, manufactured and tested in accordance with the latest relevant standards and codes of practice published by the Bureau of Indian Standards (BIS) as applicable.

6.12.2 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. Relevant national and international standards in this connection shall be followed.

6.12.3 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 spare equipment offered shall be interchangeable.

6.12.4 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.

6.12.5 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.

6.12.6 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.

6.12.7 All equipment shall be designed for operation in tropical humid climate at the required capacity. The reference parameters for which the transformers are to be designed are as under:-

Particulars	Condition
Maximum ambient temperature	50^{o}C
Maximum daily average ambient temp	40^{o}C
Maximum yearly weighted average ambient temp	40^{o}C
Minimum ambient air temperature(Cooling)	-5^{o}C

Climatic Conditions	
Max. Relative Humidity	100%
Yearly Avg. number of thunder storms	30-50
Average Number of rainy days	60 days
Fog	Subjected to Fog in winter
Number of months during which topical monsoon prevail	3 months
Dust storms	May not occur
Average Annual rain fall	60 cms.
Maximum wind speed	180 kmph

6.13 Ratings and specifications (415V / 33kV Transformer)

The typical rating and electrical characteristics of the 0.415kV/33kV ONAN Outdoor type transformer shall be as under however, the ratings may vary subjected to design by the bidder and relevant to the respective IS codes:

Particulars	415V / 33kV Transformer Specs.
Continuous kVA ratings	As per design
Type	Oil immersed
Frequency	50 Hz
Type of cooling	Oil Natural Air Natural (ONAN)
No. of phases	3 (Three)
Rating voltage H.V. side	33 kV
Highest System voltage on H.V. side	36 kV r.m.s.
Rated voltage on L.V. side	0.433 kV r.m.s.
Vector Group	DyN11
Connections	
a. H.V. Winding	Delta
b. L.V. winding	Star with Neutral solidly earthed
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	4%
Minimum Creep age distance at 400 phase to	32 mm/kV
Transformer connections	LV side – Cables/ Bus Duct with weather proof enclosure as per design
	HV Side –Bushing with enclosure

6.13.1 Efficiency:

The percentage loading for the maximum efficiency shall be clearly stated at unity power factor as well as 0.8 and 0.9 power factor.

6.13.2 Insulation:

The dielectric strength of the winding, given insulation and the bushings shall conform to the values given in IS: 2026 (Part III)/1981 (or its latest amendment) for

highest system voltage of 36 kV, 1.1 kV and shall be suitable for the impulse test\power frequency test voltages.

6.13.3 Factory Assembly and Tests:

The transformer shall be completely assembled and tested at the Factory. Routine and Acceptance tests as per specification are to be conducted and no deviation in respect of conducting these tests will be acceptable. No extra charges for these tests will be paid. Test charges shall be part of cost of the equipment. If purchaser selects to send a representative, all tests shall be carried out in his presence. Type test certificate shall be furnished before start of supply.

6.13.4 Routine Tests:

Each completed transformer shall be subjected to following routine tests as per IS: 2026 Part. I & III (latest amendment). No extra charges for any of the tests shall be paid. No deviation shall be acceptable. If the supplier desires, he may not fix radiators on transformers (other than the one which is to be type tested) during routine testing. However in that case, radiator manufacturer's test certificate shall be furnished for reference of inspecting officer with undertaking that supplier shall be responsible for proper alignment/fixing of radiator on transformer at site.

- Measurement of resistance of each winding.
- Measurement of turn’s ratio between HV-LV windings at each tap.
- Checking of polarity and phase relation-ships for each winding.
- Measurement of no load loss and no load current.
- Positive phase sequence impedance/short circuit impedance between HV-LV windings on minimum, maximum and normal taps.
- Separate source voltage withstand test.
- BDV test on transformer oil.
- Induced over voltage withstand test.
- Measurement of neutral unbalance current.
- Regulation at rated load at unity, 0.90 and 0.80 lagging power factor.
- Load losses measured at rated frequency by applying voltage sufficient to produce the rated relevant current in one winding with the other winding short circuited.
- Measurement of insulation resistance.
- The total losses shall comprise of the No Load Losses, load losses at rated output duly converted at 75 degree C average winding temperature and shall also be

indicated in the test report. Load losses shall be that corresponding to rated load on HV & LV winding.

- Routine dielectric tests as per IS: 2026(Part. I & III), 1981.
- Check complete transformer against approved outline drawing, provision for all fittings, finish oil level etc.

6.13.5 Tests at Site

After erection at site all transformer(s) shall be subjected to the following tests:

a) Insulation resistance test.
b) Ratio and polarity test.
c) Dielectric test on oil.

In case the equipment is not found as per the requirements of the purchase order, all expenses incurred during site testing will be to the tenderer's account and the material shall be replaced by him at site, free of cost.

6.13.6 Further Tests:

The purchaser reserves the right of having other reasonable tests carried out at his own expenses either before dispatch or during performance guarantee period from Govt. approved/ Govt. recognized lab to ensure that the transformer complies with the requirements of this specification after due intimation to the supplier. In case the equipment is not found meeting the requirement of PO / specification, all expenses incurred for such testing will be on supplier's account and the material shall be replaced by the supplier at site free of cost

6.13.7 Frequency and System Voltage:

The transformer shall be suitable for continuous operation with a frequency variation of ± 3% from normal of 50 cycles per second without exceeding the specified temperature rise. The highest system rated voltage shall be 36 kV. However the flux density requirements shall be as per this specification.

6.13.8 Installation & Commissioning

Mainly following activities are required to be carried out before commissioning of Power Transformers:-

- Assembling of Power Transformer accessories.
- Testing activities in presence of Purchaser such as
  - Ratio Test

- Megger Value
- Magnetic balance.
- Oil BDV
- Earth Resistance
- Buchhloz Relay checking.
- WTI/OTI/MOLG (oil level) checking.
- Checking of points of leakage of oil from Transformer body/ Radiator/Valve
- Setting of Relays in Panel

6.14 Auxiliary transformer

The transformer used for auxiliary distribution within the plant must be in accordance with the reference standards. The ratings of the transformer shall be suitably designed by the bidder. The guaranteed technical particulars of the auxiliary transformer must be supplied along with the bid. The bidder shall also provide the list of auxiliary loads considered for the project.

6.15 Instrument Transformer

6.15.1 The instrument transformers i.e. current and voltage transformers shall be single phase transformer units and shall be supplied with a common marshalling box for a set of three single phase units. The tank as well as top metallic shall be hot dip galvanized or painted Grey colour as per RAL 9002.

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

6.15.3 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.

6.15.4 Current Transformer, Voltage Transformer, Circuit Breaker and Relays should match DISCOM requirements.

6.16 Current Transformer

6.16.1 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.

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

6.17 Type and Rating

6.17.1 The current transformer should be of indoor/ outdoor type, single phase, oil immersed, self-cooled and suitable for operation in 3 phase solidly grounded system.

6.17.2 Each current transformers should have the following particulars under the site conditions for the system under design

6.17.3 General Parameters: **33 kV CT**

Particulars	Details
Highest system Voltage (Vm)	36 kV rms
Rated frequency	50 Hz
System Neutral Earthing	Effective earthed
Installation	Indoor (IP 20)/ Outdoor (IP 65)
Rated short time thermal current	25 kA for 1 sec or appropriate thermal current as per design calculations
Rated dynamic current	63 kA (Peak) appropriate dynamic current as per design calculations
Rated min power frequency withstand voltage (rms value)	28 kV
Rated lightning impulse withstand voltage (peak value)	75 kV
Partial discharge level	10 pico Coulombs max.
Temperature rise	As per IEC 60044
Type of insulation	Class A
Number of cores	Two (2) with One (1) protection core and one (1)metering core of accuracy 0.5 class

CT secondary current	Protection cores – 1 Amp. Metering Core – 1 Amp
Number of terminals in marshalling box	All terminals of control circuits wired up to marshalling box plus 20 terminals spare
CT ratio & Rated VA Burden, short time thermal rating ,class of accuracy	Minimum burden required : 1. Metering core – 40 VA 2. Protection core – 10 VA

6.18 Voltage Transformer

6.18.1 Voltage transformers shall be electro-magnetic (EMU) type and shall comprise of compensating reactor, intermediate transformer, and protective and damping devices. The oil level indicator of EMU with danger level marking shall be clearly visible to maintenance personnel standing on ground.

6.18.2 The secondary shall be protected by 3A HRC cartridge type fuses for all windings. In addition fuses shall also be provided for protection and metering windings. The secondary terminals shall be terminated on stud type non- disconnecting terminal blocks via the fuse inside the terminal box of degree of protection IP 55. The access to secondary terminals shall be without the danger of access to high voltage circuit.

6.18.3 The accuracy of metering core shall be maintained through the entire burden range up to 75 VA on all three windings without any adjustments during operations.

6.18.4 The PTs should be single phase oil immersed self -cooled type suitable for outdoor.

6.18.5 The core should be of high grade non – ageing electrical silicon laminated steel of high permeability. The PTs should be hermetically sealed to eliminate breathing and prevent air and moisture entering the tank.

6.18.6 Each voltage transformers should have the following particulars under the site conditions for the system under design

6.18.7 General Parameters**: 33 kV VT**

Particulars	**Details**
Highest system voltage (Um)	36 kV
System neutral earthing	effective earthed
Installation	Indoor (IP 20)/ Outdoor (IP 65)
System fault level	Appropriate
Rated min power frequency withstand voltage (rms value)	28 kV
Rated lightning impulse withstand voltage (peak value)	75 kV

Standard reference range of frequencies for which the accuracy are valid	96% to 102% for protection and 99% to 101% for measurement
Rated voltage factor	1.2 continuous & 1.5 for 30 sec
Class of Accuracy	0.5 / 3P
Stray capacitance and stray conductance of LV terminal over entire carrier frequency range	As per IEC:358
One Minute Power frequency withstand voltage for secondary winding	2 kV rms
Temp rise over an ambient temp. of 50°C	As per IEC 60044
Number of terminals in control Cabinet	All terminals of control circuits wired up to marshalling box plus 10 terminals spare
Rated total thermal burden	350 VA
Partial discharge level	10 pico Coulombs max.
Number of cores	2 (two) – 1 for protection and one for metering with 0.5 class accuracy.
Rated Output, insulation level, transformation ratio, rated voltage factor	Should be provided by Bidder

6.19 33kV METERING BAY (DISCOM)

6.19.1 The current & potential transformers shall be of outdoor type single phase, 50 Hz, oil immersed self-cooled suitable for operation in the climate conditions specified shall be complete in all respects.

6.19.2 The instrument transformers shall be hermitically sealed to eliminate breathing and entering of air and moisture in the tank. Provision of pressure releasing device is not permitted.

6.19.3 The CT core, to be used for protective relays shall be of accuracy class, specified or appropriate class suitable for back up, over current and earth fault, differential, bus bar and other protections as prescribed

6.19.4 Applicable Standards:

Unless otherwise modified in this specification, 33 KV CTPT Metering Sets shall comply with the following Indian Standard Specification (latest version):

IS: 2705-1992 Specification for current transformers.

IS: 3156-1992 Specification for voltage transformers.

IS: 5621-1980 Specification for Hollow insulators and accessories

IS: 2099-1986 Specification for insulators/ bushing

IS: 3347-1986 Specification for the dimension of Porcelain transformer

IS: 335-1983 Specification for new insulating oil

6.19.5 The core of instrument transformers to be used for metering and instrumentations shall have saturation factor, low enough to avoid damage to the instruments, in the event of maximum short circuit current.

6.19.6 Nuts and bolts (or screws used for fixation of interfacing porcelain bushings for taking out terminals) shall be provided on flanges, cemented to the bushing and not on the porcelain i.e. Flange type 33 KV bushing for CT/PT, shall be provided.

6.19.7 For gasket joints, wherever used, Nitrile Butyl rubber gaskets shall be used. The gasket shall be fitted properly with adequate space for accommodating the gasket under compression.

6.19.8 The metering sets shall be supplied with first filling of insulating oil conforming to IS: 335 (including latest amendment).

6.19.9 The outer surface of metal tank shall be Hot Dip Galvanised, whereas, the inner portion shall be painted with oil resistive, insoluble paint. The purchaser reserves right for stage inspection during manufacturing process of tank / CT/PT.

6.19.10 The external surfaces of tanks of CT-PT sets shall be painted with one coat of primer and two coats of synthetic enamel paint of shade No.631 of IS: 5, the internal surfaces of the tank shall be painted with two coats of suitable heat resistant oil insoluble paint.

6.19.11 The instrument transformers shall be suitable for mounting on steel structures or concrete pedestals.

6.19.12 For load shading single phasing is adopted in the 33 kV system. The offered 33 kV CT-PT set shall be suitable for working under such abnormal operation condition.

6.19.13 The 33 kV CT PT sets shall three nos. of single phase PTs. The primary winding of 3 single phase PT shall be connected in star formation in the tank with common neutral of 33 KV brought outside the tank through 3 KV bushing for earthing.

6.19.14 The secondary terminal box shall have cable gland/ flange suitable to receive two Nos. control cable of size 6x4 sq.mm and 4x2.5 sq.mm at the bottom of the secondary box for metering connections to secondary winding of 33 kV CT-PT circuits respectively.

6.19.15 The 33 kV CT PT Set shall have 3 Nos. incoming and 3 Nos. outgoing outdoor type bushing complete with 6 Nos. bimetallic terminal connectors suitable for Dog/ Panther Conductor

6.19.16 General Parameters: **33 kV CT (Owners Bay and Metering Bay)**

Particulars	**Details**
Normal system voltage (kV rms)	33kV
Highest system voltage (kV rms)	36kV
Frequency	50 Hz
Impulse withstand voltage (kVp) (on assembled CT/ PT set)	170
One minute power frequency dry withstand voltage (on assembled CT-PT set) Primary (r.m.s.) Secondary (r.m.s.)	 70 kV 3 kV
Transformation ratio (CT Ratio)	400/1 A or as per requirement
Rated output (VA burden)	10 VA
Class of accuracy	0.2 S
Rated continuous thermal current	1.2 times of rated primary current.
Short time thermal current rating for 1 second.	25kA for 400/1 A Current density corresponding to Short Time Thermal Current should not exceed 160A /mm sq.
Rated dynamic current	2.5 times of short time thermal current rating.
Number of cores	One
Instrument security factor	Not exceeding 5
Max. ratio error	As per IS:2/05/1992

6.19.17 General Parameters: **33 kV VT (Owner's Bay & Metering Bay)**

Particulars	Details
Nominal system voltage (kV rms)	33
Highest system voltage (kV rms)	36
Nos. of phases	Three
Impulse withstand voltage (kVP) (on assembled CT-PT set)	170
One minute power frequency dry withstand voltage (on assembled CT-PT set) Primary (kV r.m.s.) Dry secondary (kV r.m.s.)	 70 3
Frequency	50 Hz
Transformation ratio (PT Ratio)	33 kV/ 110V
Rated output (VA burden)	30 VA per phase
Class of accuracy	0.2 (As per IS:3156/1992)
Winding connection	Star/ Star
Rated voltage factor and time	1.2 Continuous & 1.9 for 30 seconds.
Temp. rise over max. Ambient temp.	Within limits of IS:3156/1992
Phase angle error max.	-do-
Max. Phase angle error	-do-
Ratio error (Max.)	-do-

6.20 Circuit Breaker

6.20.1 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 re-striking 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

6.20.2 Applicable Standards: The materials shall conform in all respects to the relevant Indian Standard Specifications/ IEC Standards, with latest amendments indicated below:

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

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

6.20.4 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.

