SECTION – I

INVITATION FOR BIDS (IFB)

(NIT NO. – SECI/SD/2/NIT/2016/KPL)

SOLAR ENERGY CORPORATION OF INDIA LIMITED

(A Government of India Enterprise)

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

Tel: 011 – 71989239, Fax: 011 – 71989241

DETAILED INVITATION FOR BIDS

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

NOTICE INVITING e - TENDER
(ON BEHALF OF KAMARAJAR PORT LIMITED)
FOR
DESIGN, ENGINEERING, PROCUREMENT & SUPPLY, CONSTRUCTION & ERECTION, TESTING, COMMISSIONING
AND
COMPREHENSIVE OPERATION & MAINTENANCE FOR
7 (SEVEN) YEARS OF **240 kW (AC) SOLAR PV PLANT** AT KAMARAJAR PORT LIMITED, ENNORE, DISTRICT – CHENNAI,
TAMIL NADU
(DOMESTIC COMPETITIVE BIDDING)

NIT No.: SECI/SD/2/NIT/2016/KPL Date: 15.09.2016

1 Project Overview:

Solar Energy Corporation of India Limited (SECI) on behalf of Kamarajar Port Limited (KPL) (hereinafter called as "Employer") invites online bids from eligible bidders on Single stage – Two envelop bid system in the prescribed forms and formats, for setting up of 240kW (minimum 264 kWp DC)) Solar Photovoltaic Plant at Kamarajar Port Limited, Ennore District – Chennai, State of Tamil Nadu, India, on turnkey basis and thereafter comprehensive Operation & Maintenance for 7 years of the Plant, as per the Scope of Work mentioned hereinafter.

N.B.: Please see the Annexure 1: Site Details for procurement specific data for project site.

2 Brief Scope of work

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

2.1 Design, Engineering, Procurement & Supply, Packing & Forwarding, Transportation, Unloading, Storage at site, Site development, Construction, Erection & Installation of equipment, Testing & commissioning along with associated transmission system at 11 kV voltage level up to 11 kV substation at KPL administrative building and comprehensive O&M for 7 (Seven) years thereafter of the said Plant Facilities at Kamarajar Port Limited (KPL), Ennore, Chennai in the state of Tamil Nadu. The selected bidder has to demonstrate assured performance of the Plant as specified in the bidding documents.

2.2 Design, Procurement & Supply and erection of the following, in all respect:

2.2.1 Solar panels including module mounting structures and fasteners

2.2.2 All power conditioning systems including junction boxes, Inverters/ PCU, DC and AC

circuit breaker(s).

2.2.3 Supply and erection of weather monitoring station including solar radiation sensors

2.2.4 All associated electrical works and equipment required for interfacing at 11kV through underground cable (i.e. including but not limited to transformer(s) – power and auxiliary, breakers, isolators, lightning arrestor(s), LT/ HT/ other panels, protection system, cables, metering at 11kV level, earthing of transformers etc.) as per technical specifications.

2.2.5 Design, supply, erection, testing & commissioning of 11kV underground Cabling (approx. 200m) and associated switchgear equipment, transformer and metering equipment for connecting into nearest Substation (see Annexure 1: Site Details), as per technical specification and state regulations.

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

2.2.7 Install and setup a communication infrastructure to provide telemetry data to the Chennai state load despatch centre (SLDC) in compliance to CERC/ SERC norms/ specifications.

2.3 All associated civil works, including design and Engineering, for:

2.3.1 Construction of module mounting structure foundations, transformer and other power equipment foundations, cable trenches for cable routing and earthing pits.

2.3.2 Construction of perimeter fencing for the complete land area provided for Solar PV (SPV) Project with security gate (s)

2.3.3 Construction of Equipment room, battery room and Office cum Control room including store, pantry, toilet etc.

2.3.4 Arrangement of permanent water supply infrastructure for module washing and daily usage including storage (as applicable).

2.3.5 Construction of Storm water drainage & sewage network

2.3.6 Construction of a road network within plant for easy access to main locations.

2.4 Setting up of a comprehensive Fire detection and Protection system

2.5 Supply of mandatory spares.

2.6 Demonstration of performance of the plant as per the requirement specified in the bidding documents.

2.7 Comprehensive operation & maintenance of the Plant Facilities for 7 (Seven) years after successful commissioning and performance demonstration, as detailed in technical specification including supply and storage of all spare parts, consumables, repairs/ replacement of any defective equipment etc.

2.8 Obtaining all associated statutory and regulatory compliances and approvals for successful construction, commissioning and operation of plant. This shall include all necessary connectivity approval for parallel operation of the Plant from TANGEDCO. The bidder should

coordinate with TANGEDCO to get the same. Statutory payments, if any, made to TANGEDCO on this account only, shall be payable by the bidder, and the same shall be reimbursed by KPL on production of documentary evidence.

2.9 The **detailed scope of work** is given in Section V: Technical specifications of this bidding documents.

3 Bid Information:

3.1 The bidding documents which include detailed scope of work, Instruction to bidders, Specifications, Terms & conditions, formats etc., can be downloaded from www.tcil-india-electronictender.com. **No hard copies of bidding documents shall be issued for this NIT.**

3.2 Brief details of the NIT are as follows**:**

IFB Document No.	:	SECI/SD/2/NIT/2016/KPL
Document available for download	:	From 15.09.2016 2000hrs (IST) To 31.10.2016 1400 hrs (IST)
Last Date & Time of Bid Receipt	:	Up to 31.10.2016 1430 hrs (IST)
Bid Opening Date & Time	:	31.10.2016 at 1530 hrs (IST)
Bid processing Fees	:	1,00,000/- (Rupees one Lac only) per set + Service Tax, as applicable

3.3 All bids must be accompanied by

3.3.1 A **Bid Security of INR 2,50,000/-** [Rupees Two Lakhs Fifty Thousand only] in the form as stipulated in the Bidding Documents.

3.3.2 Bid processing fee as per 3.2 above in form of DD drawn in favour of "**Solar Energy Corporation of India Limited**" payable at **New Delhi.**

ANY ONLINE BID NOT ACCOMPANIED OFFLINE BY AN ACCEPTABLE BID SECURITY AND BID PROCESSING FEES IN A SEPARATE SEALED ENVELOPE SHALL BE REJECTED BY THE EMPLOYER/ AUTHORIZED REPRESENTATIVE AS BEING NON – RESPONSIVE AND ALL OFFLINE PAPERS RETURNED TO THE BIDDERS WITHOUT ITS ONLINE BID BEING OPENED.

4 Qualifying Requirements (QR) for Bidders:

Bidder shall meet the qualifying requirement stipulated hereunder:

4.1 General

4.1.1 The Bidder should be 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.

4.1.2 Any domestic bidder, as per IFB Clause 4.1.1, having their installations in India and abroad are allowed to bid.

4.2 **Technical Eligibility Criteria:**

4.2.1 The bidder should have designed, supplied, erected and commissioned Solar Photo Voltaic (SPV) based grid connected power plant(s) of cumulative installed capacity of 125 kWp or above, out of which at least one plant should have been of 25 kWp capacity or above. The reference plant of 25 kWp or above capacity must have been in successful operation for at least six months (6 months) prior to the date of techno-commercial bid opening as per Appendix 16.

4.2.2 If the bidder is incorporating projects under roof top, then the projects of more than 25 kWp installed at same location shall only be considered.

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 letter confirming satisfactory performance of the plant since last one year from the Employer/client before the date of techno commercial bid opening.

4.2.4 In case of bidders qualifying under IFB Clause 4.1.2, the experience of domestic bidder with grid connected installations outside India can also be considered for cumulative installation eligibility only.

4.3 **Financial Eligibility Criteria:**

4.3.1 The average annual turnover of the Bidder in the preceding three (3) financial years as on the date of Technical bid opening, shall not be less than **INR 50 lakhs** (Indian Rupees Fifty Lakhs only) or in equivalent foreign currency (Bills Clearing (B.C.) Selling Market Rate of Exchange (MRE) of the foreign currency as established by State Bank of India, prevalent as on 30 days prior to the date set for bid opening).

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 CA certificates for the purpose of verification.

4.3.4 The Net Worth of the Bidder as on the last day of the preceding financial year should be positive and should not be less than paid up share capital. However, in case, the bidder is subsidiary of a holding company, the net worth of the bidder as on the last day of the preceding financial year shall not be less than 75% of total paid-up share capital and in such case, bidder has to submit a board resolution/comfort letter from CEO of the holding company indicating that "holding company shall support the bidder financially or otherwise, to execute the project successfully". Also, the Net Worth of the Holding Company of the Bidder, as on the last day of the preceding financial year shall not be less than total 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 for substantiation of its qualification:

- õ Copies of the unaudited unconsolidated financial statements of the bidder along with copies of the audited consolidated financial statements of the Holding Company.
- õ 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 Employer reserves the right to reject any or all bids or cancel/ withdraw the Notice Inviting e-Tender (NIT) without assigning any reason whatsoever and in such case no bidder/ intending bidder shall have any claim arising out of such action.

Issuance of Bidding Documents to any Bidder shall not construe that such Bidder is considered to be qualified. Bids shall be submitted online along with the requisite hard copy (originals) of documents 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:	General Manager (Solar)
Address:	Solar Energy Corporation of India Limited
	Ist floor, A Wing, Religare Building
	D-3, District Centre, Saket, New Delhi – 17
Tel:	011 – 71989239
Fax:	011 – 71989241
Email:	projects@seci.gov.in

Note: Bidders are requested to keep themselves updated with the website of SECI Ltd & TCIL www.seci.gov.in **and** https://www.tcil-india-electrionictender.com **on regular basis for any Amendment / Clarification / Notification in respect to this NIT. No separate notification or information will be issued in print media or individually. Intimation regarding notification on the above shall be updated on** www.seci.gov.in, **and the details only will be available from** www.tcil-india-electronictender.com.

SECTION – II

INSTRUCTIONS TO BIDDER (ITB)

(NIT NO. – SECI/SD/2/NIT/2016/KPL)

SOLAR ENERGY CORPORATION OF INDIA LIMITED

(A Government of India Enterprise)

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

Tel: 011 – 71989239, Fax: 011 – 71989241

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1 Introduction

1.1 Company

Kamarajar Port Limited (KPL), formerly known as Ennore Port Limited, is the 12th major port of India, and the first port in India which is a public company. KPL is the only corporatised major port and is registered as a company. The Centre holds a stake of about 68 per cent in the Kamarajar Port Limited and the remaining 32 per cent is held by the Chennai Port Trust. Located on the Coromandel Coast about 24 km north of Chennai Port, Chennai, it is designed as Asia's energy port and was envisaged as a satellite port to decongest and improve the environmental quality at the bustling Chennai Port. The port, commissioned in 2001, has the capacity to handle a wide range of products from coal and iron ore to petroleum products and operates on a landlord port concept where all services required for operation and maintenance are outsourced.

Solar Energy Corporation of India Limited (SECI) is a Government of India Enterprise registered under Section-3 (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. SECI is also providing consultancy services to various organizations and has signed MoU's with various PSU's for development of solar projects as Project Management Consultant to provide turnkey solutions for establishing solar projects.

1.2 Project

1.2.1 **The grid connected Solar PV Project 240 kW (AC) is** to be set up for Kamarajar Port Limited in Tamil Nadu based on MOU signed between Indian Port Association and SECI. The Project shall be funded and owned by Kamarajar Port Limited (hereinafter called as "Employer") and SECI shall set up the Project on behalf of KPL through an EPC Contractor in the Plot allocated in the premises of Kamarajar Port Limited. The Solar Power generated from the Project shall be used by KPL as captive consumption.

1.2.2 The Project shall be located at a site (see Annexure 1: Site Details) earmarked by KPL inside Kamarajar Port Limited premises. The Bidder selected based on this NIT (hereinafter referred as "Contractor") shall execute the Project on turnkey basis. The details of the facilities to be set up by the Contractor in the present instance and for which Bids are hereby invited are described in this bidding document. The overall responsibility

of complete "Scope of Works" as mentioned in this bidding document as per the specification mentioned in the Section V: Technical Specifications (TS), and are required for successful installation, commissioning and operation of the project in all respect including those which are not mentioned explicitly in this bidding document, rests with the Bidder.

1.2.3 Online Bids are invited in the prescribed Bid Formats as defined under Section VI: Forms and Formats, for the Scope of Work described in the NIT document. Following are the details:

Item	**Description**
NIT No.	SECI/SD/2/NIT/2016/KPL
Brief description of the Project	Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning and Comprehensive Operation & Maintenance for 7 (Seven) Years of 240 kW (AC) Solar PV Plants at Kamarajar Port Limited, Ennore, District – Chennai, Tamil Nadu
Commissioning Period	Within 150 days from issue of Letter Of Intent
Last date and time for submission of Bids (Online and Physical)	31.10.2016 at 1430 hrs
Date of opening of Techno-commercial Bid (Online & Physical)	31.10.2016 at 1530 hrs at SECI Office, New Delhi
Date of opening of Price Bid (Online and Physical)	To be Intimated later
Bid validity	180 days from the date of opening of Techno-Commercial bid
Tender Processing Fees	INR 1, 00,000 + Service Tax, as applicable.
Bid Security (in form of BG only)	**INR 2,50,000** (Rupees Ten Lakh Only) in favor of "Solar Energy Corporation of India Limited" payable at New Delhi
Bid Security validity	210 days from the date of opening of Techno – Commercial Bid
Bank guarantee against Mobilization Advance, if required by the contractor,	The Contractor shall furnish within 15 days from the date of issue of Letter of Intent (LOI), an unconditional and irrevocable bank guarantee of 110% of mobilization advance to be drawn (if any), which is interest bearing, the Rate of interest being the SBI base rates prevailing on the

i. Amount ii. Validity	7th day prior to the Date of opening of Techno-commercial Bids, as per Format attached and which shall be i. For 10% respectively for supply contract, erection contract and civil works contract individually. ii. Valid for 180 days from the date of issue of LOI. Mobilization Advance shall be released separately for Supply Contract, Erection Contract and Civil Contract against Submission of requisite BANK Guarantees
Performance bank guarantee for EPC Contract and Operation & Maintenance	i. The Contractor shall furnish within 14 days from the date of issue of Letter of Intent (LOI), an unconditional and irrevocable bank guarantee for due Performance as per Format attached and which shall be for 10% of the total Contract Value (i.e., total sum of all the supply contract, erection contract and civil works contract) and shall be valid up to 90 days beyond defect liability period as mentioned in GCC. ii. The Contractor shall furnish within One (1) Month prior to the Expiry of the Performance BANK Guarantee for EPC Contract, an unconditional and irrevocable bank guarantee for due Performance as per Format attached and which shall be for 5% of the total Contract Value (i.e., total sum of all the supply contract, erection contract and civil works contract) and valid for 42 months from the date of Operational Acceptance. iii. The Contractor shall furnish within One (1) Month prior to the date of expiry of the bank guarantee mentioned at (ii) above, an unconditional and irrevocable bank guarantee for due Performance as per Format attached and which shall be for 2% of the total Contract Value (i.e., total sum of all the supply contract, erection contract and civil works contract) and valid for 42 months from the date of expiry of bank guarantee mentioned at (ii).
Address for correspondence	General Manager (Solar), Solar Energy Corporation of India Limited (SECI), Ist floor, Wing A, Religare Building, D - 3, District Centre, Saket, New Delhi – 110017 TEL: 011- 71989239 FAX: 011- 71989241 Email: projects@seci.gov.in

1.3 Local Conditions

1.3.1 The Bidder is advised to visit the Project site 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, as 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 or its authorized representatives 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 Project Site or failure to study the Bidding documents shall in no way relieve the successful Bidder from furnishing any material or performing any work in accordance with the Bidding documents.

1.3.4 The Time for Completion of the project as specified in the bidding documents shall not be extended unless otherwise agreed by the Employer or its authorized representatives.