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

6.20.6 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.

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

6.20.8 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.

6.20.9 Bidder shall indicate the noise level of breaker at distance of 50 to 150 m from base of the breaker.

6.20.10 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.

6.20.11 The critical current which gives the longest arc duration at lock out pressure of

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

6.21 Operating Mechanism

6.21.1 Circuit shall be vacuum type with electrically spring charged mechanism.

6.21.2 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.

6.21.3 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 VCB coil DC supply through appropriately rated battery bank and charger to be supplied by the Bidder.

6.21.4 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.

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

6.21.6 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.

6.21.7 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.

6.21.8 General parameters: **Vacuum type Circuit Breaker**:

Particulars	**Details**
Type of circuit breaker	Vacuum type
Highest System Voltage	36 kV
Rated operating voltage	33 kV
Rated frequency	50 Hz (+3% to -5%)
Number of poles	Three (3)
Rated/ minimum power frequency Withstand voltage	70 kV

Rated lightning impulse Withstand voltage	170 kV
Rated operating duty cycle	0 - 0.3 sec. - CO – 3 min. – CO
Rated line charging breaking	As per IEC
Reclosing	Single and three phase high speed auto reclosing
Maximum fault level	25 kA (rms) for 1 sec.
Auxiliary contacts	As required plus 6NO and 6NC contacts per pole as spare.
Noise level	Maximum 140dB at 50m distance from base of circuit breaker
Seismic acceleration	0.4 g horizontal

6.21.9 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.

Rated voltage (kV)	**Rated short-circuit breaking current (kA)**	**Rated normal current (A)**				
36	8	630	1250	1600	2500	4000
	16	630	1250	1600		
	40					

6.21.10 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

6.22 Isolators

6.22.1 The isolators and accessories shall conform in general to IEC 62271-102 (or equivalent Indian standard) except to the extent explicitly modified in specification.

6.22.2 Each isolating switch should have the following particulars under the site conditions for the system under design (typical values for 36 kV system are given).

6.22.3 General Parameters: **33 kV Isolators**

Particulars	Details
Operating mechanism of Isolator and Earth Switch	Motor operated
Nominal system voltage	33 kV
Highest system voltage	36 kV
Type	Outdoor (IP 65)
Rated short time current of isolator and earth switch	40 kA (rms) for 1 sec. Or appropriate as per design
Rated dynamic short time withstand current of isolator and earth switch	80 kA (peak) Or appropriate as per design
Impulse withstand voltage with 1.2/50 micro sec. wave	325 kVp to earth 195 kVp across isolating distance
One minute power frequency withstand Voltage	140 kV (rms) to earth & 150 kV (rms) across isolating distance
Temperature rise	As per Table-IV of IS: 9921
Rated mechanical terminal load	As per 62271-102

6.23 Indicating and Integrating Meters/Instruments:

All indicating instruments shall be of switchboard type, back connected, suitable for flush mounting and provided with dust and vermin proof cases for tropical use and finished in suitable colour. All instruments shall have practical laboratory means for adjustment of accuracy. The limits of errors for ammeters/voltmeters shall be those permissible for class 1.5 instruments as per IS: 1248.

6.23.1 A.C. Static HT Tri vector Meter:

A.C. Static HT Tri vector Meter shall be as per DISCOM norms and shall be intimated while placement of order. The meters shall be located at eye level to facilitate observations of readings correctly.

6.23.2 The ammeters and voltmeters shall be suitably scaled to indicate the current/voltage for all the rating of current/voltage transformers. A phase selector switch with four/six position shall be used to measure the current/voltage of each phase/line. The Bidder shall provide test certificate and calibration certificate along with the supply of the instrument.

6.23.3 The meters shall be located at normal eye level to facilitate observation of readings correctly.

6.24 Surge Arrestors

6.24.1 The surge arrestors (SAs) shall conform in general to IEC 60099-4 or IS: 3070 except to the extent modified in the specification. Arresters shall be of hermetically sealed units, self-supporting construction, suitable for mounting on lattice type support structures. Bidder shall furnish the technical particulars of Surge arrester.

6.24.2 The SA's shall be of heavy duty station class and gapless Metal Oxide type without any series or shunt gaps. The SAs shall be capable of discharging over-voltages occurring during switching of unloaded transformers, and long lines.

6.24.3 Arrestors shall be complete with insulating base for mounting on structure. Suitably enclosed for outdoor use and requiring no auxiliary or battery supply for operation shall be provided for each single pole unit with necessary connection.

6.24.4 The surge arrestors shall conform to type tests and shall be subjected to routine and acceptance tests in accordance with IEC-60099-4.

6.24.5 Each lightning arrestors should have the following particulars under the site conditions for the system under design.

6.24.6 Technical requirements for metal oxide (gapless) lightning arrestors

6.24.7 Typical values of **Isolator for 36 kV system are given**

Particulars	Details
Rate System Voltage	36 kV
Rate Arrester Voltage	30 kV

Nominal discharge current	10 kA of 8/20 micro-sec wave
Minimum discharge capability	5 kilo joule/kV (referred to rated arrestor voltage corresponding to minimum discharge characteristics)
Class	Station class
Maximum Continuous Operating	33 kV rms
Max. residual voltage (1 kA)	30 kVp
Max. residual voltage at 10 kA nominal discharge current(8/20 micro sec wave)	170 kVp
Max. switching impulse residual Voltage at 1000 A peak	140 kVp
Max. steep current residual voltage	186 kVp at 10kA
High current short duration test Value (4/10 micro-sec-wave)	100 kAp
Current for pressure relief test	40 kA rms
One minute power frequency withstand voltage of arrestor housing (dry and wet)	140 kV (rms)
Impulse withstand voltage of arrestor housing with 1.2/50 micro sec. Wave	325 kV (Peak)
Radio interference voltage at156 kV	Not more than 1000 micro volt
Partial discharge at 1.05 MCOV (continuous operating voltage)	Not more than 50 pC
Whether insulating base and discharge counter with milli- ammeter are required.	Yes

6.25 Protective Relays

6.25.1 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.

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

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

6.25.4 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/DISCOM.

6.25.5 The bidder must submit the relay setting chart as a part of design documents

6.26 Earthing for PV Array

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

6.26.2 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.

6.26.3 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.

6.26.4 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

6.26.5 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.

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

6.26.7 Each string/ array and MMS of the plant shall be grounded properly.

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

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

6.26.10 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.

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

6.26.12 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.

6.26.13 The Bidder should submit the earthing system design calculations along with the system layout for Owner approval. Prior to the installation of the system

6.26.14 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.

6.27 Isolator and Isolator-cum-Earthing Switches

6.27.1 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).

6.27.2 The Isolators shall be double break, outdoor, gang 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.

6.27.3 Each pole shall have three Pedestal type of Insulator's stacks. Necessary arrangements shall be provided for proper alignment of the contacts. Gang operated links shall be so designed that all phases shall make and break simultaneously.

6.27.4 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.

6.27.5 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.

6.27.6 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.

6.27.7 Contacts:

- 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.
- 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.
- 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.
- 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.
- 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.

6.28 Earthing Blades

6.28.1 The Isolators controlling the transmission line shall be equipped with earthing blades. The Earthing blades shall be counter balanced to ensure easy operation.

6.28.2 Line earth switch shall consist of three Earthing links per Isolator which will normally rest against the frames, when the connected Isolator is in closed position. The Earthing links of all three phases shall be suitable for fitting on either side of the Isolator.

6.28.3 Short time current withstand capacity of earthing blades of Isolator Earthing Switch shall be same as that of the main blades of Isolator. The material of the earthing Isolator, Each earthing blade shall be provide with flexible copper connections of adequate length of not less than 60mm^2 are for connection between the operating shall and the base frame.

6.28.4 The rated making capacity of earthing switches shall be as specified in the applicable standard of isolators

6.29 Insulators

6.29.1 Bushings shall be manufactured and tested in accordance with IS: 2099 & IEC: 137. Hollow column insulators shall be manufactured and tested in accordance with IEC: 60233/IS: 5261. The support insulators shall be manufactured and tested as per IS: 2544 / IEC: 600168/IEC: 600273. The insulators shall also conform to IEC 815 as applicable. Bidder shall furnish the technical particulars of all type of insulators used.

6.29.2 Porcelain insulator shall comply IS: 731-1976 or equivalent international standard and shall be homogenous, free from laminations, cavities and other flaws or imperfections that might affect the mechanical or dielectric quality and shall be thoroughly vitrified, tough and impervious to moisture. Hollow porcelain should be in one integral piece in green & fired stage.

6.29.3 Bidder may offer silicone rubber housed composite type insulator as an alternative to the above porcelain insulator with equivalent creep age distance.

6.29.4 Data sheets for the insulators with cantilever strength and compression strength, etc. shall be submitted.

6.29.5 Insulators shall be rated for not less than 6kN for bus bar supports and 4kN for isolators.

6.30 Bus Bar

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

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

6.30.3 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.

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

6.30.5 Since aluminium 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.

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

Note: 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.

6.31 Control & Relay Panel Specifications

General Requirement:

6.31.1 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.

6.31.2 The enclosure external finish colour shade shall be decided by the Owner, The internal surface shall have a glossy white finish all over.

6.31.3 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 aluminium strips and ‘ON’ ‘OFF’ indications for isolators

6.32 Low Voltage Switchgear

6.32.1 This specification is for the 415V TPN Power Control Centre (PCC).

6.32.2 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 relevant to the existing electrical system short circuit ratings.

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

6.32.4 Power Control Centres (Construction)

- Single front / compartmentalized, modular design, degree of protection IP52 with provision of extension on both sides.
- Incomer feeders: mains incomer - Electrically operated draw out type Air Circuit Breakers (ACBs).

- Outgoing feeders: Electrically operated draw out type Air Circuit Breakers (ACBs) / Moulded Case Circuit Breakers (MCCBs)
- The colour 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.
- 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
- The gland plates shall be 3 mm thick

6.33 Control Circuit

6.33.1 Control supply for breaker closing / tripping - 110V DC

6.33.2 Air Circuit Breaker spring charge motor – 240 V AC, 1 phase

6.33.3 Moulded Case Circuit Breakers – 240 V AC, 1 phase

6.33.4 Indications, annunciation – 110V DC

6.33.5 Space heater, sockets, etc. – 240 V AC, 1 phase

6.34 Bus Bar & Cable Cavity

6.34.1 The material for main bus bars and tap off bus bars shall be electrolytic grade aluminium with HR PVC sleeved insulation

6.34.2 Bus bars shall be suitable for short circuit rating and current suitable for all connected load.

6.34.3 Bottom cable entry for incoming and outgoing cables

6.34.4 A suitable gland plate shall be supplied for termination of power, control and instrumentation cables.

6.34.5 Whenever feeders are housed in multi-tier configuration, these tiers shall be segregated by sheet metal barriers.

6.34.6 Earthing: 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.

6.35 Terminals:

6.35.1 CT circuit - Isolating link type terminals with shorting facility

6.35.2 PT circuit – clip on type terminals

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

6.36 Specific Requirement

6.36.1 All ACBs shall be 4 pole, electrically operated, draw-out type, with closing coil, spring charge motor, trip coil, TNC switch for close and trip, manual closing and tripping push buttons, door I/L, test and service position micro switches, emergency P.B., safety shutters, etc. The circuit breaker shall be provided with anti-pumping feature.

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

6.36.3 Minimum10% spare feeders of each rating shall be provided in the switchgear.

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

6.36.5 All indicating lamps shall be of LED cluster type. ACB feeders shall be provided with ON, OFF, AUTOTRIP, SPRING CHARGED, TEST, SERVICE, TRIP CIRCUIT HEALTHY indications

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

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

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

6.36.9 Instrumentation: Switchgear instrumentation shall be provided as follows:

- Mains Incomer – Voltmeter with selector switch
- Ammeter with selector switch
- Power Factor meter
- Frequency meter
- TVM + MD meter
- Potential indicating lamps
- Outgoing Feeders
- Ammeter with selector switch on all feeders

6.37 General Technical Specifications (LV Switch gear Panel)

6.37.1 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.

6.37.2 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.

6.37.3 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

6.37.4 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.

6.37.5 The openable covers shall be provided with lift off type hinges, quarter turn door locks and flexible copper wire for earth connection.

6.37.6 The panel shall be dust and vermin proof. Synthetic or neoprene gaskets shall be provided at all openings.

6.37.7 The panel shall be of dead front construction suitable for front operated and back maintained functioning.

6.37.8 Panel shall be provided with fluorescent lamp of 20W capacity operated by door operated limit switch. Panel shall also have space heaters and thermostat arrangement.

6.37.9 Panel shall be provided with 3 pin switch socket combined unit of 5 Amp capacity.

6.37.10 Lifting hooks shall be provided at the top of the panel.

6.37.11 The hardware components used in the panel shall be hot dipped galvanized.

6.37.12 The control components shall be fixed on mounting plate by drilling & tapping.

6.37.13 Aluminium anodized legend plates shall be provided for all the components. For components mounted on front face, legend plate from inside shall also be provided.

6.37.14 Pre-treatment by 7 tank process shall be done before painting / powder coating the panel.

6.37.15 Panel shall have provision of drawing pocket.

6.37.16 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.

6.37.17 Cable entries will be from bottom. The opening of cable entry shall be covered by 3 mm thick gland plates.

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

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

6.37.20 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.

6.37.21 Earthing bus bar of suitable cross section shall be provided throughout the length of panel.

6.37.22 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.

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

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

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

6.37.26 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.

6.37.27 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.

6.37.28 The panel shall be provided with electrolytic grade aluminium bus bar of suitable cross section so as to maintain max current density of 0.8 AMP/ Sq.mm.

6.37.29 Bus bars shall be provided with colour coded heat shrinkable sleeves.

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

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

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

6.37.33 The panel shall be inspected at manufactures works before dispatch to site at the discretion of SECI.

6.37.34 All routine tests shall be carried out on the panel in presence of SECI or their representative or its representative. These tests shall include following:

- Verification of components ratings and operation.
- High voltage measurement test.
- Insulation Resistance measurement.
- Control testing

6.37.35 Approval on following drawings shall be obtained before manufacturing the panels

- General arrangement drawing
- Wiring Diagram.
- Detail bill of material
- 33 kV Transmission Line
- Bidder shall provide 33kV transmission with bay and metering on Turnkey basis as per DISCOM requirement.