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 Bidding documents;

(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 Bidding 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 bidding documents 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 Bid documents 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 Any data provided by the Employer to the bidder is for information only. 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 Bid documents or the Bidding Process, including any error or mistake therein or in any information or data given by the Employer. It is the bidder's responsibility, with his expertise and experience, to satisfy himself with the correctness of the data and prevailing site conditions.

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 Bidding documents 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 documents with all sections, annexures and formats form the bidding document, which is open to all prospective Bidders, requesting a proposal for implementation of the Project from the eligible bidders 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 Bidding documents.

2.1.3 Bids shall be evaluated by SECI on behalf of Kamarajar Port Limited Kamarajar Port Limited Trust, based on the information/ documents furnished in the Bids submitted by the Bidders. 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 Bid processing fees and Bid security of value as specified in the ITB Clause no. 1.2.3, in the form and manner as specified in the NIT document and originals of same must be delivered off line to SECI office before due date & time of Bid submission.

2.1.6 It is mandatory for every bidder to submit their bid online. However, the bidder must also submit all the requisite original bid documents in hard form to the address specified in IFB Clause 5 on or before the date specified at ITB Clause 1.2.3, along with the online submission of the documents. In case of any discrepancy between the online and offline submitted documents, the documents uploaded online shall prevail.

2.1.7 The specification provided with this bidding documents outlines the functional requirements. The Bidder must submit a Proposal based upon their own design, meeting the functional requirements specified in the bidding documents.

2.1.8 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.

2.1.9 The Bidder shall upload the digitally signed (by Authorized Signatory) 'Bid document along with its Amendments, Clarifications & Addendums if any' as token of acceptance along with the other prescribed documents. Bids received without the prescribed Bid document and not complying with the terms and conditions of bidding documents shall be ignored.

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

2.1.11 This is a ZERO deviation bidding document. The Bidders shall ensure compliance of all

provisions of the bid documents and submit their bid accordingly and shall submit an undertaking that they have not taken any deviations. Bids with any deviation to the bid conditions shall be liable for rejection.

2.1.12 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.

2.1.13 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 Ownership of the Contractor.

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. Bid processing fees to be submitted along with the bid shall be in the form of DD drawn in favour of "**Solar Energy Corporation of India Limited**" payable at **New Delhi**.

2.3 Understanding the Bid 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 this IFB has been attached /enclosed in appropriate envelopes. Failure to furnish relevant information and documentary evidences as stipulated in the Bid documents or submission of Bid that is not substantially responsive to the IFB document in all respects may be summarily rejected.

2.4 Clarification of bidding document

A Bidder requiring any clarification of the Bidding documents may notify the SECI in writing or by facsimile or by e-mail at the SECI contact details as indicated in this document latest by last date of submission of pre – bid query as specified in ITB Clause No. 1.2.3.

2.5 Amendment of Bidding 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 Bidding documents.

2.5.2 Any amendment, if any, will be notified on website www.seci.gov.in and www.tcil-india-electronictender.com.

2.5.3 Employer at its discretion, may extend the deadline for the submission of Bids with reasonable time, in order to allow the prospective Bidder(s) to prepare their 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)/ Board Resolution (BR), as applicable, in the prescribed Format shall be submitted along with the bid. In case of board resolution, there is no prescribed format. However, the Board resolution should clearly indicate the authorization of the person.

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, duties and levies etc except for O&M proposal. The bidder shall also provide the breakup of taxes, duties and levies etc. as per formats given under “Appendix 5: Format 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.

2.9.4 In case the bidder has mentioned the taxes, duties & other levies wrongly in the financial bid format other than the applicable, the taxes, duties & other levies mentioned by bidder will be considered for the purpose of evaluation. However, taxes, duties & other levies

shall be paid/reimbursed based on the documentary evidence submitted by the bidder subject to maximum of which has been mention by the bidder and considered during evaluation.

2.9.5 In case, any of the item/ component from the entire supplies, is imported by the bidder, then the price break up of those items shall be mentioned separately along with the applicable taxes and duties. Further, in case any concession/ exemption is desired to be availed by the bidder in accordance with the provisions of GCC Clause 8.5 and as per applicable law/ rules/ regulations, then same shall be mentioned by the bidder in their financial bid.

2.10 Bank Guarantees

2.10.1 Bidder shall be required to submit Bid Security as specified in the ITB Clause No. 1.2.3 .The Bank Guarantee (s) shall be in favour of **"Solar Energy Corporation of India Limited"** payable at New Delhi from any bank specified in the "Schedule 1: List of Banks" enclosed at SCC of this Bidding documents. The Employer shall not be liable to pay any interest on the Bid security.

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 Employer will be at liberty to encash the same. Employer shall notify the bidder in advance for submission of renewed bank guarantee.

2.10.3 A Bid submitted without the Bid processing fees and Bid security shall not be considered responsive and shall be summarily rejected.

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

2.10.5 The Bid Security 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.

2.10.6 The Employer shall, however, arrange to release the Bid Security 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 Security 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 at "Format for Performance Bank Guarantee" and after

confirmation received by Employer from the issuing bank.

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

2.10.9 The Employer shall have an unqualified discretion not to release the Bid security and forfeit the full value in case:

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

(ii) The bidder withdraws the bid after opening of bids by Employer.

(iii) In the event where the Bidder, is chosen as the Successful Bidder, fails to provide following within the specified time limit under ITB clause 1.2.3

- Unconditional acceptance of Letter of Intent (LOI) issued by Employer.
- To sign the Contract Agreement within 21 days from issuance of LOI and/or
- To furnish the Performance Bank Guarantee

(iv) Performance Bank Guarantee for O&M: The Successful Bidder has to carry out comprehensive O&M for 7 (Seven) years w.e.f. date of Operational Acceptance (i.e., after successful commissioning and performance demonstration). The Successful Bidder shall submit a Bank Guarantee at time and of amount as specified in ITB Clause No. 1.2.3 against the "O&M Performance Guarantee" and which the Contractor has to maintain for the specified period of O&M.

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 Employer or its authorised representatives, reserve the right to inspect the project components, as per project schedule to ensure compliance of the quality of Components/ material as per the specification and data sheet, before dispatch to site. Employer at its own discretion will visit the premises for inspection with prior intimation to the Contractor.

It is the responsibility of the contractor to inform Employer **at least 14 days** prior to the despatch of the major project equipment. All administrative expenses for Employer or its authorised representatives, will be borne by Employer for above inspections. However, all other expenses related to testing and inspection at manufacturer/ supplier premises or at project site shall be borne by the contractor only. In case contractor fails to show the compliance for the component under inspection as per Technical Specification & approved drawing /design & same is not approved for mass production or dispatch, in such cases Contractor shall bear the expenses towards visit of Employer's/SECI's team for subsequent visit/s for inspection of same component.

2.12 Applicability of Labour Laws

2.12.1 The Successful Bidder i.e., Contractor shall furnish valid Employee Provident Fund (EPF) code number together with supporting relevant document duly notarized by notary public to this effect within 30 days after the issuance of LOI.

2.12.2 The Contractor 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 will be 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 Security 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 Security / 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 Bid 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 Preparation and Submission of Bid

3.1 Language of the bid

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 General Terms

3.2.1 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.

3.2.2 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.

3.2.3 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 pass – phrases will be submitted in separate sealed envelope only.

3.2.4 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.

3.2.5 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.

3.2.6 The bidding document including annexures, if any, 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.

3.2.7 The Successful bidder i.e., Contractor, shall ensure submission of PF code number allotted by Regional PF Commissioner along with the Performance bank guarantees. Failure to do so is likely to result in the offer being rejected.

3.2.8 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 Employer's tender terms and conditions and scope of Works.

3.3 Format and Signing of Bid

3.3.1 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.

3.3.2 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.

3.4 Documents Comprising the Bid

Single Stage-Two Envelope Bidding procedure shall be followed through e-tendering for the subject package as under:

3.4.1 The following documents shall be submitted in the mode defined as per below:

A. Documents to be submitted Offline (in Original)

Bidding Envelope:

The bidding envelope shall contain the following sticker:

Response to NIT for	
Package of the Projects	**240 kW (AC) Grid connected Solar PV Power Plant at Kamarajar Port Limited, Tamil Nadu on Turnkey basis**
NIT Reference No.	SECI/SD/2/NIT/2016/KPL
Contents	**Covering Envelope, Pass Phrase Envelope -1 & Pass Phrase Envelope -2**
Submitted by	*(Enter Full name and address of the Bidder)*
Authorized Signatory	*(Signature of the Authorized Signatory)* *(Name of the Authorized Signatory)* *(Stamp of the Bidder)*
Bid Submitted to	**GM (Contracts And Procurement)** **Solar Energy Corporation of India Limited** **1st Floor, D-3, A-Wing, District Centre,** **Religare Building, Saket, New Delhi-110017** **Tel No. 011-71989256,** **Email – projects@seci.gov.in**

i) **Covering Envelope** must contain the following:

- Processing Fee in the form DD/Pay Order of requisite amount as mentioned in the Bid Information Sheet
- Bid Bond as mentioned in the Bank Guarantee sheet (as per Format 12(a)) for Packages quoted by the bidder.
- Bid Letter as per Format Appendix-1,
- Power of Attorney as per Appendix-15,
- Board Resolution (The certified true copy should be submitted on the letterhead of the Company, signed by the Company Secretary / Director)

ii) **Pass-Phrase Envelope-1**: Containing Pass Phrase for Technical Bid duly signed and stamped by the authorized signatory in sealed envelope

iii) **Pass-Phrase Envelope-2**: Containing Pass Phrase for Financial Bid duly signed and stamped by the authorized signatory in sealed envelope

Note:

1. The pass – phrases shall not be uploaded online.
2. Copy of Financial Proposal should not be submitted offline.

B. Documents to be submitted Online

The bidders shall strictly follow the instructions mentioned in the electronic form in respective technical bid and financial bid while filling the form. All documents of the response to NIT submitted online must be digitally signed on **www.tcil-india-electronictender.com** which should contain the following:

Note:-If the Bidder submits the Document offline as specified in Clause 3.4 A, but fails to submit online Bid then the Bid shall be considered non-responsive, However the Bid Bond shall be returned subject to request letter received from the Bidder side but the Processing fee is non-returnable.

1. "Technical Bid"

The Bidder shall upload technical bid containing the following documents, *digitally signed* by the authorized person for the project as mentioned below.

(i) All bidding documents (NIT including Blank formats, Amendment(s), Clarification(s)).

(ii) Scanned copy of Bid Security [as per format 12(a)]

(iii) Scanned copy of DD towards tender processing fees

(iv) Appendix 1: Bid Letter

(v) Appendix 2: Details of Bidder

(vi) Appendix 3: Bid Evaluation Criteria

(vii) Appendix 4: Power Plant Performance Guarantee

(viii) Appendix 6: Details of qualified technical staff for EPC and O&M separately.

(ix) Appendix 7: Declaration of Compliance

(x) Appendix 8: No Deviation Certificate

(xi) Appendix 9: Declaration on Bidder's relation to Directors

(xii) Appendix 10: Execution Timeline

(xiii) Appendix12 (e): Checklist for Bank Guarantee Verification

(xiv) Appendix 15: Power of Attorney for signing of Bid

(xv) Documents relevant to Eligibility of the bidder :

a) list of projects commissioned, commissioning certificates for reference project(s),
b) financial eligibility documents

(xvi) Technical document with all relevant enclosures as mentioned in the Section V – Technical Specifications (TS)

a. Guaranteed Technical Particular/ Data Sheet for Solar PV Module
b. Guaranteed Technical Particular/ Data Sheet for Power Conditioning Unit

c. Guaranteed Technical particulars of step-up transformer
d. Guaranteed Technical Particulars/ Data Sheet of LED lights
e. Guaranteed Technical Particulars of Power Cables (DC & AC) as per Suppler GTP.
f. Guaranteed Technical Particulars of HT panels as per supplier GTP
g. Plant power evacuation SLD (tentative)

2. "Financial Bid"

Bidders shall submit the scanned copy of Appendix 5 (Section VI – Forms and Formats) Cover Page only.

The Table 5A, 5B and 5C of the Financial Bids shall have to be filled online in the Electronic Form provided at the TCIL portal only.

3.4.2 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.

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

3.4.4 Detailed process for submission of e – tender/ e - bid is detailed under ITB clause 3.10.

3.5 Bid Due Date/ Last date of submission

3.5.1 Bids should be submitted on or 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 its website in accordance with ITB Clause No. 2.5.3, 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 of Bid

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.

3.9.3 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 the administrative expenses for Employers' personnel shall be borne by the Employer. However, all other expenses for such inspections shall be borne by contractor only.

3.9.4 The Employer will examine the Bid to determine whether they are complete, whether any computational errors have been made, whether required securities have been furnished, whether the documents have been properly signed, and whether the bid is generally in order.

3.9.5 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.

3.9.6 If the Bid is not substantially responsive as per the conditions stated under ITB Clause 3.10, it will be rejected by the Employer and may not subsequently be made responsive by the Bidder by correction of the nonconformity.

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

3.9.8 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 inclusive of taxes, i.e., Contract Value (Sum total of price for all sections/ parts thereof)
b. NPV of annual O&M Price exclusive of taxes quoted for 7 (Seven) 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 taxes, as applicable and quoted by the bidder in the financial proposal, shall be considered.

3.9.9 i) The first envelope (Technical Bid) of only those bidders will be opened by SECI whose required documents are received at SECI office before the due date and time of bid submission.

ii) Documents (as mentioned in the previous clause) received after the bid submission deadline specified in the Bid Information Sheet shall be rejected and returned unopened if super-scribed properly with address, to the bidder.

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) Bid is received by the bid due date and time including any extension thereof;

(ii) Bid is signed, stamped, sealed and marked as stipulated in ITB Clause 3.4;

(iii) Bid is accompanied by the DD for Tender processing fees and Bid Security as specified in ITB Clause 1.2.3

(iv) It is accompanied by pass – phrases for both Techno – commercial and Finance bid, the power(s) of attorney and Board Resolution as specified in Appendices, as

the case may be;

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

(vi) It does not contain any condition or qualification or deviations and 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 after the scheduled the time of Bid Submission or any time thereafter

3.11.4 No Bid shall be withdrawn in the interval between the scheduled 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 will result in the Bidder's forfeiture of its Bid Bond.

3.12 Not Used

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 3.9, the Employer shall sign the Contract with the Successful Bidder. Non Receipt of acknowledgement letter or non-willingness to sign the contract will result in forfeiture of their Bid Security.

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 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.

3.19 Special Instructions to Bidders for e- bidding / e – tendering:

3.19.1 Submission of Online Bids is mandatory for this Tender.

3.19.2 E-Tendering is a new methodology for conducting Public Procurement in a transparent and secured manner. Now, the Government of India has made e-tendering mandatory. Suppliers/ Vendors will be the biggest beneficiaries of this new system of procurement. For conducting electronic tendering, SECI has decided to use the portal https://www.tcil-india-electrionictender.com through TCIL, a Government of India Undertaking. This portal is based on the world's most 'secure' and 'user friendly' software from Electronic Tender®. A portal built using Electronic Tender's software is also referred to as Electronic Tender System® (ETS).

3.19.3 Benefits to Suppliers are outlined on the Home-page of the portal.

3.19.4 Tender Bidding Methodology: It is Single Stage – Two Envelope process.

3.19.5 Broad Outline of Activities from Bidder's Perspective:

(i) Procure a Digital Signing Certificate (DSC)-Class II and above.
(ii) Register on Electronic Tendering System® (ETS)
(iii) Create Marketing Authorities (MAs), Users and assign roles on ETS
(iv) View Notice Inviting Tender (NIT) on ETS
(v) For this tender -- Assign Tender Search Code (TSC) to a MA
(vi) Download Official Copy of Tender Documents from ETS
(vii) Clarification to Tender Documents on ETS
    a. Query to SECI (Optional)
    b. View response to queries posted by SECI
(viii) Bid-Submission on ETS
(ix) Respond to SECI Post-TOE queries

3.19.6 For participating in this tender online, the following instructions are to be read carefully. These instructions are supplemented with more detailed guidelines on the relevant screens of the ETS.