6.38 Metering System

6.38.1 ABT energy meter shall be provided as approved by RVPN 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 RVPN.

6.38.2 Meter must be provided with the necessary data cables.

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

6.38.4 The Bidder shall provide ABT compliant meters at the interface points.

6.38.5 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.

6.38.6 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.

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

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

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

6.38.10 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.

6.38.11 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.

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

6.38.13 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.

6.38.14 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.

6.38.15 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.

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

S. No.	Parameters	Details	Min No of days

1	Net MWh	15 min. block	90 days in meter
2	Average Frequency	15 min. block	90 days in meter
3	Net MVARh for > 103%	15 min. block	90 days in meter
4	Cumulative net MWh	At every mid night	30 days in meter/ 90 days in PC
5	Cumulative net MVARh for >103%	At every mid night	30 days in meter/ 90 days in PC
6	Date & time blocks for VT failure on any phase		

6.38.17 Shall have a built in clock and calendar with an accuracy of less than15 seconds per month drift without assistance of external time synchronizing pulse.

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

6.38.19 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.

6.38.20 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.

6.38.21 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.

6.38.22 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.

6.38.23 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.

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

6.39 SCADA and Remote Monitoring System

6.39.1 The plant shall be automatically operated and shall be controlled by microprocessor based control system SCADA and should be Open Platform Communications (OPC) compliant. 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.

6.39.2 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.

6.39.3 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.

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

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

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

6.39.7 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.

6.39.8 SCADA shall measure and continuously record electrical parameters and provide following data at a 5-15 minute interval.

- Energy export to grid at 33kV
- Main combiner box parameters
- Inverter level parameters
- Parameters at LV terminal (415V)
- Power characteristics of HT side
- Ambient temperature near array field
- Module surface temperature
- Wind Speed and direction
- Solar irradiation/isolation
- Any other parameter considered necessary by supplier based on current prudent practice

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

- Exported Energy to grid at 33 kV
- Energy, DC and AC voltage, power and pf of each inverter
- Solar Radiation
- Temperature (ambient and module surface)

6.39.10 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.

6.39.11 SCADA 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.

6.39.12 SCADA shall be provided with reliable power supply along with backup supply for at least one hour to cater to outage of grid.

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

6.39.14 The Contractor shall provide all administrative rights/ privileges/passwords of the SCADA system to the Employer.

6.39.15 The Bidder shall submit the data sheet with technical specifications of the SCADA system.

6.39.16 The 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 4 GB RAM. The PC shall also have 17" TFT Colour monitor, DVD Drive with Writer, Floppy Drive, USB drive, Scroll Mouse and UPS for 4 hours Power back up.

6.39.17 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.

6.40 DC Battery & Charger

6.40.1 Adequate capacity DC battery Bank should be provided for control supply of inverters, control / protection system & emergency lighting at buildings. A appropriate capacity battery charger (float cum boost charger – FCBC) 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.

6.40.2 A DC power supply Distribution panel/board should be supplied along with the Charger (FCBC) 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 Employer.

6.40.3 DC Batteries the batteries shall have the following specifications:

- Type : VRLA Stationary, sealed type, storage battery.
- Rating : 110 V D.C., Minimum 80 Ah at 8 Hour rate of discharge.
- Standard : IS 1651 – 1979; performance as per IS 8702
- Container : Plastic Resin, ABS or PP
- Terminal Posts : Designed suitably to accommodate external bolted connections

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

6.40.5 The data sheet for the battery shall be submitted along with the bid for evaluation.

6.41 Power and Control Cables specifications

6.41.1 The size of each type of cable selected shall be based on minimum voltage drop; however the maximum drop shall be limited to 2%. 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.

6.41.2 All cables shall be supplied in the single largest length to restrict the straight- through joints to the minimum number.

6.41.3 PV Modules should be connected with USE-2/RHW-2 cables array to junction box conductors and junction box to photovoltaic dis-connector with the THHN/THWN-2 sunlight resistant with 90ºC wet rated insulation cable.

6.41.4 Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted. All cable/wires shall be marked with good quality letter and number ferrules of proper sizes so that the cables can be identified easily.

6.41.5 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.

6.41.6 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.

6.41.7 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

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

6.41.9 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.

6.41.10 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.

6.42 Hardware

6.42.1 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.

6.42.2 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.

6.42.3 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.

6.42.4 All ferrous parts of hardware shall be galvanized in accordance with IS 2629.

6.42.5 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.

6.42.6 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.

6.42.7 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.

6.43 Danger Plates

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 enamelled white on both sides and with inscription in signal red colours on front side as required. The inscriptions shall be in Hindi and English.

6.44 Fire alarm System

6.44.1 The installation shall meet all applicable statutory requirements, safety regulations in terms of fire protection.

6.44.2 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 portable fire extinguisher as per the recommendation by relevant fire safety authority.

6.44.3 The minimum 2 no. of fire extinguishers (CO2 and Foam type each) shall be provided at every buildings.

6.44.4 Sand bucket should be wall mounted made from at least 24 SWG sheet with bracket fixing on wall conforming to IS 2546.

6.44.5 The plan for fire extinguishing must be provided by the bidder to SECI for the approval.

6.45 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. All testing equipment shall possess valid calibration certificate issued from approved NABL labs.

6.46 General Guidelines

6.46.1 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.

6.46.2 Successful Bidder shall prepare all designs / drawings have based on the specifications given in the tender and in light of relevant BIS standard.

6.46.3 The Employer reserves right to modify the design at any stage, to meet local site conditions / project requirements.

6.46.4 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.

6.47 Specification of Lighting in Solar Power Plant

6.47.1 Scope

This specification covers design of Array yard and sub-station, street light using 50W LED luminaires, tubular poles (from main gate up to the control room/switchyard gate and periphery wall of the plant) distribution pillar boxes, PVC cables, conduit steel trays etc. which shall be supplied by the contractor for installation of luminaires, their control gear and wiring on them. The bidder will also design, supply and install lighting fixtures and accessories based on LED for equipment room and control room building and entry points/ gates. The Bidder shall furnish Guaranteed Technical Particulars**.**

All LED luminaires shall be supplied with proper diffuser to avoid direct visibility of LED with proposer thermal management for longer life. Renowned brands available in the market need to be used.

6.47.2 General Technical Requirements:

The lighting system for outdoor and indoor areas of Solar Power Plant shall be designed in such a way that uniform illumination is achieved.

In outdoor yard equipment /bus bar areas and the peripheral wall are to be illuminated and luminaires shall be aimed for clear view.

6.47.3 Lighting Levels

- The average LUX level of 10 lm is to be maintained in switchyard. However, a lux level of 20 lm (10+10) additional switchable on requirement only) is to be maintained in switchyard on transformer.
- Lighting in other areas such as control room, office rooms and battery room & other areas (i.e. street light) shall be such that the average LUX level to be maintained shall be as under:

S. No	Area	LUX
1.	Control Room and equipment rooms	500
2.	Office	300

3.	Battery & other rooms	150
4.	Other areas including periphery wall	10
5.	Transformer yard	20
6.	H – pole and metering point	10

6.47.4 Emergency Light Points:

- Light points using LED lamps of 15-20 W (at 240 V) shall also be provided as given below:
  - Control room and equipment room 4 Nos.
  - Battery room 1 Nos.
  - Office 1 Nos.
  - Corridor 1 Nos.
- These lights shall operate on AC/DC changeover supply from the DC distribution Board. Separate wiring and distribution board shall be provided from these lights.
- The lighting level shall take into account appropriate light output ratio of luminaires, coefficient of utilization maintenance factor (of 0.7 or less) to take into account deterioration with time and dust deposition.
- LED luminaires shall meet the following parameters

PARAMETER	**SPECIFIED VALUE**
Input voltage	170-260 V
Input Frequency	50 HZ +/-1 HZ
Power Factor	0.95 (Minimum)
Power Efficiency	>96%
LED efficacy	>130 lumens per watt
Dispersion Angle	Minimum 120°
Usage hours	Dusk to dawn
Total Harmonic Distortion	< 15 %
Working Temperature	-5° to +50° C
Working Humidity	10% - 90% RH (Preferably Hermetically sealed unit)
Index of Protection Level	Minimum IP 65
Lamp Casing	Powder coated metal / Aluminium.
Life	> 50000 Hrs.
LED Type	Power LEDS from reputed makes.
Colour Temperature	2800° K/3000° K

Colour Rendering	>75
Junction Temperature	< 60° C
Electrical Connector	Lead wire with 2 meter long –or as required by the customer at site.
Expected Life of components	Passive electronic components life greater than >100,000 hours
Moisture protection in case of casing damage	IP 65 (preferably Totally encapsulated)

- Luminaire Compliances:
  - Luminaire Specification:

    Control gear specification:

    EN 61347-2-13: Particular requirements for D.C. or A.C. supplied electronic control gear for LED modules

    EN 62384: D.C. or A.C. supplied electronic control gear for LED modules.
  - Luminaire EMC specification:

    EN 61000-3-2: Electromagnetic compatibility (EMC). Limits for harmonic current emissions (Equipment input current < 16 A per phase)

    EN 61000-3-3: Limitation of voltage fluctuation and flicker in low voltage supply systems for equipment with rated current < = 16 A
- Additional information:
  - The LED luminaire housing, heat sink, pole mounting bracket, individual LED reflectors and front heat resistant tempered glass should be provided.
  - The LED luminaire housing should be made of non-corrosive high pressure die cast aluminium and the housing should be power coated grey, so as to ensure good wetherability.
  - Each individual LED source should be provided with a asymmetrical distribution high reflectance aluminized reflector, which should ensure that the light distribution of the luminaire is suitable for road lighting applications (wide beam distribution) and should ensure high pole to pole spacing.
  - The luminaire should be provided with in built power unit and electronic driver. The luminaire should be should be so constructed to ensure that the gear and LED modules are replaceable, if required.
  - The luminaire should be suitable for both standard street light poles with a typical pole diameter of 50 mm – 60 mm and should be suitable for both side entry and bottom entry (post top).

E. Performance Measurement procedure

7. Performance Ratio Test Procedure

7.1 PR - Provisional Acceptance Test Verification Procedure

7.1.1 The Performance ratio test aims at the comparison of the actual PV plant energy production with the guaranteed value for a limited operation time of the PV plant of 30 consecutive days.

7.1.2 After Commissioning of the Plant and after receiving all the satisfactory results regarding the correct operation of the plant, there will be continuous monitoring of the performance for 30 days. This monitoring will be performed on the site under the supervision of the Employer / Employer's engineer.

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

7.1.4 The test will consist of guaranteeing the correct operation of each plant individually over 30 days, by the way of the efficiency rate (performance ratio) based on the reading of the energy produced and delivered to the grid and the average incident solar radiation.

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

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

Where;

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

Or $Y_A = E_{ac} / P_{Nom}$

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

Or $Y_R = I_{R\ Site} / I_{R\ STC}$

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

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

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

$I_{R\ STC}$ = Irradiance at STC (kW/ sq. m)

$T_{cellavg}$ = Average cell/ module temperature (^oC)

T_{cell} = STC cell/ module temperature (^oC)

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

7.2 Monitoring System for PR Verification

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

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

7.3 Data measurement shall be witnessed in the format mutually agreed before the start of PR test by the employer and the contractor jointly for the said period.

7.4 The bidder shall show the specified PR for Operational Acceptance and committed CUF for Final Acceptance (i.e. after one year form the date of commissioning)

F. Civil Works

8. Detailed Contour Survey & Soil Investigation of the Site

The turnkey contractor shall be responsible for detailed soil investigation and contour survey at required locations for the purposes of foundation design and other design/ planning required for the successful completion of the project. The contractor must submit the detailed soil investigation report, bore log records, ERT reports and contour survey to SECI.

8.1 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.

8.2 Soil Tests:

The 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, etc. The Contractor shall carry out soil investigation through any Govt. approved / certified soil consultant. These reports shall be furnished to the Employer prior to commencing work. All RCC works shall be provided of required grade of concrete as per relevant IS specifications as well as soil data considering appropriate earthquake seismic zone, wind velocity, whether effect, soil characteristics etc.

8.3 Soil Investigations:

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.

8.4 Other investigations

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.

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 Employer for its review / suggestions / approval.

8.5 Land Development for site activities

The turnkey contractor is responsible for making the site ready and easily approachable by clearing of bushes, felling of trees (if required with appropriate approval from concerned authority), levelling of ground (wherever required) etc. for commencing the project. It is to ensure that land must be graded and levelled properly for the flow of water. It is advisable to follow the natural flow of water at the ground. If the land pocket needs any filling of sand, it is to ensure that the filled earth must be well compacted as per the relevant IS standards. In case the filled earth is brought out from outside the plant, the contractor shall provide the necessary challans. On the other hand, additional earth, if any, must be disposed of properly. Bidder shall take reasonable care to ensure that the plant is aesthetically designed.

8.6 Foundations:

8.6.1 The contractor is responsible for the detailed soil investigation and subsequent foundation design of the structures in the plant. The foundation of the module mounting structures, buildings and other important structures must be approved by SECI prior to construction. The contractor must provide the detailed design and calculations of the foundation.

8.6.2 The foundations should be designed considering the weight and distribution of the structure and assembly, and a maximum wind speed of 180 km per hour. Seismic factors for the site have to be considered while making the design of the foundation. Successful Bidder shall also plan for transport and storage of materials at site

8.7 Switch yard civil works

Switchyard civil work includes step up transformer plinth, HT Switchgear kiosk plinth, two pole 4 pole structure foundation, earth pits, metal spreading curb wall in and around switchyard and fencing. The transformer/ HT switchgear kiosk plinth shall be made of brickwork or Random Rubble masonry conforming to relevant standards. The height of transformer /HT Switchgear kiosk plinth shall be decided based on 33 kV ground clearance. Earth pit construction shall be of brickwork covered with RCC (1:2:4) slabs. Switchyard/ double pole area must be surrounded by chain link fencing with pre-cast RCC post/ galvanized MS angle of suitable size with double leaf gate will be provided. Area enclosed within this perimeter must be filled with gravel.

8.8 Buildings

Buildings are required to be constructed for housing the electrical equipment/ panel and central control room with office cum store building for the operation & maintenance of Solar Photovoltaic Power Plant. Security houses/ cabins shall also be required at strategic locations to secure the plant from any theft. The building shall be constructed with conventional RCC framed structure with brick partition walls. Equipment room shall be designed as per the OEM recommendations to ensure desired life of equipment.

Bidder shall furnish the drawing of the proposed buildings to the Employer for approval, prior to construction. The construction of the same shall be as under-

8.8.1 RCC Works

All RCC works shall be as per IS 456 and the materials used viz. Cement, reinforcement steel etc. shall be as per relevant standards.

8.8.2 Brick Works

Brick works in cement mortar (CM) 1:6 for 9" thick and 4½" thick wall respectively. All brick works shall be using 1st class bricks of approved quality as per IS 3102.