3.19.7 Digital Certificates

For integrity of data and authenticity/ non-repudiation of electronic records, and to be compliant with IT Act 2000, it is necessary for each user to have a Digital Certificate (DC) also referred to as Digital Signature Certificate (DSC), of Class II or above, issued by a Certifying Authority (CA) licensed by Controller of Certifying Authorities (CCA) [refer http://www.cca.gov.in].

3.19.8 Registration

To use the ElectronicTender® portal https://www.tcil-india-electrionictender.com, vendors need to register on the portal. Registration of each organization is to be done by one of its persons who will be the authorized to coordinate for the e-tendering activities. In ETS terminology, this person will be referred to as the Super User (SU) of that organization. For further details, please visit the website/portal, and click on the 'Supplier Organization' link under 'Registration' (on the Home Page), and follow further instructions as given on the site. Pay Annual Registration Fee as applicable. After successful submission of Registration details and payment of Annual Registration Fee, please contact TCIL/ ETS Helpdesk (as given below), to get your registration accepted/ activated.

3.19.9 Important Note:

(i) Interested bidders have to download official copy of the NIT & other documents after login into the ETS Portal of TCIL (https://www.tcil-india-electronictender.com. If the official copy of the documents is not downloaded from ETS Portal of TCIL within the specified period of downloading of NIT and other documents, bidder will not be able to participate in the tender.

(ii) To minimize teething problems during the use of ETS (including the Registration process), it is recommended that the user should peruse the instructions given under 'ETS User-Guidance Centre' located on ETS Home Page, including instructions for timely registration on ETS. The instructions relating to 'Essential Computer Security Settings for Use of ETS' and 'Important Functionality Checks' should be especially taken into cognizance.

(iii) Please note that even after acceptance of your registration by the Service Provider, to respond to a tender you will also require time to complete activities related to your organization, such as creation of users, assigning roles to them, etc.

3.19.10 Some Bidding related Information for this Tender (Sealed Bid)

(i) The entire bid-submission would be online on ETS (unless specified for Offline Submissions). Broad outline of submissions described in detail in 3.4 above are :

(ii) Submission of Bid Parts:

a. Technical Bid

b. Financial Bid

(iii) Submission of digitally signed documents (i.e., NIT document, Appendices, Technical Documents, Addendum, Corrigendum, amendments etc.)

(iv) For Offline Submission:

Pass – Phrase for each stage i.e., Techno – commercial bid opening and financial bid opening, duly signed, stamped and properly sealed separately to be submitted

in sealed envelopes before due date of bid submission.

3.19.11 Special Note on Security and Transparency of Bids

(i) Security related functionality has been rigorously implemented in ETS in a multidimensional manner. Starting with 'Acceptance of Registration by the Service Provider', provision for security has been made at various stages in Electronic Tender's software. Specifically for Bid Submission, some security related aspects are outlined below:

(ii) As part of the Electronic Encrypter™ functionality, the contents of both the 'Electronic Forms' and the 'Main-Bid' are securely encrypted using a Pass-Phrase created by the Bidder himself. Unlike a 'password', a Pass-Phrase can be a multi-word sentence with spaces between words (e.g. I love this World). A Pass-Phrase is easier to remember, and more difficult to break. It is recommended that a separate Pass-Phrase be created for each Bid-Part. This method of bid-encryption does not have the security and data-integrity related vulnerabilities which are inherent in e-tendering systems which use Public-Key of the specified officer of a Buyer organization for bid-encryption. Bid-encryption in ETS is such that the Bids cannot be decrypted before the Public Online Tender Opening Event (TOE), even if there is connivance between the concerned tender-opening officers of the Buyer organization and the personnel of e-tendering service provider.

(iii) **CAUTION:** All bidders must fill Electronic Forms™ for each bid-part sincerely and carefully, and avoid any discrepancy between information given in the Electronic Forms™ and the corresponding Main-Bid. If it is found during the Online Public TOE that a bidder has not filled in the complete information in the Electronic Forms™, the TOE officer may make available for downloading the corresponding Main-Bid of that bidder at the risk of the bidder. **If variation is noted between the information contained in the Electronic Forms™ and the 'Main-Bid', the contents of the Electronic Forms™ shall prevail.**

(iv) In case of any discrepancy between the values mentioned in figures and in words, the value mentioned in words will prevail.

(v) Additionally, the bidder shall make sure that the Pass-Phrase to decrypt the relevant Bid-Part is submitted to SECI in a sealed envelope before the start date and time of the Tender Opening Event (TOE).

(vi) There is an additional protection with SSL Encryption during transit from the client-end computer of a Supplier organization to the e-tendering server/ portal.

3.19.12 Other Instructions

(i) For further instructions, the vendor should visit the home-page of the portal https://www.tcil-india-electrionictender.com, and go to the User-Guidance Centre

(ii) The help information provided through 'ETS User-Guidance Centre' is available in three categories – Users intending to Register / First-Time Users, Logged-in users of Buyer organizations, and Logged-in users of Supplier organizations. Various links (including links for User Manuals) are provided under each of the three categories.

(iii) Important Note: It is strongly recommended that all authorized users of Supplier organizations should thoroughly peruse the information provided under the relevant links, and take appropriate action. This will prevent hiccups, and minimize teething problems during the use of ETS.

3.19.13 SIX CRITICAL DO'S AND DON'TS FOR BIDDERS

Specifically for Supplier organizations, the following 'SIX KEY INSTRUCTIONS for BIDDERS' must be assiduously adhered to:

(i) Obtain individual Digital Signing Certificate (DSC or DC) of Class II or above well in advance of your tender submission deadline on ETS.

(ii) Register your organization on ETS well in advance of the important deadlines for your first tender on ETS viz 'Date and Time of Closure of Procurement of Tender Documents' and 'Last Date and Time of Receipt of Bids'. Please note that even after acceptance of your registration by the Service Provider, to respond to a tender you will also require time to complete activities related to your organization, such as creation of users, assigning roles to them, etc.

(iii) Get your organization's concerned executives trained on ETS well in advance of your first tender submission deadline on ETS

(iv) Submit your bids well in advance of tender submission deadline on ETS (There could be last minute problems due to internet timeout, breakdown, et al)

(v) It is the responsibility of each bidder to remember and securely store the Pass-Phrase for each Bid-Part submitted by that bidder. **The bidders may note that as per ITB Clause 3.10.1,** the bid shall be considered as non-responsive due to non-submission of correct, valid and operative Pass-Phrase to decrypt either Technical Bid Part or Financial Bid Part in a separate sealed envelope before due date and time of submission of bid.

(vi) ETS will make your bid available for opening during the Online Public Tender Opening Event (TOE) 'ONLY IF' your 'Status pertaining Overall Bid-Submission' is 'Complete'.

NOTE:

(i) While the first three instructions mentioned above are especially relevant to first-time

users of ETS, the fourth, fifth and sixth instructions are relevant at all times.

(ii) Minimum Requirements at Bidder's End

a. Computer System with good configuration (1 GB RAM, Windows 7 and above)

b. Broadband connectivity

c. Microsoft Internet Explorer 7.0 or above

d. Digital Certificate(s)

(iii) Any Further support and assistance:

TCIL/ ETS Helpdesk	
Telephone/ Mobile	Customer Support: +91-11- 26202699 (Multiple Telephone lines) Emergency Mobile Numbers: +91-9868393775, 9868393717, 9868393792
Email-ID	ets_support@tcil-india.com

Section – III

General Conditions of Contract

(NIT NO. – NIT NO. – SECI/SD/2/NIT/2016/KPL)

SOLAR ENERGY CORPORATION OF INDIA LIMITED

(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

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A. CONTRACT AND INTERPRETATION

1. Definitions and Abbreviations

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

"**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 Employer 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 IFB, in accordance with the terms and conditions hereof.

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

"Bid Price" shall mean the price bid submitted by the bidders comprising of 1) EPC Price bid (Firm value of the financial proposal as the sum of individual Bid value of supply, erection and civil works including all Taxes and Duties) and 2) O&M Price bid excluding all Taxes and Duties.

"**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 & installation methodology (as per Section-VI, Technical Specification) has been installed and energy has flown into grid.

"**Completion of facilities**" 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 Installation, Testing & Commissioning has been completed for all individual components of the Infrastructure 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 value of the quoted price by the successful bidder specified in its financial proposal as the sum of individual contract value of supply, erection and civil works under different work packages specified in the financial proposal, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract excluding taxes, duties levies etc., as applicable.

"**Contractor**" means the Bidder whose bid to perform the Contract has been accepted by the Employer and is named as such in the Contract Agreement/LOI/NTP, 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.

"**DISCOM**" means Power Distribution Company of the state, responsible for distribution of Electrical power in the region and associated activities.

"Defect Liability Period" means the period of twelve (12) months from the date of completion of the Facilities or a part thereof, during which the Contractor must repair any defect identified by the Project Manager / Engineer In charge after commissioning of the Plant. All the expenses to repair the defects shall be borne by the contractor and no additional cost charged to the Employer.

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

"**Employer**" Kamarajar Port Limited (KPT), having its corporate office at "Ennore, District – Chennai" and includes the legal successors or permitted assigns of the Employer and also its authorized representative i.e. Solar Energy Corporation of India Limited (SECI), New Delhi.

"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 in detail under Section V: Technical Specification of this IFB, to be carried out by the Contractor under the Contract.

"**Final Acceptance**" Final Acceptance" means acceptance of Facilities by the Employer at the end of First Year of O&M period, as stated in this NIT, from the date of Operational Acceptance or demonstration of minimum annual CUF whichever comes later which certifies the Contractor's fulfilment of the Contract in respect of Functional and Plant Performance Guarantees of the Facilities.

"**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 (s), 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.

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

"NIT" means Notice inviting Tender.

"NTP" means Notice to Proceed.

"O&M" means Comprehensive 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 period shall commence after Operational Acceptance of the Facilities by the Employer.

"Plant" 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 (EIC)**" means the person appointed by the Employer to perform the duties delegated by the Employer.

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

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

"**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.

"Tender Document" means all the Sections of this documents (i.e. Section-I to VI), including its Annexures, Addendums, Clarifications, Amendments (if any) issued by SECI.

"Tax" means the taxes/ duties/ levies/ octroi etc. as applicable and put in force by the state Government / central Government/ Local Bodies/ Statutory bodies etc. from time to time.

"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.

"TS" means Technical Specification

2. Use of Contract Documents & Information

2.1 All documents, as mentioned in the GCC Clause 57, 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 (s) will be signed in three (3) 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 LOI.

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 with respect to this project other than the Contract itself, shall remain the property of the 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 vice versa, except where the context otherwise requires.

3.3 Headings

The headings and marginal notes in the NIT 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 Not Used

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

3.10.1 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.

3.10.2 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 ~~Bhubaneswar~~ 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

6.1.1 Adjudicator

6.1.2 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.

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

6.1.4 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.

6.1.5 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.

6.1.6 Should the Adjudicator resign or prolonged absence from work assigned due to unforeseen circumstances, 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. Third arbitrator shall be appointed in accordance with the Arbitration and Conciliation Act, 1996.

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 (as amended). The venue of arbitration shall be Bhubaneswar 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 Unless otherwise expressly limited in the Technical Specifications, the Contractor's obligations cover all Plant and Equipment for 240 kW (AC) Solar PV power Plant with cells and modules manufactured in India, 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 along with interconnecting underground transmission system at 33 kV voltage level up to designated substation at Kamarajar Port Limited including O&M of the complete facilities for seven (7) years. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labour, materials, equipment, spare parts (as specified in GCC Sub-Clause 7.3 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.

7.2 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.

7.3 Contractor is required to provide the list of all the spares required to maintain the facility for O&M period. Contractor agrees to supply such spare parts, as recommended or otherwise required for the effective and hassle free operation and maintenance of the Facilities. However, the contractor, based on its previous experiences & OEM's recommendations, is to provide a list of spares including specifications, supplier details and indicative price, as recommended by him and OEM. The contractor shall keep and maintain the inventory of such spares for the hassle free operation during the complete O&M period without additional cost to Employer. Also, at the end of penultimate year of the O&M contract, contractor shall supply a list of all recommended spares as per the operational requirement of the plant and with reference to the mean time between failures (MTBF), along with detailed specifications, supplier details and tentative cost for future purchase. The price of such spare parts shall include the breakup of taxes and duties as applicable towards purchase and supply of spare parts. Employer, at its discretion, will purchase the spare as required for future operation.

8. Contractor's responsibility

8.1 The Contractor shall grade/level the land identified for development of 240 kW Solar power Plant (with cells & modules manufactured in India) at Kamarajar Port Limited in the state of Tamil Nadu, 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 along with interconnecting transmission system up to designated substation at Kamarajar Port Limited including the O&M of the complete facilities for seven (7) years. It is contractor's responsibility to coordinate with state/central agencies in order to get any permission

whatsoever, required for successful development & operation of Plant till its desired life.

8.2 The Contractor confirms that it has entered into this Contract on the basis of proper examination of the data relating to the Facilities provided by the Employer and assessed by himself at the site location, after proper due diligence relating to the Facilities prior to bid submission. The Contractor acknowledges that any failure to obtain or 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 & operation of Plant till its desired life as 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 In the matter of connectivity of Plant to Designated Substation, Employer shall fill up the application & hand it over to the contractor however all other activities beyond it such as coordination with State's Agency/Department for technical/regulatory compliance for interconnection including payment of Fee or any other charges to the State Agencies/DISCOM as the case may be shall be taken care by the Contractor. Bidders are advised to include these cost in their final offer/Price BID.

8.5 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, 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.

8.6 Contractor shall also seek for any exemption applicable for the project as per the orders released from GOI time to time in appropriate Formats including all the required attachments. 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.

8.7 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.

8.8 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)

8.9 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 . Not applicable

9.2 If requested by the Contractor and up- on Employer's 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.

9.3 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, under 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: Format for Financial proposal by successful bidder at the time of conclusion of E-Reverse Auction shall be firm and shall not be subject to price variation.

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 will be, if needed, 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 Clause 14. 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.

11.3 Employer shall make best efforts to release the payment in line with SCC Clause 14, within 15 calendar days of receiving invoices along with **complete set of supporting & compliance documents** from Contractor, certified by Engineering in-charge or any other authority appointed by Employer for this purpose.

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:

NOT APPLICABLE.

12.3 Performance Bank Guarantee during EPC

12.3.1 The Contractor shall, within fourteen (14) days of the issue of LOI, provide Bank Guarantee (s) for the due Performance of the Contract for an amount and validity mentioned under ITB Clause 1.2.1. However, in case of delay in demonstration of the Performance Test (PR test) and Operational Acceptance, the validity of all the contract Performance Bank Guarantees (PBG) shall be extended by the period of such delay beyond initial validity of the PBG.

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 Format provided in Appendix 12(b): Format of bank guarantee for Performance security during EPC under Section-VI: Forms and formats.

12.3.3 The Bank Guarantee submitted against the Performance Bank Guarantee shall be essentially from any of the Banks listed at “Schedule – 1: List of Banks” supplemented at SCC of the Bidding Documents.

12.4 Performance Bank Guarantee during O&M or “O&M Bank Guarantee“

12.4.1 The contractor shall, at the time of Operational Acceptance and at the end of fifth year of O&M, provide Bank Guarantee for the due performance under the Operation and Maintenance of the

Plant. The value and validity of the O&M Bank Guarantee shall be as per ITB Clause 1.2.1. The Bank Guarantee must be submitted in the "Format 12(c): Format of Bank Guarantee for the Performance during O&M" specified under Section VI: Forms and Formats.

12.4.2 The Bank Guarantee submitted against the O&M Bank Guarantee shall be essentially from any of the Banks listed at "Schedule – 1: List of Banks" supplemented at SCC of the Bidding Documents.

13. Taxes and Duties

13.1 Except as otherwise specifically provided in the Contract, the Contractor shall bear and pay all taxes, duties, 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, Custom 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/ tax invoice.

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/BL/AWB in the name of Contractor (and not in the name of Employer). The Contractor shall further ensure that he endorses the GR/LR/RR/BL/AWB 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 or civil works, if any, shall be to the contractor's account and no separate claim in this regard will be entertained by the Employer.

13.5 Service Tax, if any, shall be to the contractor's account and no separate claim in this regard will be entertained by the Employer for EPC portion of Contract. However, for O&M Contract, any statutory variation on account of service Tax shall be paid/reimbursed based on Documentary Evidence.

13.6 The taxes, duties, levies and charges, as mentioned by bidder (hereinafter called "TAX" in GCC Clause 13) are to be considered for evaluation. Bidders are required to ascertain correctness of amount mentioned in the bid as on date of techno – commercial bid opening.

13.7 Any new tax introduced or revision in respective applicable tax rates after the date of techno – commercial bid opening, shall be paid/reimbursed by the employer subject to submission of requisite documentary evidence by the bidder. However, any variation in Service Tax and Work Contract Tax shall not be payable for EPC portion of the Contract.

13.8 Direct transaction shall mean those equipment/material which are dispatched from the Contractor's works to the Employer's stores/site. The prices of the bought out items i.e. those equipment/material which are dispatched from the subcontractor's works to the Employer's stores/site (Sale in transit) shall be quoted inclusive of excise duty and sales tax. No variation in ED and CST on bought out items shall be admissible. All other taxes such as Service tax, duties & levies including sale tax on work contract (applicable on erection as well as Civil & Allied works portion of the contract) and all taxes, duties including custom duty as applicable on the material used for such Erection as well as Civil & Allied works Packages of the contract shall be included in the bid prices and no separate claim in this regard will be entertained by the Employer. The contractor shall show the amount of service tax in the invoice and shall certify that the tax has been deposited with the appropriate authority

D. Project Implementation:

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

- Now or hereafter enters the public domain through no fault of that party
- 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.
- Otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

15.4 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.

15.5 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 (EIC):

If the Project Manager/ EIC is not named in the Contract, then within seven (7) days of the Effective Date, the Employer shall appoint and notify the Contractor in writing of the name of the Project Manager/ EIC. The Employer may from time to time appoint some other person as the Project Manager/ EIC 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/EIC 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/ EIC, 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/ EIC, 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/ EIC 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/ EIC 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/EIC.

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 Final 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/ EIC 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, test, pre-commission and 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 with prior intimation to the Project Manager/EIC or when required by the Project Manager/EIC, 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/ EIC.

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/EIC 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.

18.2.3 If at any time the Contractor's actual progress falls behind the scheduled program, or it becomes apparent that it will so fall behind, the Contractor shall, at the request of the Employer or the Project Manager/ EIC, prepare and submit to the Project Manager/ EIC a revised program, taking into account the prevailing circumstances, and shall notify the Project Manager/ EIC, of the steps being taken to expedite progress so as to attain Completion of the Facilities within the Time for Completion. If any extension thereof entitled under GCC Sub-Clause 54.1, or any extended period as may otherwise be agreed upon between the Employer and the Contractor, Contractor shall submit the revised plan for completion of Facility accordingly.

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/ EIC' or his authorized representative. The deliberations in the meetings shall inter-alia include the weekly program, progress of work (including details of manpower, material, 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/ EIC' or his authorized representative. These recordings shall be jointly signed by the 'Project Manager/ EIC' 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 along with contact details of their representative 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/ EIC 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/ EIC.

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 to achieve completion of activities as per schedule to enable commissioning of the Project by the scheduled commissioning date.

21.2 Transportation

The contractor shall ensure that all the plant and equipment required to complete the Facility at site, are procured and dispatched on FOR site basis. The Contractor shall at its own risk and expense transport all the Plant and Equipment and the Contractor's Equipment to the Site by the mode of transport that the Contractor judges most suitable under all the circumstances.

21.3 Packing and Marking

21.3.1 The Contractor shall be responsible for securely protecting and packing the plant & equipment as per prescribed standards in force to withstand the journey and ensuring safety of materials and

also arrival of materials at destination in original condition and good for contemplated use. Packing case size & weight shall take into consideration the remoteness of the goods final destination and absence of heavy material handling facilities at all points in transit.

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

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

21.4 Storage of Equipment

The plant and equipment thus procured under the scope of the contract must be kept in safe custody till put under operation. All the spares, as required for the trouble free O&M of Plant, must be kept under secure storage during O&M period.

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, except if mentioned otherwise.

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 Labuor:

The Contractor shall provide and employ on 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, first aid facility 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 labour 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 labour of its Subcontractors.

The Contractor shall, in all dealings with its labour and the labour 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

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

23.3.2 Unless otherwise specified in the Contract, upon completion of the Facilities, the Contractor shall remove from the Site all Equipment (indicated under GCC Clause: 23.3.1) brought by the Contractor onto the Site after obtaining a permission from Project Manager/In-charge to do so.

23.4 Site Regulations and Safety

The Contractor shall have to provide necessary and adequate safety measures including Personal Protective Equipment (PPE) and precautions to avoid any accident, which may cause damage to any equipment / material or injury to workmen. The contractor, if required, will provide necessary safety training 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, packaging material, rubbish & debris and temporary installations 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, packaging material, rubbish & debris and temporary works & installations 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, breakage of modules, 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 disposal of such Scrap shall vest with the Contractor for the items supplied by the Contractor and issued by Employer under this contract for installation and construction without any additional cost to the Employer. The removal of scrap shall be subject to the Contractor producing the necessary clearance from the relevant authorities (Custom, Excise etc.), if required by the law, in respect of disposal of the scrap. The liability for the payment of the applicable taxes/duties shall be that of the Contractor.

The Contractor shall also indemnify to keep the Employer harmless from any act of omission or negligence on the part of the Contractor in following the statutory requirements with regard to removal/disposal of scrap. The Indemnity Bond shall be furnished by contractor as per Format enclosed as Appendix 17 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 Watch &Ward 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 forthwith take necessary actions to remove the cause to the complete satisfaction of the Employer otherwise, the Employer at its liberty may reject all or any component of plant or workmanship connected with such work.

24.3 The Contractor shall issue request letter to the Employer or its authorized representative for testing of any component of the Plant, which is ready for testing at least 07 days for indigenous material and 15 days for the material source from outside India 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. In case results of such test are found to be negative, Employer shall reject such material and the cost of such testing shall also be recovered from the contractor.

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 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/ EIC) 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 Sub – 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 repeat notice, issue a Completion Certificate stating that the Facilities have reached Completion as at the date of the Contractor's repeat 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 repeat 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, commissioning 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 to suit the provisions of Technical Specification without any additional cost or;
- 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 TS) 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

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

- The Contractor has completed the supply installation, testing & commissioning of all the components of the Plant along with its associated infrastructure which is to be developed as per terms of "Technical Specification" of the Tender Document.
- The Plant Performance Guarantee Test (PR 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, if any, 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 Operational 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 18 of Section VI: Forms and Formats which is to be executed by the contractor for the Plant handed over by Employer for performance of its O&M Contract (Entire Solar Photo Voltaic Plant).

27.4 Final Acceptance

27.4.1 Final Acceptance shall occur in respect of the Facilities when:

- The Plant have achieved the Operational acceptance and served the O&M for the period stipulated under the contract agreement; and
- All the contractors' liabilities under the O&M contract have been satisfied; and
- Contractor has provided the list of recommended spares with detailed specification, source and price for further procurement; and
- The Contractor has paid the liquidated damages, if any, as specified in SCC Clause 25 thereto;

27.4.2 At any time after the events set out in GCC Sub – Clause 27.4.1 have occurred, the Contractor may give a notice to the Project Manager requesting the issue of Final 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.

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

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

27.4.5 The O&M contract period may further be extended for a suitable period as per mutually agreed terms and conditions. The contractor is allowed to submit his intent at the time of Final acceptance.

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 would 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 specific Contract Price i.e., Supply, Erection and Civil Works, 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, not later than 15 days after the receipt of such instructions, inform in writing to the Employer of such claim for additional payment.

29.6 In any case, if the Bidder deviates from the design or specification as defined in the NIT document, the Bidder 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 may get the work done at the risk and cost of the contractor

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 along with all necessary Municipal, Panchayat and Government permits & licenses etc. at its own cost.

32. Insolvency

The Employer may at any time, by notice in writing, summarily terminate the Contract without compensation to the Contractor in 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 receiver appointed from administration 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 GCC Clause 34.

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 liquidated damages on the contractor as per GCC Clause 34.

34. Liquidated Damages

34.1 The project is scheduled to be commissioned within the period specified in SCC 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 schedule, the Employer shall levy Liquidated Damages on the Contractor at the rate of 0.10% per day of the value of the remaining work for first sixty days(The value of remaining work shall be consider based on difference between the total contract price and Bills Submitted for Payment by the Bidder). For next fifty days of delay in successful commissioning of Plant, Liquidated Damages @ 0.10% per day of the Total Contract value shall be applicable. However, total amount on account of LD shall be maximum of 5% (five percent) of the total contract value.

34.3 The project should be commissioned within the stipulated time period mentioned at SCC. In case of delay for more than the maximum time period allowed (including LD) as mentioned at para 34.2

above, the Employer may get the project completed 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/ NTP 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 of twelve (12) months from the date of completion of the Facilities, during which the Contractor must repair any defect identified by the Project Manager / EIC after commissioning of the Plant. All the expenses to repair the defects shall be borne by the contractor and no additional cost charged to the Employer (“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 a 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.

35.14 The Bidder's liability under this contract for any reason, what so ever, shall be limited to the total

Contract Price (Including T & D)

36. Termination by default and Breach of Contract

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:

36.1 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.

36.2 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.

36.3 In case of termination of the Contract due to breach of contract, the Contractor may be debarred from participation in future tenders by Employer, through a communication in writing for a period to be specified therein.

36.4 In case the termination of contract in accordance with GCC Clause 32 thereto.

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 Employer 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:

- Act of God, including, but not limited to lightning, fire not caused by contractors' negligence and explosion (to the extent originating from a source external to the site), earthquake (above 7.0 magnitude on Richter Scale), volcanic eruption, landslide, unprecedented flood, cyclone, typhoon or tornado;
- 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, quarantine;
- Radioactive contamination or ionizing radiation originating from a source in India or resulting from another Force Majeure Event mentioned above.

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:

- Unavailability, late delivery, or changes in cost of the plant, machinery, equipment, materials, spare parts or consumables for the Power Project;
- Delay in the performance of any contractor, sub-contractor or their agents;
- Non-performance resulting from normal wear and tear typically experienced in power generation materials and equipment;
- Strikes at the facilities of the Contractor / Affected Party;
- Insufficiency of finances or funds or the agreement becoming onerous to perform; and
- Non-performance caused by, or connected with, the Affected Party's:
  - Negligent or intentional acts, errors or omissions;
  - Failure to comply with an Indian Law; or
  - Breach of, or default under this Contract Agreement.
- Normal rainy seasons and monsoon

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 the period 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 Force Majeure 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 will not be entitled to claim any compensation for Force Majeure conditions and shall take appropriate steps to insure its men and materials utilized by it under the Contract.

39. Insurance

39.1 During the Contract period, i.e., during Construction, 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. During O&M period (after Contract period is over), the insurances shall be arranged by the Owner (at Owner cost).

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 company shall rest 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 In – transit insurance (Marine/ Cargo/ others as applicable), Contractor All Risk, Erection All Risk, workmen compensation , third party liability, insurance against theft and acts of GOD and others 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 Employer shall be named as co – insured under all insurance policies taken out by the contractor pursuant to GCC Clause 39, except for the workmen compensation, third party liability and Employer's liability insurances. Also, Contractors' sub – contractor shall be named as co – insured under all insurances taken out by the contractor pursuant to GCC Clause 39 except for Cargo

insurance, workmen compensation insurance and Employer's liability insurance. All insurers' rights of subrogation against such co – insured for losses or claims arising out of the performance of the contract shall be waived under such policies.

39.8 All the insurance cover taken for the construction and O&M period shall be seamless in nature.

39.9 The insurance are to be suitably taken for the activity/ act which is required to cover all the risks 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 whatsoever.

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 (As amended), 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 Tamil Nadu 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/ fault 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 company. It should take immediate steps to repair the damaged apparatus or replacement thereto.

46. Liabilities during Transit

All the supplies mentioned/ required under this NIT shall be FOR destination basis. The Contractor shall be responsible for loss, damages or depreciation to goods or of plant, equipment, and machineries up to delivery at Site. The replacement of the affected item shall also to be carried out by the contractor to meet the performance of the contract within the specified time.

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 Performance Bank Guarantee (s) 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 withheld or retained as such by the Employer or till the 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 to be used in grid connected Solar Power Plant 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 10 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.

48.5.2 Power Conditioning Units (PCU)/ Inverters: PCUs shall be warranted for the minimum period of 5 years or guarantee period provided by the OEM, whichever is higher.

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, workmanship or any reason attributable to works carried out by the contractor, 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 GCC Sub Clause 48.5, 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 reserves the right to take up rectification work at the risk and cost of the Contractor.

49. Final Bill/ Final Due Payment

The final bill relating to the EPC Contract or its parts viz. Supply, Erection and Civil Works 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 favor by the adjudicator or arbitrator, as the case may be, up to the date of preparation of the final bill.

50. Operation and Maintenance

50.1 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:

50.2 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 TS Clause 3, 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 and transmission line also shall be included.

50.3 Breakdown / Corrective maintenance:

Whenever a fault/failure/breakdown/malfunctioning occurs, the Contractor has to attend to rectify the fault & the fault must be rectified within the 48 hours from the time of occurrence of fault, failing which LD will be applicable in line with SCC Clause 25.2 or 25.4 depending upon nature of fault/failure/defect/ breakdown/malfunctioning. The contractor must maintain all the records pertaining to such faults/failure/breakdown/malfunctioning and necessary measures taken.

The date of Comprehensive Operation & Maintenance Contract period shall begin on the date of Successful demonstration of guaranteed PR i.e., Operational acceptance. 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.

50.4 Serviceability Level Agreement (SLA)

50.4.1 Contractor shall make efforts to maintain 100 % serviceability of complete Plant including all other associated infrastructure developed by the Contractor during execution of project as its scope of work.

50.4.2 Contractor shall produce monthly serviceability report for individual components of the plant & associated infrastructure to the employer by 5th of next month.

50.4.3 Contractor shall maintain a Complaint log book, which shall include the timing of logging of complaint including unique Complaint number, time of closure of complaint & it's Root Cause Analysis.

50.4.4 Any complaint related to unserviceability/improper functioning of any & all component of the plant including but not limited to PV Module, PCU, Transformers, switchgears, SCADA, roads, drainage, water supply lighting system, office infrastructure, CCTV system which is not attended & rectified within 48 hours, shall attract a penalty of Rs. 1000 per 24 hours, which shall be over & above GCC Clause 34 & 50.3. If such complaint is not rectified within 480 hours from logging of

complaint. Employer may choose to rectify the same through any other agency at the risk of Contractor and Employer shall recover 110% of such cost incurred from subsequent payment to the contractor. Cumulative value of such LD shall be limited to 50% of yearly O&M Cost

50.4.5 Such rectification work carried out by employer doesn't exempts/relieves Contractor from its responsibility towards subsequent operation, maintenance, repair & replacement of such component/ infrastructure of the Plant or meeting the performance parameters of the Plant.

50.4.6 O&M Routine & Manpower: Contractor shall provide Preventive / Routine Maintenance schedule based on Original Equipment manufacturer and good engineering practices. The team deployed for the O&M must have a minimum manpower structure with following qualification;

Project Manager (B.E./B.Tech Electrical, with minimum 5 years of relevant experience) -1 No.