8.8.3 Doors & Windows:

Steel framed doors, Windows and ventilators shall conform to IS – 1081 with necessary glass panels including of all fixtures and painting etc. complete. Doors and windows 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.

8.8.4 Plastering

Plastering in cement mortar 1:5, 1:6 and 1:3 shall be applied to all internal, external walls and ceiling of slab respectively as per IS 1542.

8.8.5 Flooring

Flooring for stores shall be of cement flooring in concrete mix 1:2:4 using 10 mm aggregates as per IS 2571. Flooring for control building, equipment room and other places, if needed, shall be of vitrified tiles 8 mm. For toilet area, the floor shall be of ceramic tiles 8 mm thicknesses. The floor finishing must include skirting up to a suitable height. The wall tiles, if proposed, shall be glazed tiles of 6 mm thickness and provided up to lintel level.

8.8.6 Roofing

The roof of the building shall be insulated and waterproofing shall be done as per relevant IS standard.

8.8.7 Plinth Protection

Plinth protection 1000mm wide shall be provided around all the buildings.

8.8.8 White washing & colour washing.

White washing and colour washing work shall be conforming to IS 6278.

- Internal walls - Acrylic distempering as per IS 427.
- External walls – Heat reflective synthetic enamel as per IS 428.
- For cement painting IS 5410 shall be followed.

- For painting of steel doors, ventilators IS 2338, IS 1477 (Part I & II) shall be followed.

8.8.9 Rolling Shutters.

Rolling shutters made of cold rolled strips shall conforming to IS 4030 with approved gauge thickness shall be provided with all fixtures, accessories, painting all etc. complete.

8.8.10 Water supply.

GI pipes of Medium quality conforming to IS 1239 (Part I) and IS 1795 for Mild Steel pipes shall be used for all water supply and plumbing works.

8.8.11 Plumbing and Sanitary:

Sanitary fittings, which include water closet (EWC/IWC), wash basins, sink, urinal fitting including flushing tank, and necessary plumbing lines shall be provided for office cum stores building and Security house.

8.8.12 Electrification of Building

Electrification of buildings shall be carried out as per IS 732 and other relevant standards. The lighting design of the buildings shall be carried out as per IS 3646. The building shall be provided with adequate quantity of light fittings, 5A/ 15A 1 phase sockets, fans etc., controlled by required ratings of MCBs and MCB, DBs. Supervisor room must be fitted with suitably sized HVAC system. It is encouraged that bidder shall use the latest energy efficient equipment for the electrification and illumination.

8.8.13 Toilet:

Toilet shall be designed for 15 persons; and constructed with following finish

- Floor: Vitrified tiles/ ceramic tiles
- Door window: made out of aluminium sections, 6mm float glass
- Ventilators: Mechanical exhaust facility
- Plumbing fixtures: Repute make
- Sanitary ware: Repute make
- EWC: 390 mm high with health facet, toilet paper roll holder and all fittings
- Urinal (430 x 260 x 350 mm size) with all fittings.
- Wash basin (550 x 400 mm) with all fittings.
- Bathroom mirror (600 x 450 x 6 mm thick) hard board backing
- CP brass towel rail (600 x 20 mm) with C.P. brass brackets
- Soap holder and liquid soap dispenser.
- GI pipes (B class) of reputed makes
- Overhead water tank equivalent of 1,000 litre capacity

8.8.14 Drainage for Toilets:

Drainage pipes shall be of PVC (6 kg/cm^2) Supreme, Prince or equivalent make. Gully trap, inspection chambers, septic tank for 15 person and soak well to be constructed for abovementioned requirement.

8.8.15 Air Conditioner for Control Room:

The control room shall be equipped with appropriate numbers of fans for effective heat dissipation. The SCADA cabin shall have split type air conditioning units.

8.8.16 Fire Extinguishers:

Liquefied CO_2 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.

8.8.17 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.

8.8.18 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 Employer, detailed specifications of the sign boards.

8.9 Water supply & Cleaning

8.9.1 A suitable arrangement of water shall be ensured to cater the day-to-day requirement of drinking water and needs of Solar Photovoltaic during entire O&M period.

8.9.2 The Bidder shall estimate the water requirements for cleaning the photovoltaic modules at least once in every week in order to operate the plant at its guaranteed plant performance.

8.9.3 All necessary arrangement for wet cleaning of the solar panels shall be in the scope of the bidders and accordingly the agency has to provide all the necessary equipment, accessories, tool & tackles, pumps, tankers, tractors and piping arrangement which are required for the same.

8.10 Roads within Solar Power Plant

8.10.1 Suitable approach road and internal Solar Photovoltaic roads to carry safe and easy transportation of equipment and material at the project site shall be made. The road should provide easy and fast approach to each location of the plant. These roads are to be designed optimally to carry the crane load with all necessary chambers, gradients, super elevation, and radius of curvatures for the easy movement of cranes, trucks and public transport.

8.10.2 Roads are to be constructed with sufficient width (minimum 3.75m) followed by 0.5m well compacted shoulders on each side. The road must be well compacted as per the relevant IS standards and MORTH updated till date.

8.10.3 All peripheral roads and pathways from central road to Inverter room road shall be WBM road. Also, all cable crossings and other crossings shall be provided with GI/ Hume pipes.

8.11 Peripheral Boundary/ peripheral wall:

8.11.1 The objective to provide a peripheral wall is to demarcate the boundary and to keep away the unauthorized access to plant. The contractor shall provide GI chain link/ RCC pre cast/ RR masonry wall all around the periphery of the plant. The wall height must be minimum of 2 meter from the FGL. The boundary wall must be provided with a rugged main entry gate. The construction of peripheral wall and the main entry gate must conform to the relevant IS standards and practice.

8.11.2 All the drawings/ specifications for the peripheral wall and main entry gate design/ planning must be submitted to SECI for approval prior to construction for their accord.

8.12 Drainage

8.12.1 The storm water drainage shall be planned for the plant to ensure no water stagnation in the plant. The drains must be constructed with brickwork/ RCC/ RR masonry as suitable for the site conditions. The drains outfall must be connected to the nearest drain outside the plant premises. It is advised that the drainage for the plant must be designed keeping the natural flow of water to the nearest exit point.

8.12.2 Bidder is to provide RCC hume pipe at the crossing of road and drains and at required locations. The peripheral drain shall be of brick pitching which is backed up by cement mortar bed and all joints are filled up with cement mortar in C.M. 1:4, no pointing and plastering is required. All other internal drains i.e. on both side of central road, pathways to inverter room, control room, switchyard are to be done by excavating the drain of required size and with required trapezoidal section.

8.13 **Painting & Finish:**

8.13.1 All metal surfaces and support structures shall be thoroughly cleaned of rust, scale, oil, grease, dirt etc. Fabricated structures shall be pickled and then rinsed to remove any trace of acid. The under surface shall be made free from all imperfections before undertaking the finishing coat.

8.13.2 After Phosphate treatment, two (2) coats of yellow zinc chromate primer shall be applied followed by two (2) coats of epoxy based synthetic enamelled paint. Shade shall be Siemens Grey RAL- 7032. Thickness of paint shall be not less than 75 micron.

8.13.3 All unpainted steel parts shall be cadmium plated or suitably treated to prevent rust formation. If these parts are moving elements then they shall be greased.

8.14 **Watchmen / Security Cabin**:

Contractor shall provide adequate numbers of prefabricated Watchman's portable cabin at strategic locations with in of the plant. The Minimum size of watchmen's (Security Cabin) cabin is 1.2 metre x 1.8 metre size and height of 2.4m with appropriate roof at the top. Location of the watch Cabin (Security Cabin) will be as directed by the Employer. The Prefabricated Security Cabin of size 3 metre x 3 metre at the main entrance gate shall be designed and constructed by the Successful Bidder keeping in view the safety and security of the power plant.

8.15 **Underground RCC water Tank**

Contractor has to 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.

G. Inspection & Testing

9. Inspection:

9.1 **SECI** shall have free access to **Bidder's manufacturer's works** to inspect, expedite and witness **shop floor tests**. Any materials or work found to be defective or which does not meet the requirements of the specification will be rejected and shall be replaced at Bidder's cost. Owner reserves the right to carry out stage wise inspection of fabrication and components. The Bidder shall furnish a detailed quality assurance plan (QAP) for review by the Employer.

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

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

9.4 The shop test shall be carried out to prove the performance parameters of the offered model. The testing shall be done in the presence of the representatives of the department.

9.5 The Employer will nominate its representatives (max. of 2 nos.) for inspection of stage manufacturing and testing at works & 7 days training at premises of SPV module and PCU manufacturer. The notice of such inspection shall be given 30 days in advance in case of countries outside India and 15 days in India.

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

- Start Up Trials
- Load Test
- Records & Measurements
- Safety Device List
- Setting values for all sensors for Pressure and Temperature
- Dimensional Check-up, Overall Inspection, Completeness of Scope of Supply
- Shop Test/Load Test for Solar Power Plant

10. Load Trials & Reliability test at Site

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

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

10.3 All the equipment supplied by the vendor will be tested as per relevant standard/ Quality assurance plan at site conditions and the performance monitored.

11. Quality Issues

11.1 Contractor will submit and get finalized detailed comprehensive Standard Field Quality Plan (SFQP) within 30 days from date of issue of the order for bought out items and items manufactured by them. The Standard Field Quality Plan shall relate to the specific and objective erection practices right from storage of equipment till final inspection and testing to be followed for bought out items and items manufactured by Contractor. Accordingly, the Manufacturing Quality Plan shall be submitted broadly under following sub-heads:-

- Raw material/Bought Out items and Components.
- In process inspection and test/checks to establish successful completion/ accomplishment of the process.
- Final tests/checks in accordance with relevant national/ international standards/ specification.

11.2 The quantum of check for each and every inspection/test items shall be based on an established sampling method and the quantum of check indicated in the SFQP should be designed adequate quality protection.

11.3 In case reference documents/acceptance norms are indicated as per plant standards then the same shall be duly substantiated/properly explained by well-established and proven engineering practices. All submissions will be in English language only.

11.4 Bidder will to allow SECI to carry out Quality/Audit/Quality surveillance on bidders and our sub-vendor's work with reference to contractual obligations to ensure that the quality management practices/norms as detailed out in the Quality Manual are adhered to. To facilitate this activity, you shall keep SECI informed all progress of work in this contract on monthly basis.

11.5 Contractor will associate/fully witness in each inspection being carried out at their/their sub-vendor's works by our authorized inspection engineer(s).

11.6 SECI shall also carry out quality audit and quality surveillance of your systems, procedures and quality control activities. However, this shall not relive you of any of your contractual responsibilities under the contract.

12. **Warranty / Guarantees**

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

12.2 The modules shall be warranted for at least 05 years for failures due to material defects and workmanship.

12.3 The mechanical structures, electrical works and overall workmanship of the grid connected solar power plant must be warranted for a minimum of 5 years.

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

12.5 The warranty / guarantee period shall be as follows:

- Solar PV Modules: Modules shall be warranted for a minimum period of 25 years in the Bidder's detailed Warranty / Guarantee certificate. Same should be furnished with its Bid.
- Power Conditioning Units (PCU): PCUs shall be warranted for the guarantee period provided by the original equipment manufacturer. Same should be furnished with its Bid.
- Transformers, associated switch gear and others: Bidder must furnish in detail its warranties / guarantees for these items.

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

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

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

SHEET-1

Guaranteed Technical Particular data Sheet for Solar PV Module

(To be furnished by the bidder)

S. No.	Particulars	Unit	Type/value
1.	PV Module Manufacture name & Country		
2.	PV Module type (Thin/ Crystalline- Mono/Multi)		
3.	Product Code		
4.	Product Status	Standard	
5.	No. of PV cells per Module		
6.	Mounting arrangement for Solar Module		
7.	Solar Module frame material		
8.	Module dimensions		
9.	Output Cables (viz., Polarized Weather Proof DC rated multi-contact connector)		
10.	Weather resistant HDPE Junction Box (IP65)		
11.	Construction front back		
12.	Temperature rise of solar cells under severe working conditions over Max. Ambient Temp.		
13.	Nominal voltage		
14.	Nominal Wattage		
15.	Power Tolerance (3%)		
17.	Peak power voltage (Vmp)		
18.	Peak power current (Imp)		
19.	Open circuit voltage (Voc)		
20.	Short circuit current (Isc)		
21.	Weight of each module (Kg)		
22.	Fill Factor		
23.	Standards/Approvals from International Agencies	IEC 61215 IEC 61730 IEC 61646 TUV	
24.	Module is suitable to operate at 50^0 ambient	Yes/No	
25	Cell efficiency	%	
26	Module efficiency	%	

SHEET-2

Technical Particular Data Sheet for Power Conditioning Unit

(To be furnished by the bidder)

Particulars	**Unit**	**Value**
AC Side		
Nominal AC power @ 25°C		
Nominal AC power @ 50°C		
Output AC voltage		
Frequency		
Total Harmonic Distortion		
AC over / under voltage over / under frequency protection		
Phase shift (cos phi)		
DC Side		
Maximum Input DC power		
Maximum DC voltage		
MPPT voltage range		
Maximum DC current		
DC over voltage protection		
DC voltage ripple		
Others		
Minimum Efficiency (CE)		
Euro Efficiency		
Ambient temperature range		
Humidity (non-condensing)		
Quiescent power		
Degree of protection		
Dimensions approx. (HXWXD)		
Weight		
Compliances (Reference Standards)		

SHEET -3

TECHNICAL PARTICULARS OF 415V/33kV STEP-UP TRANSFORMER

(To be furnished by the bidder)

S. No.	Description	Guaranteed particulars to be filled in by the manufacturer
1.	Service	
2.	Type	
3.	Rating kVA	
4.	Rated frequency Hz	
5.	Number of phase HV side LV side Neutral (separate outside)	
6.	Rated Voltage a) HV winding kV b) LV winding kV	
7.	Vector group	
8.	Type of cooling (ONAN/ONAF)	
9.	Insulation level a) Power frequency withstand -kV rms. (HV/LV) b) Impulse withstand voltage -kV (HV/LV)	
10.	Method of Earthing	
11.	Duty	
12.	Short circuit level	
13.	Off circuit tap changer: a) Range % b) In steps of c) Tapping provided on HV side	
14.	Tap changer type	
15.	Impedance voltage at 75°C a) At principal tapping %	
16.	Temperature rise above 50°C ambient	

S. No.	Description	Guaranteed particulars to be filled in by the manufacturer
	a) Top of oil by thermometer ^{o}C b) Womdomg by resistance ^{o}C	
17.	Terminal details a) HV side b) LV side	
18.	Losses (at 75^{o}C and principal tapping) a) No load loss at rated voltage kW and frequency b) Load loss at rated current kW (ONAN) c) Total loss at maximum rated power kW	
19.	Efficiency at 75^{o}C and 0.9 PF a) At full load (ONAN) % b) At 75% load (ONAN) % c) At 50% load (ONAN) %	
20.	Hot spot temperature in winding limit to ^{o}C	
21.	Shipping dimensions a) Height m b) Breadth m c) Length m	
22.	Painting	
23.	Reference Standards	

SHEET - 4

SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS OF 36 KV INDOOR SWITCHGEAR AND CONTROL PANEL

A) Circuit Breakers:

1) Manufacturer's name and collaborator
   (If any)
2) Type designation:
3) Number of poles.
4) Class
5) Rated voltage.
6) Rated insulation level.
   i) Lightning impulse withstand
   Voltage.
   ii) One minute power frequency
   Withstand voltage.
   iii) One minute power frequency
   Withstand voltage for auxiliary
   Circuits.
7) Rated frequency.
8) Rated normal current:
9) Rated short circuit breaking current/
   Capacity.
10) Rated short time withstand current
    And its duration.
11) Rated transient recovery voltage for
    Terminal faults.
12) Rated short circuit making current.
13) Rated operating sequence
    (Test duty cycle).
14) First pole to clear factor.
15) a) Opening time.
    b) Closing time.
16) Total break time measured from the
    instant of trip circuit energisation :
    (a) At 10% breaking capacity (m sec)
    (b) At 100% breaking capacity (m sec)

17) Protection class of Breaker

18) Constructional features:

i) Mass of complete Circuit Breaker with mechanism and Vacuum Bottle .

ii) Mass of Vacuum Bottle.