Shift Engineers (BE/B-Tech Electrical, with minimum 3 years of relevant experience) –1 No / Shift

Polytechnic/Diploma Electrical (with minimum 3 years of relevant experience) -2 / shift

Polytechnic/Diploma Mechanical or Civil (with minimum 3 years of relevant experience) -1/shift

Unskilled for cleaning & other unskilled works with respect to Plant – As per requirement.

However contractor shall engage additional manpower as and when need arise.

51. 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, the Contractor 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.

52. Unforeseen/ Differing site Conditions

52.1 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

- The physical conditions or artificial obstructions on the Site that could not have been reasonably foreseen
- 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
- The extent of the anticipated delay
- The additional cost and expense that the Contractor is likely to incur and the breakup of the same.

On receiving any notice from the Contractor under this GCC Sub- Clause 52.1, 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.

52.2 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 52.1 shall be paid by the Employer to the Contractor as an addition to the Contract Price, after submission of relevant documents justifying same.

52.3 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 52.1, the Time for Completion shall be extended in accordance with GCC Clause 54.

53. 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.

54. Extension of Time for Completion

54.1 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:

54.1.1 Any occurrence of Force Majeure as provided in GCC Clause 38 (Force Majeure), unforeseen/ differed site conditions as provided in GCC Clause 52 (Unforeseen/ differed site Conditions).

54.1.2 Any changes in laws and regulations as provided in GCC Clause 53 (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.

54.2 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).

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

54.4 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.

55. 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).

56. 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

57. Documents constituting the Contract

The following documents shall constitute the Contract between the Employer and the Contractor, and each shall be read construed as an integral part of the contract:

a) Contract Agreement
b) Letter of Intent / Notice to proceed
c) Special Conditions of Contract
d) General Conditions of Contract
e) Technical Specifications and Drawings
f) The Bid and Price schedules submitted by the contractor

58. Fraud Prevention Policy

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

(NIT NO. – SECI/SD/2/NIT/2016/KPL)

SOLAR ENERGY CORPORATION OF INDIA LIMITED

(A Government of India Enterprise)

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1 Project description

NIT for Design, Engineering, Supply, Construction, Erection, Testing, Commissioning and O&M of 240 kW (AC) Solar PV Power plants along with associated transmission system to supply power at 11 kV level to the Indoor Substation at Kamarajar Port Limited as per details provided in Technical Specifications, Ennore, Tamil Nadu.

2 Project Site

Kamarajar Port Limited, Ennore, Chennai.

3 Appointing Authority (GCC Clause 6.1.5)

Appointing Authority of Adjudicator and arbitrator shall be **Chairman, KPL.**

4 Project Manager/ Engineer in - Charge (GCC Clause 17.1)

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

5 Scope of Works

The detailed scope of works under this contract shall be referred at Section V: Technical Specifications.

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 Employer.

7 Performance Guarantee (GCC Clause 27.2)

7.1 The plant performance will be evaluated through Performance Ratio (PR) test as per IEC 61724 and Capacity Utilization Factor (CUF) calculation as per the formulas and procedures mentioned under TS Clause 7.

7.2 The minimum acceptable PR of the plant is 0.78 and CUF shall be 18% against installed rated 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 TS Clause 7 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 TS Clause 7.

7.5 The performance of plant will be evaluated based on minimum CUF demonstrated at the end of every year from the date of commissioning till the culmination of the O&M period. 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. Second year onwards linear degradation of the module output (i.e., 0.75 % per year) shall be considered for the calculated CUF every year.

7.7 During the O&M period, the bidders need to maintain 99% 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 radiation profile and other related parameters of the area & make sound commercial judgment about the Performance Ratio and CUF. 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 bidders are free to install additional DC capacity any time during O&M period, with proper consent by the Employer, to meet the desired performance parameters with no additional cost to the Employer.

7.10 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 120 days from the date of award of LOI / NTP 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)
3	Approval of Major drawings	D+25
4	Completion of Civil work	D+60

5	Completion of supply of major equipment like SPV Modules (including structure for the above), Power Conditioning Units, transformers etc.	D+80
6	Installation of all major equipment	D+100
7	Interconnection of all major equipment and completion of installation	D+110
8	Completion, testing and commissioning of Plant Facilities	D+120
9	Operational Acceptance (PR test demonstration)	D+150

9 Mode of Execution

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

10 Programme of Work

The Contractor shall submit the detailed programme of work within 15 days from the date of receipt of Letter of Intent. The programme shall include a Bar/ Gantt 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 LOI / NTP and shall thereof, report to the Employer accordingly.

12 Completion Schedule

12.1 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.

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

the above scheduled completion period.

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

Payments shall be released against each component of Price Bid in the following manner after submission by the contractor and acceptance of Security cum Performance Bank Guarantee by Employer and signing of Agreement as per provisions of bidding document.

14.1.1 In accordance with the provisions of GCC Clause 11 (Terms of Payment), the Employer shall pay the Contractor in the following manner and at the following times:

14.1.2 For **Supply of Plant and Equipment** including PV Modules, Inverter and BOS up to site (FOR basis) including transportation and insurance along with mandatory spares

(i) 10% of the total price of supplies of Plant and Equipment as advance payment against Bank Guarantee of 110% of the advance amount drawn (with validity as per ITB Clause 1.2.3) which shall be furnished by contractor in addition to Performance Bank Guarantee.

(ii) 60% of the total price of supplies of Plant and Equipment shall be paid against delivery of supplies on pro-rata basis against receipt of material at site under the Contract.

(iii) 25% of the total price of supplies of Plant and Equipment shall be paid on Operational Acceptance of the Facility pursuant to successful Guarantee Tests and demonstration of PR and submission of all as – built documentation.

(iv) 5% of the total price of supplies of Plant and Equipment shall be paid on demonstration of CUF for the successful first year of operation.

14.1.3 For Erection, Testing and Commissioning

(i) 10% of the total price of Erection, Testing and commissioning as advance payment against Bank Guarantee of 110% of the advance amount drawn (with validity as per ITB Clause 1.2.3) which shall be furnished by contractor in addition to Performance Bank Guarantee.

(ii) 70% of the total price of Erection, Testing and Commissioning shall be paid on pro-rata basis on completion of installation of equipment on certification by the Engineer-In-Charge/ Project Manager for the quantum of work completed after successful clearance of quality check points involved in the quantum of work billed.

(iii) 15% of the total price of Erection, Testing and Commissioning shall be paid on Operational Acceptance of the Facility pursuant to successful Guarantee Tests and demonstration of PR.

(iv) 5% of the total price of Erection, Testing and Commissioning shall be paid on demonstration of CUF for the successful first year of operation.

14.1.4 For Civil and Allied Works

(i) 10% of the total price of Civil Works as advance payment against Bank Guarantee (with validity as per ITB Clause 1.2.3) for 110% of the advance amount drawn, which shall be furnished by contractor in addition to Performance Bank Guarantee.

(ii) 70% of the total price of Civil Works shall be paid progressively on certification by the Project Manager/ Engineer In - Charge for the quantum of work completed/ Milestones achieved after successful clearance of quality check points involved in the quantum of work / Milestones billed.

(iii) 15% of the total price of Civil Works shall be paid on completion of all the civil works including finishing and debris removal.

(iv) 5% of the total price of Civil Works shall be paid on demonstration of CUF for the successful first year of operation.

14.1.5 On successful Operation and Maintenance of the Solar Power Plant on **quarterly** basis at the end of every quarter for each year till 7 years. The O&M of the plant starts after Operational Acceptance.

(i) Year 1: OM -1
(ii) Year 2: OM -2
(iii) Year 3: OM -3
(iv) Year 4: OM -4
(v) Year 5: OM -5
(vi) Year 6: OM -6
(vii) Year 7: OM -7

14.2 Recovery of interest bearing Mobilization advance:

Recovery of the mobilization advance and interest component on the advance amount shall be made from the progressive payments released to the Contractor as per terms above. The

amount of interest to be recovered from a particular bill shall be calculated at SBI base rate (per annum) prevailing on the 7th day prior to the date of opening of techno – commercial bid on the value of advance corresponding to the percentage of total progressive payment being released. The period for which the interest is to be calculated shall be reckoned from the date of release of the advance payment to the actual date of release of the said progressive payment. The interest on the advance payment shall stand fully recovered on release of all the progressive payments. If the amount payable under any interim bill is not sufficient to cover all deductions to be made for interest on the advance payment and other sums deductible therefrom, the balance outstanding shall be recovered from the next payments immediately falling due from the BG submitted by the bidder against mobilization advance will be returned to the contractor after adjustment of mobilization advance in full including interest thereof.

If the bidder is not taking any mobilization advance from the Employer, then the mobilization advance mentioned as percentage of the total cost will be distributed to the other heads proportionately.

Notes:

(i) All the transactions shall be made directly between the Employer (i.e., Kamarajar Port Trust) and the Contractor after certification by SECI. Hence for every consignment, the name of consignee must be the name of "Kamarajar Port Limited".

(ii) The bidder shall furnish a detailed break-up, including bill of materials, for the Price Component of all the packages which shall be mutually discussed and finalized with --the Employer. Progressive payment for Erection and Civil works will be made against monthly bills based on certification by the Project Manager/ Engineer In – Charge for the work completed.

(iii) The release of first progressive payment for Civil Works shall also be subject to submission of documentary evidence by the Contractor towards having taken the insurance policy (ies) in terms of relevant provisions of GCC Clause 39 (Insurance) and acceptance of same by the Project Manager/ Engineer-In-Charge.

(iv) All the applicable Taxes and Duties which are payable by the Employer under the Contract, pursuant to GCC Sub – Clause 13.5, shall be reimbursed to the Contractor upon the production of satisfactory Tax Invoice (s) by the Contractor subjected to maximum of which has been considered during evaluation.

(v) Contract Value (CV):

The firm sum quoted by the Successful Bidder in its Financial Proposal is the sum of individual contract values for supply, erection and civil works under different work order packages as mentioned below:

a. Supply Contract Value: Total value mentioned against the Supply package mentioned at SCC clause 14.1.1 and Bill of Quantities.
b. Erection Contract Value: Total value mentioned under the Erection Testing and commissioning works package mentioned at SCC clause 14.1.2 and Bill of Quantities.
c. Civil Contract Value: Total value mentioned under the Civil and allied works package mentioned at SCC Clause 14.1.3 and Bill of quantities.
d. O&M Contract Value: Total value mentioned under the Operation & Maintenance works mentioned at SCC clause 14.1.4 and Bill of Quantities

(vi) Employer shall issue separate work order for different components of the contract i.e.,

a. Supply Contract
b. Erection Contract
c. Civil and allied works Contract
d. O&M Contract

14.3 Mobilisation Advance, if requested, shall be payable against submission of unconditional and irrevocable Mobilization advance payment bank guarantee of equivalent amount as per format in Appendix 12 (d) of Section VI: Forms and Formats issued by a bank enlisted at Schedule-1. This bank guarantee shall be valid as per ITB Clause 1.2.3 from the date of issue of LOI. The recovery of the mobilization advance shall be made in accordance with SCC Clause 14.2. Moreover, if the Mobilization advance is not requested by the bidder, the same shall be added to the pro – rata payments till commissioning.

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

14.5 The Employer will withhold / deduct /under this Contract, and or to any additions or deductions provided for in this Contract, the statutory deductions as per provisions of the laws in force before making payments. Accordingly the Contractor shall submit Bills / Invoices after incorporating and in compliance of the following:

14.5.1 All payments shall be made in Indian Rupees, unless otherwise specified in the LOI/NTP/ Contract Agreement. All payment shall be made on the basis of actual measurement for the quantified items as per schedule of works and approved by Project Manager/ EIC within 30 days of submission of certified invoice by the contractor.

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. KPL will issue C – Form etc. in order to get sales tax concession. Bidders are requested to take in account while quoting their bids.

14.6 The Contractor, while raising Bills / Invoices shall raise separate Bills / Invoices against individual contracts with reference to the LOI/ Contract number and indicating applicable taxes / duties on the contract. Bills / Invoices for more than one contract package shall not be clubbed together.

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 Proper tax invoices, raised against the different work packages viz. Supply, Erection and Civil works must be submitted mentioning the tax component clearly and separately.

16.2 Bidder will quote the rates of taxes & duties based on the concessional rate or exemption in the same (as applicable) 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 Employer shall consider the same on production of documentary evidences and Tax Invoices.

ii. If any decrease takes place in taxes and duties due to statutory variation, the same shall be passed on to Employer and Employer shall consider the reduced 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 Employer, 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 Employer or Employer shall consider the reduced 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 admissible 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. Employer 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 Not Used

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 Contractor 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 Water for construction and O&M of the plants shall be made available @Rs. 96/kl but the same shall be provided subject to the availability as per the scale of rate of KPL. Cost of electricity required during construction shall be payable by the bidder.

21.2 Power during construction shall be made available to the Contractor @Rs. 11/kWh subject to the availability as per the scale of rate of KPL.

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

23.1 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:

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

23.3 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.

23.4 Bill of material.

23.5 Inventory of recommended and mandatory spares at project Site.

23.6 Immediately after taking over of complete facilities (s), the same will be handed over to the Contractor for Operation & Maintenance for a period of 7 years as mentioned in the bidding document.

24 Liquidated Damages

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

25 Liquidated Damages (LD) for PR and CUF deviations (GCC Clause 27.1.2)

25.1 During the Operational Acceptance any shortfall in the Performance Ratio (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 LD of 1% of the total Contract Value shall be levied. In case the Plant PR result is 0.05 below 0.78, i.e., 0.73 or lower, the total performance bank guarantee submitted by the bidder will be encashed. In case the Performance

guarantee has already been encashed on any account, the due amount will be recovered from the Final Instalment of the EPC payable at the end of the first year (as per the Terms of Payment specified in Clause 14 of SCC)

25.2 In case of any defect in the system after commissioning, the Contractor shall repair it within 48 hours. Otherwise LD shall be charged for shortfall in generated units beyond 48 hours as per Tariff of Rs. 6.5, with the cumulative maximum of 5% of the maximum of the total contract value, and the same shall be deducted from their payments due / Bank guarantee submitted to the Employer the LD will be calculated with reference to GCC 50.1.2.

25.3 Liquidity Damages for during O&M period shall be charged at a rate of:

Difference in units derived from committed and achieved CUF x Rs. 6.5; for period after commissioning till the O&M contract closure on annual basis, upto 5% of the total Contract Value. The CUF shall be evaluated as per the formula mentioned at Clause 7 of TS of this NIT.

25.4 In case the Project fails to generate any power continuously for 1 month any time during the O&M period, apart from the force majeure and grid outages as certified by competent authority from DISCOM, it shall be considered as “an event of default”. In the case of default the entire O&M Bank Guarantee will be encashed.

25.5 The Liquidated Damages specified on account of delays, as specified in GCC Clause 34 and LD specified on account of deviations in Functional Guarantees as specified in SCC Clause 25 above shall be assessed independent of each other.

26 Mandatory spares (GCC Clause 7.3)

List of Mandatory spares

Sr No	Item	Quantity	UOM
1	Solar PV modules	0.5	% of DC Power Rating as proposed by the bidder in Bid

27 Miscellaneous

27.1 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.

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

27.3 The Contractor will construct/ provide a separate temporary facility/ arrangement at site (including office furniture, computer, vehicle etc) for the office of Employer's employee/ consultant/SECI's employees at the time of construction of the Solar Power Plant. All the temporary facilities constructed for the purpose of execution of the contract shall be removed after taking necessary permissions from the Employer immediately after Operational Acceptance.

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

27.5 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	7. Ratnakar Bank Limited
15. Union Bank of India	
16. United Bank of India	
17. UCO Bank	
18. Vijaya Bank	
19. Bank of Baroda	

SECTION – V

TECHNICAL SPECIFICATIONS

(NIT NO. – SECI/SD/2/NIT/2016/KPL)

SOLAR ENERGY CORPORATION OF INDIA LIMITED

(A Government of India Enterprise)

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

Tel: 011 – 71989239, Fax: 011 – 71989241

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DISCLAMIER:

1. Though adequate care has been taken while preparing the Bidding documents, 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 IFB/Issue of the IFB documents, it shall be considered that the IFB documents are complete in all respects has been received by the Bidder.
2. Solar Energy Corporation of India Limited (SECI) on behalf of Kamarajar Port Limited (KPL), The Employer, reserves the right to modify, amend or supplement this IFB documents including all formats and Annexures.
3. While this bidding documents have been prepared in good faith, neither Employer or its authorized representatives 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 bidding documents, even if any loss or damage is caused by any act or omission on their part.
4. The specification mentioned for all the equipment which include Solar modules, PCU, combiner boxes, DC cables, module mounting structures, transformer, CT, PT, LT/ HT cables, interfacing panels, switch gears & other associated equipment etc., to complete the power generation and evacuation to the designated substation, in the present bidding documents is for the **reference** only. It is subject to revise/ alter as per the design/ planning/Good engineering practices etc., to be carried out by the selected bidder, to the satisfaction of the Employer or its authorized representatives. It is advised that the bidders 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 throughout the plant life cycle. Moreover, the components not separately mentioned, but are required to complete the plant for operation is also included in the scope of bidder and shall be vetted by the Employer or its authorised representatives.

General Manager

Solar Energy Corporation of India Limited

Noted and Accepted

Place:

(Signature)

Date: Name and Designation of bidder

A. Introduction

1. Site Description

1.1 The land for the proposed project is located at Kamarajar Port Limited, Ennore, Dist: Chennai, State: Tamil Nadu.

1.2 Proposed Land Details:

Table 1: Site Details

Particulars	Description
Details of proposed capacity of the solar power plant	240 kW (AC) Solar PV Plant (Mono/ Multi crystalline) at Kamarajar Port Limited, Ennore, Chennai, Tamil nadu
Suburb	Ennore
District	Chennai
State	Tamil Nadu
Location	Kamarajar Port Limited
Site Details/Connectivity/Access	Annexure 1: Site Details
Nearest Substation (Point of Interconnection) Details	KPL Administrative Block (11kV/440V Indoor Substation)
Power Evacuation required	200m (approx.)
Estimated life of PV Power plant	25 Years
Land Available	1.5 Acres (approx.)
Type of Land	Port Land
Details of land in possession	Land, owned by KPL, shall be handed over to Contractor for execution of contract after filling and levelling.
Minimum values of PR and CUF of the plant after netting off the auxiliary consumption.	PR : 0.78 & CUF : 18% (against installed DC capacity at STC)
Water and Power for Construction	To be provided by KPL on chargeable basis. Water@Rs.96/kl; Power during Construction@Rs.11/kWh

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.

2.2 Technology: Solar PV Mono/ multi-crystalline modules (>16 Multi, >18% mono) of high efficiency.

2.3 Adequate capacity of SPV module, PCUs, String Combiner 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.

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

2.5 Selection of the equipment's and adoption of a plant layout to ensure ease of maintenance.

2.6 Strict compliance with the established and proven quality assurance systems and procedures during the different stages of the project starting from sizing, selection of make, shipment, storage (at site) , during erection, testing and commissioning.

2.7 Proper monitoring of synchronization which ensures availability of power.

2.8 The plant instrumentation and control system should be designed to ensure high availability and reliability of the Plant Facilities to assist the operators in the safe and efficient operation of the plant with minimum effort. It should also provide for the analysis of historical data and help in Plant O&M people to take up the plant and equipment on predictive maintenance.

2.9 Inverter output voltage of 230-415V has to be stepped up to 11kV to connect it to the 11kV Indoor HT Panel of suitable rating at the point of interconnection as per the TS Clause 1.2. (Substation SLD shall be provided by the Employer)

2.10 The power plant has to operate in parallel with the grid system which is infinite electrical system. Any faults in the SPV power plant shall not affect the DISCOM network. Suitable protective measure is to be in built so that any disturbance of the grid will not cause any damage of the equipment's of the Solar Power Plant.

2.11 Plant should be designed such a way that solar PV plant get automatically isolated from grid in case of disturbance of grid and on normalisation of grid solar PV plant will synchronise automatically .

2.12 The basic and detailed engineering of the plant shall aim at achieving high standards

of operational performance especially considering following:

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

2.12.2 Selection of PCUs with proven reliability and minimum downtime and ready availability of requisite spares to be insured.

2.12.3 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.

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

2.12.5 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.

2.13 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.

2.14 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.

2.15 The minimum array capacity at STC shall be determined to have 264 kW (DC) output at the time of installation. If the bidder anticipates any degradation of the modules more than 2.5% of the module output during the first year, it shall be taken care of to

meet guaranteed generation to avoid liquidated damages/ compensation on account of Generation Performance Guarantees.

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

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

2.18 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%. Bidder recommendation of the spares shall be on the basis of established reliability.

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

2.20 The supply, erection, commissioning and all other allied works for said (AC) capacity SPV Power Plant shall be completed as per timelines specified under SCC.

C. Scope of Supply and Work

3. Detailed Scope of Work

3.1 Scope of Supply & Work includes all design & engineering, procurement & supply of equipment and materials, testing at manufacturers works, inspection, packing and forwarding, supply, receipt, unloading and storage at site, site preparation, reclamation work, associated civil works, services, permits, licences, installation and incidentals, insurance at all stages, erection, testing and commissioning of 240 kW (AC) (see Annexure-1) Grid Interactive Solar PV Power Plant and performance demonstration with associated equipment and materials on turnkey basis at Kamarajar Port Limited, Ennore, State: Tamil Nadu and 7 (seven) years comprehensive operation and maintenance from the date of commissioning or Operational Acceptance, whichever is later.

3.2 The equipment and materials for the said (AC) capacity 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 to meet the total minimum of the said AC capacity including mounting frames, structures including fasteners, washers etc., array foundation and module interconnection.

3.2.2 Array Junction boxes, distribution boxes and Fuse boxes: MCBs, Surge Arrestors with string monitoring capabilities and with proper lugs, glands, ferrules, terminations and mounting structures.

3.2.3 DC and AC cables of appropriate sizes with adequate safety and insulation.

3.2.4 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.

3.2.5 230 – 415V / 11kV Inverter transformer complying inverter manufacturer recommendation and state grid code.

3.2.6 11kV / 415V auxiliary transformer (s) of suitable rating and type.

3.2.7 Metering and protection system along with battery system.

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

3.2.9 Internal 415V interconnection & Indoor feeder panels to cater to auxiliary power supply needs of plant.

3.2.10 11kV indoor switchgear and panels having incoming and outgoing feeders with VCBs, CTs, PTs, Bus bars, cables terminals kits and bus section panel. The control and relay panel should form integral part of the switchgear (i.e. should be physically integrated into one unit). The switchgear will be installed in a separate switchgear room.

3.2.11 ABT meters (Main and Check) with all necessary metering rated CTs and PTs at the plant take off point as well as at the substation as per CEA Metering Regulation 2006 as amended time to time and state metering code.

3.2.12 Data acquisition system with remote monitoring facilities.

3.2.13 Lightning protection for entire plant area.

3.2.14 PVC pipes, cable conduits, cable trays and accessories/trenches.

3.2.15 Earthing of the entire plant as per relevant standards.

3.2.16 Control room equipment related to solar system etc.

3.2.17 Testing, maintenance and monitoring of equipment.

3.2.18 Spares & consumables, as required or recommended, for the O&M period.

3.2.19 Fire detection and protection system in buildings and fire extinguishers.

3.2.20 All safety gadgets during Construction and O&M period including but not limited to, rubber mats of appropriate grade, PPE, rubber gloves and shoes etc.

3.2.21 One Weather monitoring station: The Weather monitoring station with associated systems shall include but not be limited to the following:

- Pyranometers – One for horizontal and other in the tilted plane of array
- Ultrasonic Anemometer (wind speed and direction)
- Temperature Sensor – One for ambient and one for module surface
- Power source to the all sensors
- Data Logger
- Desktop and Printer

3.2.22 Construction of suitable infrastructures for power evacuation at 11kV from take-off points till the receipt of lines at the nearest substation as per Clause 1.2.

3.2.23 Design & Laying of 11kV underground armoured cable to distance of 200m (appox) from SPV plant to the nearest substation as per Clause 1.2.

3.2.24 Design of said AC capacity Grid Interactive Solar Power Plant and associated civil, structural, electrical & mechanical auxiliary systems includes preparation of single line diagrams (AC and DC) and installation drawings, manuals, electrical layouts, erection key diagrams, electrical and physical clearance diagrams, design calculations for cable-sizing and 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, covered under Bidders scope of work. In addition, bidder should develop standard drawing as per good engineering practice for cabling, earthing etc.

3.2.25 In addition to above, the Bidder is required to measure the Solar Radiation (in the Plane of Array as well as on Horizontal surface) and other climatic conditions relevant

to measure the plant performance. 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 insolation and climatic conditions.

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

3.2.27 Any other equipment / material, not mentioned but essentially required to complete the said (AC) capacity Solar Power Plant in all respect.

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

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 Employer as per requirement may be ensured, failing which Employer 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 underground cabling infrastructure from power plant boundary to inject power from Solar Photovoltaic Power Plant to the Point of interconnection at the substation as per Clause 1.2.

3.7 The items of civil design and 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 Construction and erection of perimeter fence and main/ security gate(s) for complete land area provided.

3.7.2 Construction of foundation for mounting structures for SPV panels, considering life of plant & existing soil/ natural conditions.

3.7.3 Civil foundation work for transformers, switchgears, buildings, equipment etc.

3.7.4 Construction of all roads including approach and internal roads for the solar project.

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

3.7.6 Stores cum control room building along with requisite workstations, air conditioning, internal and external illumination, other equipment as per the specifications.

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

3.7.8 Suitable Communication System for SCADA with remote monitoring capabilities, including subscription of internet data connection with sufficient bandwidth to remotely access SCADA until the O&M Period.

3.7.9 Construction of Storm water drainage & sewage network.

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

3.7.11 Galvanized steel/ HDPE conduits and their accessories and Pre-cast concrete pipes with accessories for crossings.

3.7.12 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.

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

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

3.7.15 Laying of 11 kV UG cable for power evacuation from take-off point at plant to the delivery point at the substation as per TS Clause 1.2.

3.8 Obtaining statutory approvals /clearances on behalf of the Employer from various Government Departments, in addition to Central/State Electricity Authorities/ TNEB/ /TNERC and including but not limited to, the following-

- Pollution control board clearance, if required
- Mining Department, if required
- Forest Department, if required
- Necessary connectivity approval for parallel operation of Plant from TANGEDCO. All other approval, as necessary for setting up of a solar power plant including CEIG, connectivity, power evacuation, railways, PTCC etc. as

per the suggested guidelines

3.9 All other statutory approvals and permissions, not mentioned specifically but are required to carry out hassle free Construction and O&M of the plant prevailing at Site.

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

3.11 Construction Power & construction Water as required for construction and completion of this contract are to be arranged by the Bidder or will be supplied by the Employer on chargeable basis, subject to availability.

3.12 Total Operation & Maintenance of Solar Photovoltaic Power Plant for the 7 year's period including deployment of engineering personnel, technicians and security personnel after the commissioning till final acceptance, during this period, the responsibility of O&M shall be with contractor.

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

3.14 Submission of following documents, drawings, data sheet, and engineering information to Employer or its authorized representative for review and approval in hard copy and soft copy from time to time as per project schedule:

3.14.1 Contour plan and soil investigation data for the sites can be shared by the Employer on request. However, the Employer takes no responsibility for the accuracy or completeness of either of the data and will not be liable for any inaccuracy of the same. Bidders are expected to get themselves satisfied with their own resources about authenticity of the data before consideration in their bids.

3.14.2 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.

3.14.3 Design basis criteria along with relevant standards (list of standards and respective clause description only)

3.14.4 Solar insolation data and basis for generation data.

3.14.5 Design calculations and sheets.

3.14.6 Detailed technical specifications of all the equipment.

3.14.7 General arrangement and assembly drawings of all major equipment.

3.14.8 Schematic diagram for entire electrical system.

3.14.9 GTP & G.A. drawings for all types of structures/ components, 11kV switchgears & other interfacing panels.

3.14.10 Relay setting charts.

3.14.11 Quality assurance plans for manufacturing and field activities

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

3.14.13 Detailed risk assessment and mitigation plan.

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

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

3.14.16 As-built drawings / documents and deviation list from good for construction (GFC) after commissioning of the Plant.

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

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

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

3.16 The contractor shall forward the following to Employer within 20 days from issue of LOI:

3.16.1 Schedule for various activities in the form of PERT Chart.

3.16.2 Detailed engineering calculations, Design basis report and complete layout of the plant.

3.16.3 Equipment data sheets, Guaranteed technical particular of equipment and GA drawings of major equipment like, inverter, mounting structure and transformer.

3.17 Providing a detailed training plan for all operation, maintenance procedures, which

shall after approval by Employer form the basis of the training program. The contractor shall also provide training to Employer's nominated staff.

3.18 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.

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

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

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

3.22 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).

3.23 Procurement of spare 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 during entire O&M period.

3.24 Handover the system to maintain an inventory of spare parts, tools, equipment, consumables and supplies for the facility's operation along-with required details of recommended spares list with all associated information regarding replacement records, supplier details, tentative cost, storage details, specifications on the basis of replacement frequency and mean time between failures and mean time to restore at the culmination of penultimate year under O&M period.

3.25 Maintain and keep all buildings, roads, equipment etc., in clean, green and workable conditions.

3.26 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.

4. Operation and Maintenance

4.1 The contractor shall be entrusted to carry out the total O&M activities of the Plant Facilities to the contractor for the 7 (seven) years after commissioning w.e.f. from the date of Operational Acceptance.

4.2 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 DISCOM/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, preventive and corrective action.
- General up keeping of all equipment, building, roads, Solar PV modules, inverter etc.
- Submission of periodical reports to Employer 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.
- Periodic cleaning of solar modules as per the recommendations of OEM
- Replacement of Modules, Invertors/PCU's and other equipment as and when required.

- Comprehensive Repair, Operation & maintenance all other facilities like roads, drainages, water supply system and other civil, mechanical, electrical & plumbing system developed during project as a part of Solar PV Power plant.

4.3 Continuous monitoring the performance of the Solar Power Plant and regular maintenance of the whole system including Modules, PCUs, transformers, underground cable, outdoor/indoor panels/ kiosks etc. are necessary for extracting and maintaining the maximum energy output from the Solar Power Plant.

4.4 Preventive and corrective 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 7 (Seven) years from the date of start of O&M of the project shall be carried out at fixed annual cost included in O&M cost quoted by the Contractor.

4.5 The period of Operation and Maintenance will be deemed to commence from the date of completion of performance demonstration/Operational 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.

4.6 All the equipment required for Testing, Commissioning and O&M 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.

4.7 Operation and Performance Monitoring

4.7.1 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.

4.7.2 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.

4.8 Maintenance

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

4.8.2 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.

4.8.3 Maintenance of other major equipment involved in Solar Photovoltaic Power Plant such as step up transformers, underground cable, indoor 11kV VCB 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.

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

4.8.5 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.

4.8.6 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.

4.8.7 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.

4.8.8 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.

4.8.9 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 or amended from time to time.

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

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

4.8.12 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.

4.8.13 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 for more than 2 times a year may lead to the Termination of the O&M Contract by the Employer.

4.9 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.

4.10 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. All the instruments are required to be calibrated from NABL

accredited lab before put in use. The certificate of the same shall be submitted to Employer for verification.