19) Operating mechanism of circuit breaker and its associated equipment :

i) Type of closing mechanism.

ii) Whether the circuit breaker is trip free or fixed trip and whether it is with lockout preventing closing.

iii) Rated supply voltage of closing mechanism.

iv) Current required at rated supply Voltage to close the circuit breaker.

v) Number and type of spare auxiliary Switches/contacts.

vi) Current required at rated supply Voltage by other auxiliaries.

20) Other information

i) Type of breaker (Drawout or fixed)
Type of isolation (Vertical or horizontal)

ii) Type of arc control device.

iii) Main Contact:

1. Type
2. Material.
3. Silver facing provided.
4. Design contact pressure.

iv) Life:

i) Mechanical operations.

ii) Electrical operations.

iii) Short circuit operations.

iv) Max. temperature rise over an ambient temp. of 50 Deg.C.

vi) Transient behavior details:

a) PF recovery voltage between phases.

b) Peak transient recovery voltage.

c) Rate of rise of recovery voltage.

vii) Rated Current of Terminal Connectors.

viii) Details of interlocks provided.

ix) Derating factor for specified 50 Deg.C
ambient temp. & site condition if any.

x) Max. chopping current.

xi) Vacuum interrupter details.

a) Make & Code No. of vacuum bottle.

b) Pressure inside interrupter.

c) Manufacturer's code number/Reference standard.

xii) Contact wear indication.

21) Thickness of sheet steel

22) Whether CRCA Sheet used

The manufacture should give the necessary information as regards the overall dimensions of the circuit breakers and details necessary for the design of the foundation. General information regarding maintenance should also be given.

B) 33KV VOLTAGE TRANSFORMERS:

1) Manufacturer's name.

2) Type designation.

3) Highest equipment voltage.

4) Number of phases.

5) System earthing.

6) Insulation level:

i) One minute power frequency withstand
voltage for :

a) Primary winding.

b) Secondary winding.

ii) Impulse withstand voltage.

7) Frequency.

8) Transformation ratio.

9) Rated output.

10) Accuracy class.

11) Winding connection.

12) Type:

i) Resin cast

ii) Whether three phase.

iii) Type of fuses provided.

a) Primary.

b) Secondary.

c) Make.

14) Whether Voltage Transformer is mounted on the top part of the Cubical.

C) Current Transformers:

1) Manufacturer's name.
2) Type designation.
3) Rated voltage.
4) Type of insulation resin cast.
5) Insulation level:
   i) 1 Mt.PF withstand voltage for primary winding.
   ii) Impulse withstand voltage.
   iii) PF withstand voltage for secondary.
6) Frequency.
7) Transformation ratio.
8) Rated output (Core-I and Core-II).
9) Class of accuracy (Core-I and Core-II).
10) Instrument security factor.
11) Short time thermal current and its duration.
12) Secondary wdg. rise at 75 C.(Max.)
13) Knee point voltage.
14) Maximum exciting current (in r.m.s.)

D) RELAYS:

Numerical Relay

1. Manufacturer's name.
2. Type designation.
3. Rated CT Secondary Current.
4. Tap range.
5. VA burden.

i) Highest tap.

ii) Lowest tap.

6. Rate Voltage of Coil for Operation.
7. Whether relay is able to store a minimum of two previous fault values including fault level and phase.
8. Whether relay is mounted in flush pattern on the Panel board.
9. Whether test blocks provided as per specification.
10. Whether numerical relay is with communication facility and standard open protocol / SCADA compatibility along with IED for purpose of SCADA.
11. Whether communication on RS-485 Port-Mod Bus-Open Protocol provided.
12. Type of characteristic.
13. Descriptive leaflet attached or not.
14. Accuracy class of CT needed.
15. Range of setting for over current and earth fault protection.
16. Whether drawout type.

E) INDICATING AND INTEGRATING INSTRUMENTS :

I) Ammeter Voltmeter PF Meter

1. Manufacturer's name
2. Type designation/reference.
3. Accuracy class(es) & governing standard.
4. The burden in VA at normal current and/or nominal voltage.
   a) Current coil.
   b) Potential coil.
5. Transformation ratio(s) of instrument Transformer (s) for which the instrument has been adjusted, if relevant.
6. Size.
7. Whether suitable for sheet steel mounting.
8. Colour finish.
9. Short duration overload capacity.
10. Make and type of selector switch for Ammeter/Volt meter.

II) Control Switches:

1. Manufacturer's name.
2. Type designation.
3. Type of handle provided.
4. No. of position.
5. No. of contacts.
   i) Normally closed.
   ii) Normally opened.
6. Making capacity/breaking capacity.
7. Whether spring return to normal
   or stay put type.
8. Type of lock provided.

III) Indicating Lamps:

1. Manufacturer's name
2. Type designation.
3. Operating voltage.
4. Size of lenses.
5. Wattage of lamps.
6. Colour of lamp body.

IV) Switch Board Wiring:

1. Insulation of wiring.
2. Size of wiring conductor for
   a) CT circuits.
   b) PT circuits.
   c) AC supply circuits.
   d) Other circuits.
3. Size of earthing bar for safety earthing.
4. Type of terminals provided on wiring.
5. Conductor material.
6. Colour used.
   a) AC circuits.
   i) 1st phase.
   ii) 2nd phase.
   iii) 3rd phase.
   iv) Neutral.

v) Earth.

b) DC circuits.

7. Identification of suffix used for:

a) Metering circuits.

b) O/C and E/F indication.

c) AC aux. circuits.

F) MISCELLANEOUS INFORMATION:

1. Bushings:

a) Make and Drawing No.

b) Type of bushing.

c) Creepage distance.

i) Total

ii) Protected.

d) 1 minute power frequency withstand test voltage for bushing.

i) Dry.

ii) Wet.

e) Impulse withstand voltage.

f) Reference standard

g) Permissible safe cantilever loading on bushing

h) Catalogue n. of bushing offered and its mechanical strength.

2. Motor / Magnetic Actuator:

a) Make

b) Wattage

c) Rated voltage

d) Protection equipment

e) Closing contactor

3. Terminal connectors:

a) Make/Material.

b) Rated continuous current.

c) Rated short time current for 3 seconds.

d) Max. temp. rise of terminal connector over ambient temp. of 50^{o}C. & Max. temp. attained.

4. Paint shade of outdoor kiosk.

5. Main bus bar:
   a) Size.
   b) Material (Copper only).
   c) Rated short time current for 3 seconds.
   d) Current density.
6. Interconnecting Bus Bar.
   a) Size.
   b) Material (Copper only).
   c) Rated continuous current for 3 seconds.
   d) Current density.
7. C.T. Windings:
   a) Primary:
   i) No. of turns.
   ii) Cross sectional area.
   b) Secondary:
   i) No. of turns.
   ii) Cross sectional area.
   iii) Material.
8. Power Cable sealing kits:
   a) Make
   b) Type
   c) Size
9. List of interlocks
   i) Mechanical interlock
   ii) Electrical interlock.
10. Overall dimensions
   a) For vacuum circuit breaker kiosk complete.
   b) Circuit breakers
   c) Impact for foundation design to include
      dead load + impact value on opening at
      max. interrupting rating in dead load.
11. Constructional Features
   i) Mass of complete circuit breaker with mechanism and
   vacuum bottle.
   ii) Mass of vacuum bottle.
   iii) No. of breaks in series per pole.
   iv) Minimum. clearance in air.

a) Between poles.

b) to earth.

12. Arrangement provided

a) Pole discrepancy.

b) Trip free/fixed trip

c) Anti pumping

13. Connection for CTs

a) Size

b) Material

14. Connection for PTs

a) Size

b) Material

SHEET- 5

Schedule of Guaranteed Technical Particulars for 33 kV Single Phase Potential Transformer

(To be furnished by the bidder)

S.No.	Particulars	To be Furnished by The Bidder
1.	Name and Address of Manufacturer	
2.	Manufacturer's type and designation	
3.	Nominal system voltage (KV rms)	
4.	Highest system voltage (KV rms)	
5.	Insulation level	
	a) Impulse withstand voltage (KVP-	
	b) One minute power frequency dry withstand voltage (KV rms)	
6.	Rated frequency (Hz.)	
7.	Rated transformation ratio	
8.	Rated output (VA burden per ph.)	
9.	Class of accuracy	
10.	Rated voltage factor and time	
11.	Winding connections	
	a) Primary	
	b) Secondary	

12. Details of winding particulars	No. of Turns	Cross Sectional Area of Each Turn Sq. mm	Total weight Winding approx.
a) Primary winding (Copper)			
b) Secondary winding (Copper)			
13. Guaranteed ratio error (max.)			
14. Guaranteed phase angle error (max.)			
15. Guaranteed max. temperature rise of the winding over an ambient temperature of 50°C at rated continuous thermal current at rated frequency and with rated burden.			
16. Bushing details			
a) Make			

b) Catalogue No.
c) Total creepage distance (mm)
d) IS to which bushing conforms
e) Arcing distance (mm)
f) Max. creepage factor

17. I. Insulation Class
II. Insulation material used

18. Core details
a) Material
b) Weight of the core etc.

19. Whether any PT fuse have been provided in secondary side of P.T.

20. Whether neutral of PT or PH side is isolated/floated

SHEET- 6

Guaranteed Technical Particulars of LED lights

(To Be Submitted By the Bidder)

S. No.	Parameter	Guaranteed Value
1.	LED Operating Current	
2.	Output Luminous Flux	
3.	Beam Angle	
4.	Illuminance	
5.	Photometric Curve	
6.	Material of Luminaire	
7.	Dimension	
8.	Weight	
9.	Impact Resistance	
10.	LED Life	

Section – VI

Forms and Formats

(BID DOCUMENT NO. – SECI-SGM10-1-2015)

SOLAR ENERGY CORPORATION OF INDIA

(A Government of India Enterprise)

D – 3, Ist floor, Wing A, Religare Building, District Centre, Saket, New Delhi – 17

Tel: 011 – 71989230, Fax: 011 – 71989241

Appendix 1: Performa for Bid Letter

Appendix 2: Details of Bidder

Appendix 3: Bid Evaluation Criteria

Appendix 4: Power Plant Performance Guarantee Test

Appendix 5: Performa for Financial Proposal

Appendix 6: Details of qualified technical staff

Appendix 7: Declaration of Compliance

Appendix 8: No Deviation Certificate

Appendix 9: Declaration on Bidder's relation to Directors

Appendix 10: Execution Timeline

Appendix 11: Performa of acknowledgement letter for receipt of NIT Documents

Appendix 12(a): Format of Bank Guarantee for Bid Bond

Appendix 12(b): Format for Performance Bank Guarantee

Appendix12(c): Format of Bank Guarantee for Performance of O&M

Appendix12(d): Bank Guarantee Verification

Appendix 13: Terms of Payment

Appendix 14: Contract Agreement

Appendix 15: Power of Attorney for signing of Bid

Appendix 16: Indemnity Bond to be executed by The Contractor for The Removal / Disposal of Scrap/Disposal of Surplus Material

Appendix 17: Indemnity Bond to be executed by the contractor for the plant handed over by SECI for Performance of its O&M Contract (Entire Solar Photo Voltaic Plant)

Appendix 18: Format of Bank Guarantee for Mobilization Advance.

Appendix 1: Performa for Bid Letter

Date: --/--/----

To,

Senior Manager (PV)

Solar Energy Corporation of India

1st Floor, A Wing, Religare Building

D-3, District Centre, Saket, New Delhi - 110017

Sub: Submission of the NIT Document

Dear Sir,

We, the undersigned, have considered and complied with the "Instructions to Bidders" and have accepted the terms stipulated in the NIT documents. The scope of work shall include but not be limited to Engineering, Procurement, Manufacturing, Construction, Installation, Testing, Commissioning, Operation and Maintenance for 5(five) years after 1 year completion from the date of commissioning for demonstration of assured performance of a 10MW AC Solar Photovoltaic Grid Connected Power Plant on turnkey basis at Village Badi Sid, Tehsil Baap, District Jodhpur in the State of Rajasthan. All the above shall be as per NIT Document No. **SECI–SGM10–1–2015** dated 12.06.2015.

Also we have familiarized ourselves with the land surface and subsurface, metrological, climatological and environmental conditions which may exist in the installations area. In full cognizance and compliance with these aforesaid conditions and the regulations of local government authorities, we the undersigned do hereby offer for the Engineering, Procurement, Manufacturing, Construction, Installation, Testing, Commissioning, Operation and Maintenance of a 10MW AC grid-interactive solar photovoltaic power plant using PV technology on a turnkey basis at Village Badi Sid, Tehsil Baap, District Jodhpur in the State of Rajasthan for which we have Bid. The work covered under the Bid shall be completed to the entire satisfaction of yourselves or your representative in conformity with the NIT documents at the prices accompanying this Bid.

It is a term of our Bid that the Project shall be handed over installed, interconnected, tested, commissioned and modified and shall achieve Commissioning not later than (180) One Hundred and Eighty Days from the date of issue of LOI. This shall be the essence of the Contract between us.

We further agree and stipulate as follows:

1. Until the final Contract Documents are prepared and executed, the NIT documents, with any modifications, additions, deletions agreed with the Employer and your written acceptance thereof, shall constitute a binding Contract between us, upon terms contained in aforesaid documents and the Financial Proposal accompanying the Bid.
2. That the Employer will not supply any material. In all respects we shall be fully self- sufficient in the Performance of the work.
3. I/ We understand that you are not bound to accept the lowest of the Bid you may receive.
4. I/ We shall make available to the Employer any additional information it may find necessary or require to supplement or authenticate the qualification statement.
5. I/ We acknowledge the right of the Employer to reject our Bid without assigning any reason or otherwise and hereby waive, to the fullest extent permitted by applicable law, our right to challenge the same on any account whatsoever.
6. I/ We understand that you may cancel the bidding process at any time and that you are neither bound to accept any Application that you may receive nor to invite the Applicants to Bid for the Project, without incurring any liability to the Applicants.
7. 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.
8. I/ We further certify that no investigation by a regulatory authority is pending either against us or against our Associates or against our CEO or any of our directors/ managers/ employees.
9. I/ We undertake that in case due to any change in facts or circumstances during the bidding process, we are attracted by the provisions of disqualification in terms of the provisions of this NIT; we shall intimate the Employer of the same immediately.
10. We understand that the selected Bidder shall be an existing Company incorporated under the Indian Companies Act, 1956 or 2013.
11. 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 Employer in connection with the selection of Applicants, selection of the Bidder, or in connection with the selection/ bidding process itself, in respect of the above mentioned Project and the terms and implementation thereof.
12. I/ We agree and undertake to abide by all the terms and conditions of the NIT document.

13. We agree to keep the bidding valid for acceptance for a period of 180 days from the date of floating the Bid (hereinafter referred to as validity period) and the Bid shall not be withdrawn on or after the opening of bidding till the expiration of the validity period or any extension thereof.
14. We also undertake not to vary/ modify the Bid during the validity period or any extension thereof.
15. We represent that we have fully satisfied ourselves as to the nature and location of the Project having in mind the general and local conditions and other factors incidental to the Performance of the works and the costs there of.
16. We further represent that from our own investigation of the Site of the Project we have fully satisfied ourselves as to the character, quality other soil conditions to be encountered in the Performance of the works and we understand and represent that any failure to acquaint ourselves in respect of these matters and the other factors and conditions as set forth shall not relieve us from any responsibility for estimating properly the difficulty and cost of successfully performing the works.
17. 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.
18. We agree to return to you all reports and technical data provided for our use in preparing this Bid and in the subsequent conduct of the works. We undertake that we will not use the same for any other work/purpose.
19. 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.
20. We submit this Bid with the full understanding that our Bid fully complies with all the terms and conditions of the NIT documents including Bid evaluation criteria and that no deviation/exception to the NIT documents have been taken by us. We also agree that in case we have taken any exceptions/ deviations to the NIT documents, the Employer will be free to reject our offer on account of such exceptions/deviations.
21. We agree to guarantee following minimum Plant Performance parameters: Performance Ratio (PR) not less than 0.78 at the time of Operational Acceptance and plant Capacity Utilization Factor (CUF) not less than 19% at the end of every year from the date of Commissioning, including the O&M period.

Dated this _____ day of _____ 2015

Signature: _____

In the capacity of:_

Duly authorized to sign Tenders for and on behalf of (Name & Address)

_

_

_

Witness

_____

Appendix 2: Details of Bidder

1. General
   a. Name of Company:
   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: Bid Evaluation Criteria (BEC)

1. Following factors shall be required for evaluation of Bid:

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

1. EPC Contract Price (Total EPC Price including all taxes and duties as provided in the Financial Proposal)
2. NPV of O&M Contract Price excluding taxes for five years
3. Discount Rate: 10.81 %
4. Evaluated Bid value (EBV) = EPC price (1) + NPV of O&M Contract Price (2)

Note:

- Bidder with lowest EBV shall be L-1 and Bidder and higher than that shall be the L-2
- Present Value Factor for the mentioned Discount Rate will be considered up to 3 decimal places only.

Appendix 4: Power Plant Performance Guarantee Test

- Performance Ratio as determined through the PR Test Procedure specified here should not be less than 0.78 for Operational Acceptance.
- The Contractor shall demonstrate plant Capacity Utilization Factor (CUF) not less than 19% at the end of every year from the date of Commissioning, including the O&M period.
- The Bidder shall clearly mention the technology used Fixed, tilt or Seasonal or (please specify) in Table below.

Table : Solar Plant Performance Parameters

Particulars	**Proposal**
Solar PV module Technology proposed	
Mounting structures proposed	Fixed tilt / seasonal tilt tracking/ single axis tracking/dual axis tracking.
PR at the time of Operational Acceptance test.	0.78
Guaranteed CUF	19%

Note:

- CUF shall be demonstrated against the minimum DC Capacity to be installed (i.e. 11MW)
- PR shall be demonstrated against the installed DC Capacity.
- Subsequent to the Commissioning of the Plant, the Contractor shall notify the Employer a date for Commencement of PR Test Procedure.
- CUF will be calculated annually from the date of Commissioning of the Facilities.
- PR should be determined as per the formula and procedure specified in Clause 7 of Section V: Technical Specifications.

Appendix 5: Performa for Financial Proposal

Date:--/--/----

To,

Senior Manager (PV)
Solar Energy Corporation of India
1st Floor, D-3, A Wing, Religare Building
District Centre, Saket, New Delhi - 110017

Sub: Financial Proposal for Engineering, Procurement, Construction, Operation and Maintenance of 10MW (AC) Solar Photovoltaic Grid Interactive Power Plant using Photovoltaic at Village Badi Sid, Tehsil Baap, District Jodhpur in the State of Rajasthan on EPC basis.

Sir,

I,_____, present the financial proposal for the Bid for "Engineering, Procurement, Construction, Operation and Maintenance of 10WM AC Solar Photovoltaic Grid Interactive Power Plant using Photovoltaic technology at Engineering, Procurement, Construction, Operation and Maintenance of 10WM AC Solar Photovoltaic Grid Interactive Power Plant using Photovoltaic at Village Badi Sid, Tehsil Baap, District Jodhpur in the State of Rajasthan in response to NIT document No. _____, confirming that:

- I agree to all the terms and conditions set forth in this NIT 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 NIT documents and as finally indicated by the Evaluation Committee.
- 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" Site. The break-up of taxes considered are also furnished in price bid.
- Prices quoted in this Bid are exclusive of taxes and duties. The statutory variation in taxes shall be admissible in accordance with the Clause No.16 of Section IV: SCC Taxes and duties of this NIT. Under no circumstances shall escalation in the prices quoted against various items of this NIT Document be entertained. 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

S. No.	Item	Price/ 10 MW(AC)(without taxes & duties)	Freight and Transportation*	Duties (if applicable)*	Services Tax (if applicable))*	CST (if applicable)*	VAT (if applicable)*	Price for 10 MW (AC) SPV Plant (excluding CST/VAT)	Final Price for 10 MW (AC) SPV Plant
		(A)	(B)	(C)	(D)	(E)	(F)	(G) = (A)+(B)+(C)+(D)	(H)= (A+B+C+ D+E+F)
		(In Rs.)	(In Rs.)	(In Rs.)	(In Rs.)	(In Rs.)	(In Rs.)	(In Rs.)	(In Rs.)
1	PV Modules								
2	Inverters								
3	Supply of Balance of System includes all equipment, materials, spares, accessories, MMS etc. excluding 1&2 above								
4	Civil work								
5	General work including erection, commissioning, testing etc. of entire plant including MMS excluding 4 above								
6	Total (1+2+3+4+5)								
Total EPC Price including all taxes and duties (In Words)									

Note:

1. Total EPC Price including all taxes and duties shall be considered for evaluation of bid.
2. No variation due to change in forex rate shall be admissible.
3. Payment shall be made in Indian National Rupees (INR) only. Bidder(s) has to quote their rate in INR only
4. Arithmetical errors will be rectified on the following basis: If there is a discrepancy between words and figures, the amount written in words will prevail.

* The above taxes and duties quoted by the Bidder will be only on account of direct transaction between SECI and Contractor. Any other expenditure on account of taxes and duties by Bidder and transaction between Contractor and their Supplier/Sub-Contractor etc. shall not be quoted separately in Financial Proposal. In case any Bidder does not mention anything on account of taxes in the Financial Proposal under any column that will be considered to be NIL.

(B) Table 5.B: Price Quote for O&M Contract

Sr. No.	Item	Price (excluding service tax) (in INR)
1	Operation and Maintenance of the 10MW(AC) PV Grid Interactive Power Plant for **First YEAR**	
2	Operation and Maintenance of the 10MW(AC) PV Grid Interactive Power Plant for **SECOND YEAR**	
3	Operation and Maintenance of the 10MW(AC) PV Grid Interactive Power Plant for **THIRD YEAR**	
4	Operation and Maintenance of the 10MW(AC) PV Grid Interactive Power Plant for **FOURTH YEAR**	
5	Operation and Maintenance of the 10MW(AC) PV Grid Interactive Power Plant for **FIFTH YEAR**	
Total O&M Contract Price (in figures)		
Total O&M Contract Price (in Words)		

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: **Organization:**

Address: **Phone:**

Email: **Seal Of the Company**

Appendix 6: Details of qualified technical staff

S. No.	Name	Relevant Qualification	Additional Certifications	Total Years of relevant Experience	Remarks
1.					
2.					
3.					
4.					

Note: Kindly submit copies of resumes and appropriate certifications with this sheet. Additional sheets may be used to provide accurate information.

Signature: **Designation:**

Name: **Organization:**

Address: **Phone:**

Email: **Seal Of the Company**

Appendix 7: Declaration of Compliance

Date:--/--/----

To,

Senior Manager (PV)

Solar Energy Corporation of India

1st Floor, D-3, A Wing, Religare Building

District Centre, Saket, New Delhi - 110017

Sub: Declaration of Compliance for the Bid for Engineering, Procurement, Construction, Commissioning, Operation and Maintenance of 10MW AC Solar Photovoltaic Grid Interactive Power Plant using Photovoltaic at Village Badi Sid, Tehsil Baap, District Jodhpur in the State of Rajasthan on EPC basis.

Dear Sir,

This is to certify that I, _____, am the duly authorized signatory appointed on behalf of my organization to submit this Bid. The Power of Attorney along with Board Resolution is attached herewith.

I agree to all the terms and conditions set forth in this NIT Document.

If awarded the job, the job work shall also conform to the terms and conditions, as well as specifications indicated in the NIT documents 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:	**Phone:**
Email:	

Appendix 8: No Deviation Certificate

Date:

To

Senior Manager (PV)

Solar Energy Corporation of India

1st Floor, D-3, A Wing, Religare Building

District Centre, Saket, New Delhi - 110017

Sub: No Deviation Certificate regarding Bid for Engineering, Procurement, Construction, Commissioning, Operation and Maintenance of 10MW AC Solar Photovoltaic Grid Interactive Power Plant using Photovoltaic at Village Badi Sid, Tehsil Baap, District Jodhpur in the State of Rajasthan on EPC basis.

Dear Sir,

We, _____(Bidder's name), confirm our acceptance to all terms and conditions mentioned in the NIT Document, and all subsequent clarifications, in totality and withdraw all deviations raised by us, if any.

_____

SEAL AND SIGNATURE OF BIDDER

Date: _____

Appendix 9: Declaration on Bidder's relation to Directors

This has reference to our proposed Contract regarding Engineering, Procurement, Construction, Commissioning, Operation and Maintenance of 10 MW AC Solar Photovoltaic Grid Interactive Power Plant using Photovoltaic at Village Badi Sid, Tehsil Baap, District Jodhpur in the State of Rajasthan to be entered into Agreement with SECI.

We certify that to the best of my/our knowledge;

- I am not a relative of any Director of SECI;
- We are not a firm in which a Director of SECI or its relative is a partner;
- I am not a partner in a firm in which a Director of SECI, or its relative is a partner;
- We are not a private company in which a Director of SECI is a member or director;
- We are not a company in which Directors of SECI hold more than 2% of the paid-up share capital of our company or vice-versa.

_____

Authorised Signatory of the Contracting Party

Place:

Date:

Appendix 10: Execution Timeline

I. Division of Scope of Work

Discipline / Equipment	Basic Engineering	Design / Detailed Engineering	Procurement	Supply	Construction / Project fabrication / Management	Commissioning

NOTE:
1. Bidder shall clearly indicate the agency which will carry our each activity and the location of activity.
2. Bidder to identify major equipment / items and discipline

II. DETAILED PROJECT SCHEDULE

Activities	Timeline

NOTE: The Bidder shall ensure that the entire work is completed within 180 days of issue of LOI.

SIGNATURE OF BIDDER

NAME

DESIGNATION

COMPANY SEAL

DATE

Appendix 11: Performa of acknowledgement letter for receipt of NIT Documents

Not Required as NIT document can be downloaded from SECI's website

Appendix 12(a): Format of Bank Guarantee for Bid Bond

(BANK GUARANTEE ON NON-JUDICIAL STAMP PAPER OF Rs.100)

(To be on non-judicial stamp paper of appropriate value as per Stamp Act relevant to place of execution.)

Ref._____Bank Guarantee No._____Date:_____

BID BOND BANK GUARANTEE FORMAT FOR TENDER /NIT No.

In consideration of the ----------[Insert name of the Bidder] (hereinafter referred to as 'Bidder') submitting the response to NIT inter alia for Engineering, Procurement, Construction, Commissioning, Operation and Maintenance of 10MW AC Solar Photovoltaic Grid Interactive Power Plant using Photovoltaic at Village Badi Sid, Tehsil Baap, District Jodhpur in the State of Rajasthan, in response to the NIT No._____dated ____ issued by SECI (hereinafter referred to as SECI) and SECI considering such response to the NIT of ……[insert the name of the Bidder] as per the terms of the NIT, the _____ [insert name & address of bank] hereby agrees unequivocally, irrevocably and unconditionally to pay to SECI at [Insert Name of the Place from the address of SECI] forthwith on demand in writing from SECI or any Officer authorized by it in this behalf, any amount upto and not exceeding Rupees ----------*[Insert amount as per Clause 1.2.3 of Section II: ITB*] only, on behalf of M/s. _____[*Insert name of the Bidder*] .

This guarantee shall be valid and binding on this Bank up to and including _____[insert date of validity in accordance with *Clause 1.2.3 of Section II: ITB* of this NIT] and shall not be terminable by notice or any change in the constitution of the Bank or the term of contract or by any other reasons whatsoever and our liability hereunder shall not be impaired or discharged by any extension of time or variations or alternations made, given, or agreed with or without our knowledge or consent, by or between parties to the respective agreement.

Our liability under this Guarantee is restricted to Rs._____ (Rs. _____ only). Our Guarantee shall remain in force until _____ [insert date of validity in accordance with *Clause 1.2.3 of Section II: ITB* of this NIT].

SECI shall be entitled to invoke this Guarantee till _____ [Insert date which is 30 days after the date in the preceding sentence].

The Guarantor Bank hereby agrees and acknowledges that the SECI shall have a right to invoke this BANK GUARANTEE in part or in full, as it may deem fit.