D. Technical Specification of Solar power plant

5. DC SYSTEM

5.1 Photovoltaic Module

5.1.1 Total capacity of PV Modules to be supplied for the 240 kW (AC) project is minimum of -264 kWp (DC) 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 Mono/poly-crystalline silicon photovoltaic modules as per the specifications given below:

5.1.2 The solar photovoltaic modules with efficiency more than 16% for multi-crystalline, 18% for mono-crystalline silicon based modules with positive tolerance only.

5.1.3 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 of less than 0.3% to meet the specifications.

5.1.4 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.

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

5.1.6 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.

5.1.7 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.

5.1.8 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.

5.1.9 The rated output of the modules shall have positive tolerance of +5W and no negative tolerance is allowed.

5.1.10 Modules should have rugged design to withstand tough environmental conditions and high wind speeds (minimum up to 250 km/h).

5.1.11 Modules shall perform satisfactorily in relative humidity up to 95% and temperature between -10 degree centigrade and 85degree centigrade (module temperature).

5.1.12 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.

5.1.13 The modules shall be warranted for minimum of 10 years against all material/ manufacturing defects and workmanship.

5.1.14 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 61701: Salt Spray test for highly corrosive environment
- IEC 62716: Ammonia Resistant certified, if applicable
- Test certificate from NABL approved or /ILAC member body certified labs shall be provided.

5.1.15 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.

5.1.16 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.

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

5.1.18 The temperature co-efficient of power for the modules shall not be more than 0.45% / °C.

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

5.1.20 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.

5.1.21 The module frame shall be made of anodized Aluminium or 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 to connect it to the earthing grid.

5.1.22 All materials used for manufacturing solar PV module shall have a proven history of reliability and stable operation in external applications. Module shall perform satisfactorily in relative humidity up to 95% with ambient temperature between -10°C to +50°C. The material shall withstand adverse climatic conditions, such as high speed wind, blow with dust, sand particles, and saline climatic / soil conditions and for wind speed of 250 km/hr.

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

5.1.24 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.

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

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

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

5.1.28 Review of Document, Inspection and tests:

5.1.28.1 Incoming Checks on bought out items (listed in third party test reports of relevant standard), as per internal standards of the manufacturer

5.1.28.2 In-process checks, as per internal standards of the manufacturer

5.1.28.3 Sample tests as per ISO2859-1:1999 (Normal Inspection, unless otherwise stated) in accordance with an Acceptance Quality Plan (AQP) submitted by the

Contractor for:

a. Electrical Characteristics
   i. Power (Flash test)
   ii. Dielectric withstand (Hipot test)
   iii. Insulation Resistance (IR) test
   iv. Ground continuity test
b. Visual Inspection - as per the Visual Acceptance norms specified in the AQP
c. Electroluminescence Test - as per the EL Inspection norms specified in the AQP
d. Other Checks – Pallet Box Packing

Note:

- The detailed Acceptance Quality Plan shall be submitted by the Contractor prior to placement of order, for approval of the Employer.
- The Supplier shall provide a valid calibration certificate of the apparatus used.
- The schedule for production and Pre despatch Inspection of Finished Goods shall be intimated to the Employer well in advance, and in no case less than 3 working days prior to commencement of Inspection at a location within India and 7 days in case of a foreign country.

5.2 DC Cables

5.2.1 The DC Cables in a solar PV plant are used in the following areas

a. Interconnecting SPV modules
b. From SPV Modules up to String Monitoring Unit(SMU)
c. From SMU up to the Inverter.

5.2.2 DC Cables (Interconnecting SPV Modules and from SPV Modules to SMU):

Cables used for inter-connecting SPV modules as well as Modules to SMUs shall conform to the requirements of TUV specification 2 Pfg 1169/08.2007 for DC cable for photovoltaic system.

5.2.3 These cables shall meet the fire resistance requirement as per TUV specification 2 Pfg 1169/08.2007 and shall be electron beam cured.

5.2.4 The Cables used for positive and negative shall have distinct colour identification on outer sheath of the cable preferably with identifiable line along the cable. Insulation of the cable shall have natural colour without any colour additive.

5.2.5 In addition to manufacturer's identification on cables as per TUV, following marking shall also be provided over outer sheath.

a) Cable size and voltage grade.
b) Word "FRNC" at every 5 metre.
c) Sequential marking of length of the cable in metres at every one metre
d) Colour coding for positive and negative wires.

5.2.6 The Printing shall be progressive, automatic, in line and marking shall be legible and indelible.

5.2.7 Type test, routine, acceptance tests requirements for these cables shall be as per TUV specification 2 Pfg 1169/08.2007.Charges of routine and acceptance tests shall be deemed to be included in the cable price. Sampling for acceptance tests will be as per IS 7098.

5.2.8 DC Cables (SMU to inverter): Cables used between SMUs and Inverters shall be of min. 1.5 kV (DC) grade. These Power cables shall have compacted Aluminium/copper conductor, XLPE insulated, PVC inner-sheathed (as applicable), Armoured, FRLS PVC outer sheathed conforming to IS: 7098 (Part-I). These cables shall confirm to the requirements of the standards & codes specified under LT Cables head and any other relevant standard.

5.2.9 DC Cables Sizing Criteria

The Maximum voltage drop of DC Cables (from *SMU* to Inverters) shall be limited to 1.5%.

5.2.10 Review of Document, Inspection and tests:

i. High voltage test
ii. Conductor resistance at 20deg. C
iii. Constructional and dimensional test
iv. Insulation resistance test
v. Flammability test
vi. Cable end sealing

5.3 String Monitoring Units (SMU)

5.3.1 General:

SMU shall have protection devices to protect the PV modules from current/voltage surges. SMU should be capable to monitor the string/sub- array currents, Array voltage and total current of all the strings connected to SMU. The nos. of Sub-array shall be restricted to two arrays, [if clubbed together through a "Y" connector]. SMU

shall have provision to monitor all the above parameters and shall communicate and transfer the required data to the SCADA for remote monitoring purposes.

5.3.2 Codes and Standards

Codes	Relevance
UL 94 V	Fire Resistant/ flammability
UL 746C	UV Resistant
IEC 62262	Mechanical Impact Resistance
IS 2147/IEC 60529	Enclosure Protection
IEC 61643-12	Surge Protection
IEC 62208	Enclosure for low voltage Switchgear and control gear assemblies

5.3.3 General Requirement

SMU shall be equipped (but not limited to) with the following:

i. DC Disconnector to disconnect the PV strings from the Inverter for maintenance purpose.

ii. String fuses (one for each string) to prevent the reverse current flow.

iii. Surge Protection Devices [Type II] for protection against surge currents and voltages.

iv. Current and Voltage measurement shall be shunt based sensors.

v. Suitable communication link/ media /Interface to communicate the data to SCADA.

vi. The following parameters shall be available at SCADA for monitoring the health of the each PV string:

   a. String(s) Current
   b. Voltage of SMU
   c. Total current of SMU
   d. Total Power of SMU
   e. Status of Disconnector Switches and MOVs

5.3.4 DC Surge Protection Devices (SPD):

SPD shall consist of three Metal Oxide Varistors (MOV) type surge arrestors which shall be connected from positive and negative bus to earth. The discharge

capability of the SPD shall be at least 10kA at 8/20 micro second wave as per IEC 61643-12. During earth fault and failure of MOV, the SPD shall safely disconnect the healthy system. SPD shall have thermal disconnector to interrupt the surge current arising from internal and external faults. In order to avoid the fire hazard due to possible DC arcing in the SPD due to operation of thermal disconnector, the SPD shall be able to extinguish the arc.

5.3.5 String Fuses

In order to provide protection to all cables and modules, string fuses shall be provided in both positive and negative legs of the string cabling. However, in case of negative grounded inverters, string fuse shall be provided in positive leg only as per recommendation of inverter manufacturer. String fuses shall be of gPV category and dedicated to solar applications and conform to IEC 60269-6 or UL-2579 standards. String fuses should be so designed that it should protect the modules from reverse current overload.

5.3.6 SMU Enclosure

5.3.6.1 The enclosure shall be fire retardant with self-extinguishing property and free from Halogen.

5.3.6.2 Degree of protection for enclosure shall be at least IP 65.

5.3.6.3 The enclosure shall be UV protected.

5.3.6.4 The mechanical impact resistance of enclosure shall be IK 07 or better.

5.3.6.5 The size of the enclosure shall be designed in such a way that the temperature rise of the enclosure should not more than 30 deg. C above the ambient temp of 50 deg. C. The components mounted inside the SMU shall have higher temperature withstand capability and shall continuously operate under such conditions without degrading the performance parameters and life expectancy. Contractor shall furnish the design calculation for temperature rise for owner's approval.

5.3.6.6 In each SMU 5% spare terminals (along with cable glands) rounded off to next higher integer shall be provided to connect the PV strings.

5.3.6.7 All terminals blocks shall be rated for min 1000V and rated continuously to carry maximum expected current.

5.3.6.8 In case, SMU is proposed to be mounted on the MMS structure, the additional load of the SMU shall be considered for the design of structure.

5.3.6.9 All internal wiring shall be carried out with 1100V grade stranded copper wires. All internal wiring shall be securely supported, neatly arranged readily accessible

and connected to component terminals and terminal blocks. Wire terminations shall be made with solder less crimping type of tinned copper lugs which firmly grip the conductor and insulation. Insulated sleeves shall be provided at all the wire terminations. Engraved core identification plastic *[UV resistant]* ferrules marked to correspond with the wiring diagram shall be fitted at both ends of each wire. Ferrules shall fit tightly on wires shall not fall off when the wire is disconnected from terminal blocks.

5.3.7 DC Plug-In Connectors for Field Cabling

5.3.7.1 Cable connector to be used for connecting SPV modules and String monitoring boxes shall be In accordance with DIN EN 50521. Connector shall be of plug and socket design to be plugged together by hand but can be separated again using a tool only.

5.3.7.2 Technical Requirements

- Rated Current, IEC (90 °C) — 30 A (4 mm^2, 6 mm^2)-40 A (10 mm^2)
- Rated Voltage — 1000 Volts as per TUV
- Connector Design — Snap-In locking Type
- Protection Degree — IP67
- Ambient Temperature — (-) 400 C to (+) 900 C
- Protection/Safety Class — Class II

5.3.8 Review of Document, Inspection and tests:

5.3.8.1 Suitable numbering system shall be evolved for easy identification and traceability of SMU during erection, commissioning and maintenance. Same numbering system should be reflected in SCADA system.

5.3.8.2 Test on SMU shall include the following:

A) Checks on bought out items as per internal standards of the manufacturer

B) In-process checks, as per internal standards of the manufacturer

C) Sample tests as per following:

1 IR-HV-IR test (as per ISO2859-1:1999)

2 String Monitoring Card/ Power Supply card/ DC-DC Converter function check (as per ISO2859-1:1999)

3 Communication Function Test (as per ISO2859-1:1999).

5.4 Power Conditioning Unit (PCU)

5.4.1 Power Conditioning Unit (PCU) shall consist of Inverter shall along with associated control & protection, filtering, measuring instruments and data logging devices.

5.4.2 The PCU shall be designed to supply the three AC power to grid. The rated power/name plate capacity of the inverters shall be the AC output of the inverter at 50^{o}C. Any inverters with AC output at 50^{o}C, below the name plate/rated power of the inverter shall not be allowed.

5.4.3 The inverter supplied shall have minimum of 10% additional DC input Capacity. (E.g. Inverter supplied with rated capacity of 100 kW (AC) shall accept at least 110 kW of DC power.)

5.4.4 PCU must have provision to be isolated from grid through Air circuit breakers which shall be inbuilt with the inverter or located in separate standalone panel.

5.4.5 Dimension, weight, cooling arrangement etc. of the PCU shall be indicated by the Bidder in the offer. Type (in- door & out-door) of installation also to be indicated.

5.4.6 Bidder has to provide sufficient information to the satisfaction of the Employer before placing the final order for PCUs/Inverters.

5.4.7 PCU shall confirm to IEC 61000 or equivalent international standard for compliance to requirements for electromagnetic compatibility and to IEC 60068-2 or equivalent international standard for requirement of environment testing.

5.4.8 The minimum European efficiency of the inverter shall be 98% 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.

5.4.9 The PCU shall remain connected to the grid as per central electricity authority (CEA) technical (standards for connectivity to the grid) regulation 2007 with all latest amendments and its component shall be designed accordingly.

5.4.10 The PCU shall have protection against any sustained fault, lighting discharge in feeder line and earth leakage faults.

5.4.11 The incoming DC feeder of PCU shall have suitably rated isolators to allow safe start up and shut down of the system and it terminal should be shrouded. The DC feeder shall terminate in the fuse box through suitable fuse rating. The PCU fuse box shall have one spare terminal with fuse and holder for future use. The connection between the fuse box and inverter shall be through copper bus bars or copper cable via bimetallic lugs.

5.4.12 Internal surge protection device (SPD) shall be provided in the PCU on DC and AC side. It shall consist of Metal Oxide Varistor (MOV) type arrestors. The discharge capability of the SPD shall be at least 10KA at 8/20 micro second wave as per (Type II) IEC 61643-12. During earth fault and failure of MOV, the SPD shall safely disconnect the healthy system. SPD shall have thermal disconnector to interrupt the surge current arising from internal and external faults. In order to avoid the fire hazard due to operation of thermal disconnector, the SPD shall extinguish the arc.

5.4.13 The PCU should be designed for parallel operation through galvanic isolation. Solid state electronic devices shall be protected to ensure smooth functioning as well as ensure desired life expectancy of the inverter.

5.4.14 The PCU shall have anti-islanding protection as per IEC 62116 or equivalent international standard.

5.4.15 In case of grid failure, the PCU shall be re-synchronized with grid after revival of power supply. Vendor to furnish the time taken by PCU to be re- synchronized after restoration of grid supply same to be indicated in data sheet to be submitted during detail engineering stage.

5.4.16 PCU shall confirm to IEC 62109 or IEC 62103 or equivalent international standard for compliance to requirement for the design and manufacture of PCU for protection against electric shock, fire, mechanical and other hazards.

5.4.17 Control and read out should be provided on the indicating panel which is the integral part to the inverter. Display should be simple and show all the relevant parameter relating to PCU operational data and fault condition in form of front panel parameter/LED or two line LCD display. It shall include all important parameter i.e. DC input voltage, AC output voltage , AC output current, AC output power, frequency etc. and the same has to be made available to SCADA also.

5.4.18 The PCU shall be equipped with appropriate self –protective and self-diagnostic feature to protect itself and 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 when the PCU, including commutation failure, shall be cleared by the protective device.

5.4.19 The PCU design shall be such that it will not excite any resonant condition in the system that may lead to islanded operation of PV plant and loss of generation.

5.4.20 In case PCU need auxiliary power supply, standalone UPS with battery backup of 120 minutes shall be used to meet auxiliary power requirement of PCU.

5.4.21 PCU shall have in built control feature for changing output set point individually and simultaneously from CMCS through plant SCADA to have real time control over the total power exported to the grid. In addition, operator shall be able to limit the total power (active and reactive) injected in the grid through manual intervention as and required for grid security.

5.4.22 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 PCUs should be incorporated in the PCUs, keeping in mind the extreme climatic condition of the site as per the recommendations of OEM to achieve desired performance and life expectancy.

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

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

5.4.25 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.

5.4.26 Operational Requirements for Inverter/ PCU

5.4.26.1 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. Inverters must operate in synergy and intelligently to optimize the generation at all times with minimum losses.

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

5.4.26.3 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.

5.4.26.4 The system shall automatically "wake up" in the morning and begin to export

power when there is sufficient solar energy and the grid voltage and frequency is in range.

5.4.26.5 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.

5.4.26.6 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.

5.4.26.7 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.

5.4.26.8 PCU shall have provisions/features to allow interfacing with monitoring software and hardware devices.

5.4.27 Earthing Of Inverters: DC side of each inverter shall be earthed to distinct earth pit through adequate size conductor as per IS 3043 -1987. The size of conductor shall be as per the maximum fault current of DC system.