The Guarantor Bank hereby expressly agrees that it shall not require any proof in addition to the written demand by SECI, made in any format, raised at the above mentioned address of the Guarantor Bank, in order to make the said payment to SECI.

The Guarantor Bank shall make payment hereunder on first demand without restriction or conditions and notwithstanding any objection by ---------- [Insert name of the selected Contractor] and/or any other person. The Guarantor Bank shall not require SECI to justify the invocation of this BANK GUARANTEE, nor shall the Guarantor Bank have any recourse against SECI in respect of any payment made hereunder

This BANK GUARANTEE shall be interpreted in accordance with the laws of India and the courts at Delhi shall have exclusive jurisdiction.

The Guarantor Bank represents that this BANK GUARANTEE has been established in such form and with such content that it is fully enforceable in accordance with its terms as against the Guarantor Bank in the manner provided herein.

This BANK GUARANTEE shall not be affected in any manner by reason of merger, amalgamation, restructuring or any other change in the constitution of the Guarantor Bank.

This BANK GUARANTEE shall be a primary obligation of the Guarantor Bank and accordingly SECI shall not be obliged before enforcing this BANK GUARANTEE to take any action in any court or arbitral proceedings against the selected Contractor , to make any claim against or any demand on the selected Contractor or to give any notice to the selected Contractor or to enforce any security held by SECI or to exercise, levy or enforce any distress, diligence or other process against the selected Contractor.

The Guarantor Bank acknowledges that this BANK GUARANTEE is not personal to SECI and may be assigned, in whole or in part, (whether absolutely or by way of security) by SECI to any entity to whom SECI is entitled to assign its rights and obligations.

Notwithstanding anything contained hereinabove, our liability under this Guarantee is restricted to Rs. _____ (Rs. _____ only) and it shall remain in force until …….. We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if SECI serves upon us a written claim or demand.

INSTRUCTIONS FOR FURNISHING BANK GUARANTEE

- The Bank Guarantee by Bidders will be given on non-judicial stamp paper as per stamp duty applicable at the place where the tender has emanated. The non-judicial stamp paper should be in name of the issuing bank.
- The Bank Guarantee by Bidder will be given from bank as per Schedule 1: List of Banks only.
- This bank guarantee/ all further communication relating to the bank guarantee should be forwarded to Senior Manager (PV), Solar Energy Corporation of India, 1st Floor, A Wing, Religare Building, D-3, District Centre, Saket, New Delhi – 110017 only.
- The full address along with the Telex/Fax No. and email address of the issuing bank to be mentioned.
- The Bank Guarantee Checklist provided in Appendix 12(d): Bank Guarantee Verification, duly filled in, should be enclosed with The Bank Guarantee.

Appendix 12(b): Format for Performance Bank Guarantee

(**Note**: Total Performance Guarantee is to be submitted in 3 Nos. of Bank Guarantee in the ratio of 20%, 40%, 40%)

[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]

Reference No. ……. Bank Guarantee No. …….. Dated: ……. (On stamp paper of Rs.100/-)

In consideration of the ----- [*Insert name of the Bidder*] (hereinafter referred to as 'Contractor') submitting the response to NIT inter alia for Engineering, Procurement, Construction, Commissioning, Operation and Maintenance of 10 MW AC Solar Photovoltaic Grid Interactive Power Plant using Photovoltaic at Village Badi Sid, Tehsil Baap, District Jodhpur in the State of Rajasthan, in response to the NIT dated…… issued by SECI (hereinafter referred to as SECI) and SECI considering such response to the NIT of ……[*insert the name of the Contractor*] (which expression shall unless repugnant to the context or meaning thereof include its executers, administrators, successors and assignees) and selecting the Contractor and issuing Letter of Intent No ------- to (*Insert Name of Contractor*) as per terms of NIT and the same having been accepted by the Contractor. As per the terms of the NIT, the _____ [*insert name & address of bank*] hereby agrees unequivocally, irrevocably and unconditionally to pay to SECI at [*Insert Name of the Place from the address of SECI*] forthwith on demand in writing from SECI or any Officer authorised by it in this behalf, any amount upto and not exceeding Rupees----------*[Insert amount as per Clause 1.2.3 of Section II: ITB*] only, on behalf of M/s _____ *[Insert name of the Contractor*] This guarantee shall be valid and binding on this Bank up to and including_____[*insert date of validity in accordance with Clause 1.2.3 of Section II: ITB of this NIT*] and shall not be terminable by notice or any change in the constitution of the Bank or the term of contract or by any other reasons whatsoever and our liability hereunder shall not be impaired or discharged by any extension of time or variations or alternations made, given, or agreed with or without our knowledge or consent, by or between parties to the respective agreement.

Our liability under this Guarantee is restricted to Rs. _____ (Rs. _____only).

Our Guarantee shall remain in force until ……..[*insert date of validity in accordance with Clause 1.2.3 of Section II: ITB*]. SECI shall be entitled to invoke this Guarantee till ……. until [*Insert date which is 30 days after the date in the preceding sentence*].

The Guarantor Bank hereby agrees and acknowledges that SECI shall have a right to invoke this BANK GUARANTEE in part or in full, as it may deem fit.

The Guarantor Bank hereby expressly agrees that it shall not require any proof in addition to the written demand by SECI, made in any format, raised at the above mentioned address of the Guarantor Bank, in order to make the said payment to SECI.

The Guarantor Bank shall make payment hereunder on first demand without restriction or conditions and notwithstanding any objection by ---------- [*Insert name of the Contractor*] and/or any other person. The Guarantor Bank shall not require SECI to justify the invocation of this BANK GUARANTEE, nor shall the Guarantor Bank have any recourse against SECI in respect of any payment made hereunder

This BANK GUARANTEE shall be interpreted in accordance with the laws of India and the courts at Delhi shall have exclusive jurisdiction.

The Guarantor Bank represents that this BANK GUARANTEE has been established in such form and with such content that it is fully enforceable in accordance with its terms as against the Guarantor Bank in the manner provided herein.

This BANK GUARANTEE shall not be affected in any manner by reason of merger, amalgamation, restructuring or any other change in the constitution of the Guarantor Bank.

This BANK GUARANTEE shall be a primary obligation of the Guarantor Bank and accordingly SECI shall not be obliged before enforcing this BANK GUARANTEE to take any action in any court or arbitral proceedings against the selected Contractor , to make any claim against or any demand on the selected Contractor or to give any notice to the selected Contractor or to enforce any security held by SECI or to exercise, levy or enforce any distress, diligence or other process against the selected Contractor.

The Guarantor Bank acknowledges that this BANK GUARANTEE is not personal to SECI and may be assigned, in whole or in part, (whether absolutely or by way of security) by SECI to any entity to whom SECI is entitled to assign its rights and obligations.

Notwithstanding anything contained hereinabove, our liability under this Guarantee is restricted to Rs. _____ (Rs. _____ only) and it shall remain in force until

…….. We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if SECI serves upon us a written claim or demand.

Signature _____

Name_____

Power of Attorney No._____

For

_____[Insert Name of the Bank]__

Banker's Stamp and Full Address.

Dated this ____ day of ____, 20__

Witness:

1. …….

Signature

Name and Address

2. ……..

Signature

Name and Address

INSTRUCTIONS FOR FURNISHING PERFORMANCE BANK GUARANTEE

- The Bank Guarantee by Bidders will be given on non-judicial stamp paper as per stamp duty applicable at the place where the tender has emanated. The non-judicial stamp paper should be in name of the issuing bank.
- The Bank Guarantee by Bidder will be given from bank as per Schedule 1: List of Banks only.
- This bank guarantee/ all further communication relating to the bank guarantee should be forwarded to Senior Manager (PV), Solar Energy Corporation of India, 1st Floor, A Wing, Religare Building, D-3, District Centre, Saket, New Delhi – 110017 only. The full address along with the Telex/Fax No. and email address of the issuing bank to be mentioned.
- The Bank Guarantee Checklist provided in Appendix 12(d): Bank Guarantee Verification, duly filled in, should be enclosed with The Bank Guarantee.

Appendix12(c): Format of Bank Guarantee for Performance of O&M

[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]

Reference No. ……. Bank Guarantee No. ……. Dated: ……. To:

WHEREAS ……. *[Insert name of the Contractor]* with address ……. *[Insert address of the Contractor]* having its registered office at ……. *[Insert address of the Contractor]* (hereinafter, the "Bidder") wishes to participate in NIT document No. _____ issued by SECI ("SECI") (hereinafter, the "Beneficiary") for Operation and Management of Performance of Solar Power Project.

And WHEREAS a Bank Guarantee for Rupees *[…….]* valid till ……. *[Insert date 5 years from the date of Final Acceptance]* is required to be submitted by the Contractor as per the terms and conditions of the NIT.

We, …….[Insert name of the Bank and address of the Branch giving the Bank Guarantee] having our registered office at ……. [Insert address of the registered office of the Bank] hereby give this Bank Guarantee No. ……. [Insert Bank Guarantee number] dated ……. [Insert the date of the Bank Guarantee], and hereby agree unequivocally and unconditionally to pay immediately on demand in writing from the Beneficiary any officer authorized by it in this behalf any amount not exceeding Rupees […….] to the said Beneficiary on behalf of the Bidder.

We ……. *[Insert name of the Bank]* also agree that withdrawal of the Bid or part thereof by the Bidder within its validity or non-submission of further O&M Performance Bank Guarantee by the Bidder within the stipulated time of the Letter of Intent to the Bidder or any violation to the relevant terms stipulated in the NIT would constitute a default on the part of the Bidder and that this Bank Guarantee is liable to be invoked and encashed within its validity by the Beneficiary in case of any occurrence of a default on the part of the Bidder and that the encashed amount is liable to be forfeited by the Beneficiary.

This agreement shall be valid and binding on this Bank up to and inclusive of ……. *[Insert the date of validity of the Bank]* and shall not be terminable by notice or by Guarantor change in the constitution of the Bank or the firm of the Bidder Or by any reason whatsoever and our liability hereunder shall not be impaired or discharged by any extension of time or variations or alternations made, given, conceded with or without our knowledge or consent by or between the Bidder and the Beneficiary.

NOTWITHSTANDING anything contained hereinbefore, our liability under this guarantee is restricted to Rupees ……..(*Insert the Amount*). Our Guarantee shall remain in force till ……. *[Insert date]*. Unless demands or claims under this Bank Guarantee are made to us in writing on or before ……. *[Insert date]*, all rights of the Beneficiary under this Bank Guarantee shall be forfeited and we shall be released and discharged from all liabilities there under.

[Insert the address of the Bank with complete postal branch code, telephone and fax numbers, and official round seal of the Bank]	[Insert signature of the Bank's Authorized Signatory]

Attested:

……. [Signature] (Notary Public)

Place: ……. Date: …….

INSTRUCTIONS FOR FURNISHING BANK GUARANTEE

- The Bank Guarantee by Bidders will be given on non-judicial stamp paper as per stamp duty applicable at the place where the tender has emanated. The non-judicial stamp paper should be in name of the issuing bank.
- The Bank Guarantee by Bidder will be given from bank as per Schedule 1: List of Banks only.
- This bank guarantee/ all further communication relating to the bank guarantee should be forwarded to Senior Manager (PV), Solar Energy Corporation of India, 1st Floor, A Wing, Religare Building, D-3, District Centre, Saket, New Delhi – 110017 only.
- The full address along with the Telex/Fax No. and email address of the issuing bank to be mentioned.
- The Bank Guarantee Checklist provided in Appendix 12(d): Bank Guarantee Verification, duly filled in, should be enclosed with The Bank Guarantee.

Appendix12 (d): Bank Guarantee Verification

CHECKLIST			Yes	No
I.		Does the bank guarantee Compare verbatim with Standard SECI Performa for BG	☐	☐
II.	a)	Has the executing Officer Of BG indicated his name Designation & power of Attorney No./signing power Number etc. on BG.	☐	☐
	b)	Is each page of BG duly signed/initialled by the executant, and last page is signed will full particulars and under the seal of the Bank.	☐	☐
	c)	Does the last page of the BG carry the signatures of two witnesses alongside the signatures of the executing Bank Manager.	☐	☐
III.	a)	Is the BG on non-judicial stamp Paper of appropriate value.	☐	☐
	b)	Is the date of sale of non- judicial stamp paper shown on the BG and the stamp paper is issued not more than six months prior to the date of execution of BG.	☐	☐
IV.	a)	Are the factual details such As Bid Specification No., LOI No., contract price, Etc. correct.	☐	☐
	b)	Whether overwriting/cutting of any on the BG authenticated under signature & seal of executant.	☐	☐
V.		Is the amount and validity of BG in line with terms of the NIT.	☐	☐
VI.	a)	Is the Bank Guarantee Issued from a Bank's Branch located outside	☐	☐

	b)	If the response to VI. a) above is yes, has the Bank Guarantee been routed through the correspondent branch in India for due verification of the signature(s) of the executant(s)?	☐	☐
VII.		Whether the BG has been issued by a Bank as per relevant provisions of the bidding documents.	☐	☐

Note: Bidder / Contractor / Associate / Collaborator is required to fill up this from and enclose along with the Bank Guarantee.

Appendix 13: Terms of Payment

In accordance with the provisions of Clause 14 of SCC: Terms of Payment.

Appendix 14: Contract Agreement

This agreement is made at New Delhi, the ----------day of ----------in the 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 SECI having their Head Office at 1st Floor, A Wing, Religare Building, D-3, District Centre, Saket, New Delhi – 110017 only. (hereinafter called "SECI" which expression shall unless excluded by or repugnant to the context include its successors or assigns) of the other part.

WHEREAS the aforesaid SECI has accepted the tender of the aforesaid Contractor for ---------- ---------- as per SECI's LOI No.---------- ----------hereinafter called "**the Works**" and more particularly described enumerated or referred to in the specification, terms and conditions prescribed in the LOI which for the purpose of identification have been signed by ---------- on behalf of the Contractor and by ---------- ----------on behalf of SECI 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 SECI has accepted the tender of the Contractor for the said works for the sum of Rs.----------(Rupees:----------) upon the terms and subject to the conditions herein mentioned.

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

(a) The Contractor shall do and perform all works and things in this contract mentioned and described or which are implied therein or therefrom respectively or are reasonably necessary for the completion of the works as mentioned and at the times, in the manner and subject to the terms, conditions and stipulations contained in this contract, and in consideration of the due provision,

executions, construction and completion of the works agreed to by the contractor as aforesaid, SECI doth hereby covenant with the Contractor to pay all the sums of money as and when they become due and payable to the Contractor under the provisions of the contract. Such payments to be made at such times and in such manner as is provided by the contract.

(b) The conditions and covenants stipulated herein before in this contract are subject to and without prejudice to the rights of the SECI to enforce penalty for delays and / or any other rights whatsoever including the right to reject and cancel on default or breach by the Contractor of the conditions and the covenants as stipulated in the general conditions, specifications, forms, or tender schedule, drawing, etc., attached with SECI's LOI 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.____ [*Inset Name of Contractor*]

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 SECI, 1st Floor, A Wing, Religare Building, D-3, District Centre, Saket, New Delhi – 110017.

In the presence of Name, Full Address & Signature:

i) ----------

ii) ----------

POWER OF ATTORNEY

(To be executed on non-judicial stamp paper of appropriate value as per Stamp Act relevant to place of execution.)

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, Commissioning, Operation and Maintenance of 10MW AC Solar Photovoltaic Grid Interactive Power Plant using Photovoltaic at ----------, pursuant to the NIT document no. _____issued by SECI ("SECI"),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 SECI.

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 favor of the person executing this Power of Attorney for the delegation of power hereunder on behalf o f 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 Appostille certificate.

Appendix 16: Indemnity Bond to be executed by The Contractor for The Removal / Disposal of Scrap/Disposal of Surplus Material

(TO BE EXECUTED ON STAMP PAPER OF APPROPRIATE VALUE)

INDEMNITY BOND

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

IN FAVOUR OF

SECI, a Government of India Enterprise, having its registered office at SECI, 1st Floor, A Wing, Religare Building, D-3, District Centre, Saket, New Delhi – 110017 (hereinafter referred to as "SECI") .

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

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

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

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

NOW THEREFORE THIS INDEMNITY BOND WITNESSETH AS UNDER:

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

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

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

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

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

……(Name of the Place)……

Witness:

Indemnifier

1. .....
2. .....

(Authorised Signatory)

Appendix 17: Indemnity Bond to be executed by the contractor for the plant handed over by SECI for Performance of its O&M Contract (Entire Solar Photo Voltaic Plant)

(On non-judical stamp paper of appropriate value) INDEMNITY BOND

THIS INDEMNITY BOND IS made this ..... day of ..... 20..... by ..... a Company registered under the Companies Act, 1956/Partnership Firm/Proprietory concern having its Registered Office at..... ..... (hereinafter called as "Contractor" or "Obligor" which expression shall include its successors and permitted assigns) in favour of SECI, a Company incorporated under the Companies Act, 1956 having its Registered Office at 1st Floor, A Wing, Religare Building, D-3, District Centre, Saket, New Delhi – 110017 and its Project at .....(hereinafter called "SECI" which expression shall include its successors and assigns) :

WHEREAS SECI has awarded to the Contractor a Contract for ..... vide its Letter of Intent/Award Letter/Contract No..... dated and its Amendment No..... (applicable when amendments have been issued) (hereinafter called the "Contract") in terms of which SECI is required to hand over various Equipment and facilities provided under Supply Contract, Erection Contract, herein after called "Solar Photo Voltaic Plant" to the Contractor for execution of the Contract.

AND WHEREAS by virtue of Clause No. 27.3 of Section III:GCC of the said Contract, the Contractor is required to execute an Indemnity Bond in favour of SECI for the Solar Photo Voltaic Plant handed over to it by SECI for the purpose of Performance of the Contract/O&M portion of the Contract.

NOW, THEREFORE, this Indemnify Bond witnesseth as follows :

1. That in consideration of Solar Photo Voltaic Plant as mentioned in the Contract, Valued at Rs.....#..... (Rupees.....) handed over to the Contractor for the purpose of Performance of the Contract, the Contractor hereby undertakes to indemnify and shall keep SECI indemnified, for the full value of the Solar Photo Voltaic Plant. The

Contractor hereby acknowledges actual receipt of the Solar Photo Voltaic Plant as detailed in the Schedule appended hereto. The Contractor shall hold such Solar Photo Voltaic Plant in trust as a "Trustee" for and on behalf of SECI.

2. That the Contractor is obliged and shall remain absolutely responsible for the safe O&M/protection and custody of the Solar Photo Voltaic Project against all risks whatsoever till completion of O&M Contract in accordance with the terms of the Contract and is taken over by SECI. The Contractor undertakes to keep SECI harmless against any loss or damage that may be caused to the Solar Photo Voltaic Plant.

3. The Contractor undertakes that the Solar Photo Voltaic Plant shall be used exclusively for the Performance/execution of the Contract strictly in accordance with its terms and conditions and no part of the Solar Photo Voltaic Plant shall be utilised for any other work or purpose whatsoever. It is clearly understood by the Contractor that no-observance of the obligations under this Indemnify Bond by the Contractor shall inter-alia constitute a criminal breach of trust on the part of the Contractor for all intents and purposes including legal/penal consequences.

4. That SECI is and shall remain the exclusive owner of the Solar Photo Voltaic Plant free from all encumbrances, charges or liens of any kind, whatsoever. The Solar Photo Voltaic Plant shall at all times be open to inspection and checking by Engineer-in-Charge/Engineer or other employees/agents authorised by him in this regard. Further, SECI shall always be free at all times to take possession of the Solar Photo Voltaic Plant in whatever form the Solar Photo Voltaic Plant may be, if in its opinion, the Solar Photo Voltaic Plant are likely to be endangered, mis-utilised or converted to uses other than those specified in the Contract, by any acts of omission of commission on the part of the Contractor or any other person or on account of any reason whatsoever and the Contractor binds itself and undertakes to comply with the directions of demand of SECI to return the Solar Photo Voltaic Plant without any demur or reservation.

5. That this Indemnify Bond is irrevocable. If at any time any loss or damage occurs to the Solar Photo Voltaic Plant or the same or any part thereof is mis- utilised in any manner whatsoever, then the Contractor hereby agrees that the decision of the Engineer-in-Charge/Engineer of SECI as to assessment of loss or damage to the Solar Photo Voltaic Plant shall be final and binding on the Contractor. The Contractor binds itself and undertakes to replace the lost and/or damaged Solar Photo Voltaic Plant at its own cost and / or shall pay the amount of loss to SECI without any demur, reservation or protest. This

is without prejudice to any other right or remedy that may be available to SECI against the Contractor under the Contract and under this Indemnify Bond.

6. NOW THE CONDITION of this Bond is that if the Contractor shall duly and punctually comply with the terms of and conditions of this Bond to the satisfaction of SECI, THEN, the above Bond shall be void, but otherwise, it shall remain in full force and virtue.

IN WITNESS WHEREOF, the Contractor has hereunto set its hand through its authorised representative under the common seal of the Company, the day, month and year first above mentioned

SCHEDULE

Particulars of the Equipment / Facilities handed-over	Quantity	Value	Other details, (if any)	Signature of Attorney in token of receipt

WITNESS

For and on behalf of

M/s. .....

I. 1. Signature ---------- Name ----------

2. Name ---------- Signature ----------

3. Address ---------- Designation ----------

Authorised representative*

II. 1. Signature ----------

2. Name ---------- Common Seal

(In case of Company)

3. Address ----------

* Indemnity Bonds are to be executed by the authorised persons and (i) In case of contracting Company under common seal of the Company of (ii) having the power of attorney issued under common seal of the company with authority to execute Indemnity Bonds, (iii) In case (ii) the original Power of Attorney if it is specifically for our contract or a Photostat copy of the Power of Attorney if it is a General Power of Attorney and such documents should be attached to Indemnity Bond.

The value shall be sum of Supply and Erection Contract value.

Appendix 18: Format of Bank Guarantee for Mobilization Advance

[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]

Reference No. ……. Bank Guarantee No. ……. Dated: …….

To:

WHEREAS SECI has issued LOI No……. for "……." (hereinafter called "the Contractor"), having its registered office at ……..

AND WHEREAS vide Clause 12.2 of Section III: General Conditions of Contract, Mobilization Advance up to 10% (10 percent) of the original contract value of Rs…….. is payable to the Contractor against Bank Guarantees, the Contractor hereby applies for Mobilization Advance of --% (--- percent) amounting to Rs……../- (Rupees……..) of the Contract Price, Now, we the undersigned, Bank of ……., being fully authorized to sign and to incur obligations for and on behalf of and in the name of Bank of ……..hereby declare that the said Bank will guarantee the Employer the full amount of Rs. ……../- (Rupees……..) as stated above. We, ……[Insert Name of Bank], do hereby unconditionally, irrevocably and without demur guarantee and undertake to pay the Employer immediately on demand any or all money payable by the Contractor to the extent of Rs. ……../- (Rupees……..) without any demur, reservation, context, recourse or protest and/or without any reference to the Contractor. Any such demand made by the Employer on the Bank shall be conclusive and binding notwithstanding any difference between the Employer and the Contractor on any dispute pending before any court, Tribunal, Arbitrator or any other authority. We agree that the guarantee herein contained shall be irrevocable and shall continue to be enforceable till the Employer discharges this guarantee. This guarantee is valid till ……..[*insert date of validity in accordance with Clause 1.2.3 of Section II: ITB*] At any time during the period in which this guarantee still valid of the Contractor fails to fulfil its obligation under the Contract, it is understood that the Bank will extend this guarantee under the same condition for the required time on demand by the Employer at the cost of the Contractor. The Guarantee hereinbefore contained shall not be affected by any change in the constitution of the Bank or of the Contractor. The neglect or forbearance of the Employer in enforcement of payment of any money, the payment whereof is intended to be hereby secured

or the giving of time by the Employer for the payment hereof shall in no way relieve the Bank of their liability under this Deed. The expressions "the Employer", "the Bank" and "the Contractor" hereinbefore used shall include their respective successors and assigns. Notwithstanding anything contained herein: Our liability under this Bank Guarantee shall not exceed Rs……./- (Rupees…….) this bank Guarantee shall be valid up to……..[*insert date of validity in accordance with Clause 1.2.3 of Section II: ITB*] We are liable to pay the guaranteed 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 ……(date of expiry of Guarantee). In witness whereof we of the Bank have signed and sealed this Guarantee on the ……day of …….. being herewith duly authorized.

For

_____[Insert Name of the Bank]__

Banker's Stamp and Full Address.

Dated this ____ day of ____, 20__

Witness:

1. ……..

Signature

Name and Address

2. ……..

Signature

Name and Address

INSTRUCTIONS FOR FURNISHING PERFORMANCE BANK GUARANTEE

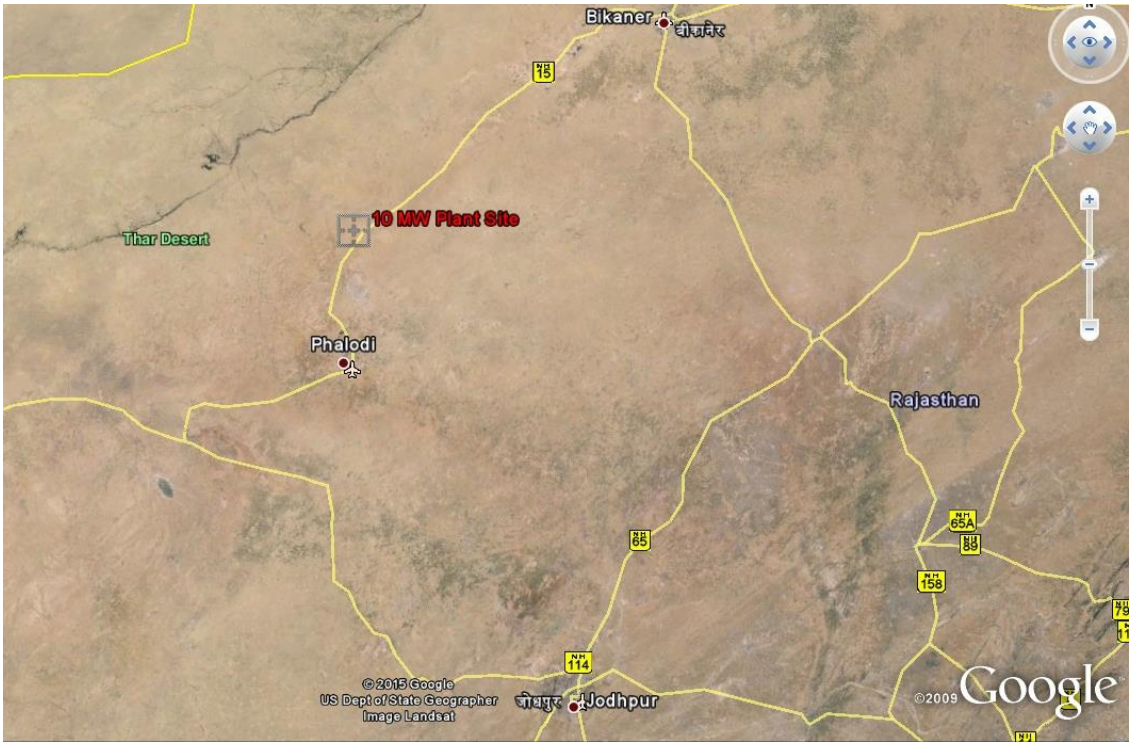
- The Bank Guarantee by Bidders will be given on non-judicial stamp paper as per stamp duty applicable at the place where the tender has emanated. The non-judicial stamp paper should be in name of the issuing bank.
- The Bank Guarantee by Bidder will be given from bank as per Schedule 1: List of Banks only.
- This bank guarantee/ all further communication relating to the bank guarantee should be forwarded to Senior Manager (PV), 1st Floor, A Wing, Religare Building, D-3, District Centre, Saket, New Delhi – 110017.
- The full address along with the Telex/Fax No. and email address of the issuing bank to be mentioned.

- The Bank Guarantee Checklist provided in Appendix 12(d): Bank Guarantee Verification, duly filled in, should be enclosed with The Bank Guarantee.

Annexure 1: Details of Site

1. **Site Location:**
   i. The proposed power project shall be located at village Badi Sid, Tehsil-Bap, District Jodhpur in the State of Rajasthan.
   ii. The site is located at Latitude 27°4'N and Longitude 72 ° 3 E.
   iii. The nearest urban area from the site is Bikaner at a distance of 135 km and jodhpur at a distance of approx. 155 km
   iv. Located approx.405 KM from State capital Jaipur, Badi Sid is surrounded by Phalodi Tehsil towards South , Kolayat Tehsil towards East , Osian Tehsil towards South , Sankra Tehsil towards west.
   v. Siana , Nokha , Bikaner , Nagaur are the nearby Cities to Badi Sid

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



i. By Train

Bap Rail Way Station are the very nearby railway stations to Badi Sid. However Bikaner Railway Station is major railway station approx. 132 km from Badi Sid, Phalodi Jn- 30km.

ii. By Air:

The nearest international airport from the site is at Jodhpur, which is at a distance of about 158 km from the site.

3. **Land**

i. The project site is rectangular in shape with total area of approx. 32 hectares (approx. 80 acres).

ii. The land for the proposed Project will be acquired by SECI and access rights shall be given to the Contractor for the purpose of execution of the Contract.

iii. The preliminary topographical survey, geotechnical investigation and soil survey has to be carried out by the agency i.e the Contractor.

iv. The site for proposed project is even. The scope of works shall also include making necessary approaches and measures to minimize soiling and dusting.

v. The developer has to carry out soil investigation through Govt. Approved laboratory for designing of the civil foundations, structures, control room building, invertor building etc.