5.4.28 Standards & Compliances

PCU shall conform 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.	IEEE 519
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 or equivalent
Grid Connectivity	Relevant CEA/ CERC regulation and grid code (amended up to date)
Reliability test standard	IEC 62093 or equivalent

5.4.29 The Bidder should select the inverter (Central/string) as per its own system design so as to optimize the power output.

5.4.30 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)
- Total Harmonic Distortion (THD) <3%
- No load loss < 1% of rated power and maximum loss in sleep mode shall be less than 0.05%
- Optional VAR control
- Power factor Control range: 0.9 (lead – lag)
- Humidity: 95% Non – Condensing
- Unit wise & integrated Data logging
- Dedicated Prefabs / Ethernet for networking

5.4.31 Inverter/ Power Condition unit must provide protection against:

- Over current
- Over temperature
- AC/ 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

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

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

5.4.34 The power conditioner must be entirely self-managing and stable in operation.

5.4.35 A self-diagnostic system check should occur on start up. Functions should include a test of key parameters on start up.

5.4.36 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
- Frequency

5.4.37 Documentary Requirements & Inspection

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

5.4.37.2 The Contractor shall provide to the Employer, data sheet containing detailed technical specifications of all the inverters and PCUs,

5.4.37.3 Type test reports including temperature rise and surge withstand test. In case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the owner either at third party laboratory in the presence of owner's representative and submit the reports for approval.

5.4.37.4 Operation & Maintenance manual before dispatch of PCUs.

5.4.37.5 The Employer or its authorized representative reserves the right to inspect the PCUs/ Inverters at the manufacturer's site prior to dispatch.

5.4.37.6 Routine tests as per following on the assembled PCU:

a. Test to demonstrate automatic / manual synchronization and connection to utility service

b. Test to demonstrate operation protective (including utility service interface protection) and instrumentation circuits demonstrated by direct test if feasible or by simulation operation conditions for all parameters that cannot be directly tested.

c. Test to demonstrate operation of start-up, stable operation of the PCU, disconnection and shutdown controls and response to other control signals

5.4.38 Following sample tests on the assembled PCU: (1 Panel per offered lot)

a. Prior to the inspection call, manufacturer shall submit the MQAP for the inverter manufacturing along with the test offered during the inspection and type test report.

b. Sample testing to include measurement of phase currents, efficiencies, harmonic content and power factor at four points preferably 25, 50, 75 and 100% of the rated nominal power.

c. Maximum power point tracking (MPPT) functional check

6. AC SYSTEM

6.1 LT Switchgear

6.1.1 LT Switchgear shall mean the combination of electrical disconnect switches, fuses or circuit breakers and all associated accessories used to control, protect and isolate electrical equipment on the low voltage side of electrical interconnection.

6.1.2 Codes and Standards

All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions as published one month prior to the date of opening of bids. In case of conflict between this specification and those (IS codes, Standards etc.) referred to herein, the former shall prevail. All work shall be carried out as per the following codes and standards.

IS CODE	Relevance
IS 694	PVC insulated cables for working voltages up to and including 1100V
IS/IEC 60947–1	Degree of protection provided by enclosures for low voltage Switchgear and Control gear
IS 1248	Electrical Indicating instruments
IS 3202	Code of practice for climate proofing of electrical Equipment.
IS/IEC 60947–2	AC Circuit Breakers including MCCB
IS 2705	Current Transformer
IS/IEC 60947–4-1	Contactors and motors starter for voltages not exceeding 1000 V AC or 1200 VDC
IS 3072	Code of practice for installation and maintenance of Switchgear
IS 3156	Voltage Transformer

IS 3231& IEC 60255	Electrical relays for power system protection.
IS/IEC 60947–1	General Requirements for Switchgear and Control gear for voltages not exceeding 1000 V.
IS 5082	Wrought Aluminum and Aluminum alloys for electrical purposes.
IS/IEC 60947–5-1	LV switchgear and Control gear Control current devices and switching element.
IS 8623 (3 parts) / IEC 61439-1&2	Specification for factory built assemblies of Switchgear & Control gear for voltages up to and including 1000 V AC & 1200 V DC.
IS/IEC 60947	Air-Break Switches, air break disconnector, air break disconnector and fuses combination unit for voltage no exceeding 1000V AC or 1200V DC
IEC 60255	Electrical Relays
IS 3043	Code of practice for earthing.
IS 11171	Specification for dry type transformers.
IEC 61850	Communication networks and systems in substations
IS 13703/ IEC60269	HRG Cartridge fuses
IS:3043	Code of practice for earthing.

6.1.3 All outdoor equipment shall be designed for operation in tropical humid climate at the required capacity. The reference environmental parameters 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	35^{o}C
Minimum ambient air temperature (Cooling)	-5^{o}C
Max. Relative Humidity	95%
Yearly Avg. number of thunder storms	30-50
Average Number of rainy days	60 days
Fog	In winter
Number of months during which topical monsoon prevail	5 months
Dust storms	May not occur
Average Annual rain fall	100 cms.

Maximum wind speed	250 kmph

6.1.4 Technical Parameters

6.1.4.1 Power Supply (AC SYSTEM)

The Bidder shall provide the complete turnkey design, supply, erection, testing and commissioning of equipment to collect the output of PCU(s) at a common location and step-up to 11kV from where it shall be transmitted to the 11 kV substation at KPL Administrative Block through underground cable. However, the detailed scheme of design lies with the bidder and must submit the same to Employer for approval prior to construction.

1	Voltage	415V+/-10%,3 Phase, 4 wire, Neutral Solidly Earthed
2	Frequency	50 Hz +/- 5%
3	Combined variation (in volts & frequency)	10% absolute sum

1.6.1.4.1 Cubicle Data (Bus-bar Rating of Inverter Breaker)

1	Continuous Current rating	As per system requirement and SLD
2	Short time rating where	
	a) Circuit Breaker (CB) is used as incomer	50kA (RMS) for one sec
	b) Fuse protection is used in Incomer	Prospective current of 50KA (RMS) for the fuse clearing time
3	Dynamic Rating where	
	a) Circuit Breaker (CB) is used as incomer	105kA (PEAK)
	b) Fuse protection is used in Incomer	Prospective current of 105kA (PEAK) as limited by fuse
4	Bus bar insulation	
	a) For switchgear	PVC Sleeve insulated

Note: For other switchgear, the bus requirement shall be as per system requirement.

6.1.4.2 Circuit Breaker

1	Type	Air break spring charged stored energy type
2	Operating duty	O-3min-OC-3min-OC

3	Symmetrical interrupting	50kA (RMS)
4	Short circuit rating	105kA (PEAK)
5	Short Circuit Breaking current	
	a) AC Component	50kA (RMS)
	b) DC Component	As per IS:13947
6	Short time withstand	50kA(RMS) for one sec
7	Number of auxiliary contact	4 NO & 4 NC

6.1.4.3 DIGITAL Multifunctional Meter

1	Accuracy class	0.5
2	Voltage ratio	415/110 V

6.1.5 Testing

6.1.5.1 Type Test

- Degree of protection as per relevant IS
- Temperature Rise test (Applicable for Panel having capacity more than 400 A)

6.1.5.2 Routine test

- Verification of make and rating of each component as per the approved drawing
- Finishing and aesthetic look of the panel.
- Physical verification for the completeness of panel such as Dimensions, Bus-bar arrangement (vertical and horizontal), Cable termination arrangement including Gland Plate arrangement, Earth Bus and earthing of panel including hinges.
- IR-HV-IR test.

6.2 HT Switchgear

6.2.1 HT Switchgear shall mean the combination of electrical disconnect switches, fuses or circuit breakers and all associated accessories used to control, protect and isolate electrical equipment on the high voltage side of electrical interconnection.

6.2.2 Codes and Standards

CODE	**Relevance**
IS: 722	AC electricity meters.
IS: 996	Single phase small AC and universal electrical motors.

IS: 1248	Direct Acting indicating analogue electrical measuring instruments and Accessories
IS: 13947	Degree of protection provided by enclosures for low voltage switchgear and control gear.
IS: 2544	Porcelain post insulators for systems with nominal voltages greater than 1000 Volts.
IS: 2705	Current transformers
IS: 3156	Voltage Transformers
IS: 6005	Code of practice for phosphating of iron and steel.
IEC:61850	Communication Standard for Numerical relays
IS: 9046	AC contactors for voltages above 1000 volts and up to and including 11000 Volts.
IS: 13703	Low voltage fuses
IS: 9385	HV Fuse
IS/IEC: 62271-200	High voltage metal enclosed switchgear and control gear.
IS/IEC: 62271-100	High voltage alternating current circuit breakers.
IS: 9921	A.C. disconnectors (isolators) and Earthing switches for voltages above 1000 V
IS: 13118	Specification for high voltage AC circuit breakers.
IEC: 60099-4	Metal oxide surge arrestor without gap for AC system

6.2.3 Technical Parameters

System Parameters		
1	Nominal System Voltage	11 kV
2	Highest System Voltage	12 kV
3	Rated Frequency	50 Hz
4	Number of Phases/Poles	3
5	System Neutral Rating	Solidly grounded
6	Minimum system Fault level	As per system design
7	Short time rating for bus bars, ckt breakers, current transformers and switchgear assembly	12.5 kA (rms)*
8	Dynamic withstanding rating	2.5 times of system fault current

9	Control Supply Voltage	220 V DC/110V DC unearthed
10	Max. Ambient air Temp	50 deg C

*12.5 kA or system requirement whichever is higher

6.2.4 Bus Bar

SYSTEM PARAMETERS		
1	Continuous current rating at 50 deg C	As per requirement
2	Temperature Rise allowed above ambient	40 deg C for plane joints 55 deg C for silver plated joints

6.2.5 Current Transformer

CURRENT TRANSFORMER		
1	Secondary Current	1A
2	Class of insulation	Class E or better
3	Rated output of each	Adequate for the relays and devices connected, but not less than five (5) VA.
4	Accuracy class	
	a) Protection	5P20
	b) Measurement	0.2S
5	Minimum primary earth fault current to be detected by CBCT	3
6	Instrument Security factors for Measurement CTs	5
7	Number of terminals in marshalling box	All terminals of control circuits wired up to marshalling box plus 20% spare terminals

6.2.6 Circuit Breakers

CIRCUIT BREAKERS		
1	The circuit breakers current rating shall be selected from the load current given in SLD which is at an ambient of 50 deg. C.	
2	Short circuit breaker current	11 KV

	A.C. component	12.5 kA or system requirement whichever is higher
	D.C. component	As per IS: 13118 or IEC-62271
3	Short Circuit making current	2.5 times of system fault current (peak)
4	Operating Duty	O-3 Sec.-CO-3 Min-CO
5	Total break time	Not more than 4 cycles
6	Total make time	Not more than 5 cycles
7	Operating Mechanism	Motor wound spring charged stored energy type as per IEC-62271

6.2.7 Voltage Transformers

VOLTAGE TRANSFORMERS		
1	Rated voltage factor	2 continuous for all VTs
2	Class of insulation	Class E or better
3	Other parameters	BUS PT-0.5 Class, VA req. adequate for application. Line PT-0.5 Class for sync. / 3P for door interlocks & protection, VA req. adequate for application.
4	One Minute Power frequency withstand voltage for secondary winding	2 kV RMS
5	Number of terminals in control Cabinet	All terminals of control circuits wired up to marshalling box plus 10 terminals spare
6	Partial discharge level	10 Pico Coulombs max.

6.2.8 Switchgear Panel

6.2.8.1 The switchgear boards shall have a single front, single tier, fully compartmentalized, metal enclosed construction complying with IEC 62271-200, comprising of a row of free standing floor mounted panels.

6.2.8.2 The circuit breakers and bus VTs shall be mounted on withdrawable trucks which shall roll out horizontally from service position to isolated position. For complete withdrawal from the panel, the truck shall rollout on the floor or shall roll out on telescopic rails. In case, circuit breaker is to be rolled out on telescopic rails, Contractor shall provide suitable trolley for withdrawal and insertion of the truck from and into the panel at each location i.e. switchgear room. Testing of breaker

shall be possible in isolated position by keeping the control plug connected.

6.2.8.3 The trucks shall have distinct SERVICE and ISOLATED positions. It shall be possible to close the breaker compartment door in isolated position to retain the specified degree of protection of switchgear panel. Circuit Breaker rack-in and rack-out from service to test, test to isolated position or vice-versa shall be possible only in the compartment door closed condition.

6.2.8.4 The switchgear assembly shall be dust, moisture, rodent and vermin proof.

6.2.8.5 The control/ relay compartments shall have degree of protection not less than IP 5X in accordance with IS/IEC 60947. However, remaining compartments can have a degree of protection of IP 4X. If louvers are provided, shall have very fine brass or GI mesh screen. Tight fitting gourmet/ gaskets are to be provided at all openings in relay compartment. Numerical relays shall be fully flush mounted on the switchgear panels at a suitable height.

6.2.8.6 The switchgear shall be specially design to withstand internal explosion etc. so that it should not endanger the operating personal while operating the breaker. In addition, pressure relief device shall be provided in each high voltage compartment of a panel for vent out the gases that may be generated in case of fault without spreading to other compartment. The pressure relief device shall not however reduce the degree of protection of panels under normal working condition.

6.2.8.7 Enclosure shall be constructed with rolled steel sections. The doors and covers shall be constructed from cold rolled steel sheets of 2.00mm or higher thickness. Gland plates shall be 2.5mm thick hot or cold rolled steel section and for non-magnetic material it shall be 3.0mm.

6.2.8.8 Total height of the switchgear panels shall not exceed 2600 mm. The height of switches, pushbuttons and other hand operated devices shall not exceed 1800mm and shall not be less than 700mm. Switchgear shall be cooled by natural air flow.

6.2.8.9 Suitable base frame made out of steel channels shall be supplied along with necessary anchor bolts and other hardware, for mounting of switchgear panels. These should be despatched in advance so that they may be installed and levelled when the flooring is being done.

6.2.9 Circuit Breakers

6.2.9.1 The circuit breakers shall be of Vacuum type.

6.2.9.2 They shall comprise of three separate, identical single pole interrupting

units, operated through a common shaft by a sturdy operating mechanism. An arrangement of two breakers in parallel to meet specified current rating shall not be acceptable.

6.2.9.3 Circuit breaker shall be restrike free, stored energy operated, anti-pumping and trip free type. Motor wound closing spring charging shall be provided for each breaker, even if it has built-in mechanical anti-pumping features. During closing, main poles shall not rebound and mechanism shall not require adjustment. Suitable dampers shall be provided to withstand the impact at the end of opening stroke.

6.2.9.4 The operating mechanism shall be such that failure of any auxiliary spring shall not prevent tripping and shall not lead to closing or tripping of circuit breaker. Failure of any auxiliary spring shall also not cause damage to the circuit breaker or endanger the operator.

6.2.9.5 Mechanical indicators shall be provided on the breaker trucks to indicate OPEN/ CLOSED conditions of the circuit breaker and charged/ discharge conditions of the closing spring. An operation counter of breaker shall be visible without opening the breaker compartment door.

6.2.9.6 The closing coil and spring charging motor shall operate satisfactorily at all values of control supply voltage 187-242 V AC/ 93.5-121V DC.

6.2.9.7 The time taken for charging of closing spring shall not exceed 30 seconds. The spring charging shall take place automatically preferably after closing operation. Breaker operation shall be independent of the spring charging motor which shall only charge the closing spring. Opening spring shall get charged automatically during closing operation. As long as power supply is available to the charging motor a continuous sequence of closing and operations shall be possible. One open-close-open operation of the circuit breaker shall be possible after failure of supply to the motor.

6.2.9.8 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.

6.2.9.9 Bidder shall indicate the noise level of breaker at distance of 50 to 150 m from base of the breaker.

6.2.9.10 The circuit breaker will normally be controlled from remote control panels through

closing and shunt trip coils. The local control console of relay flush mounted on the switchgear would normally use only for testing of circuit breaker in isolated position and for tripping it in an emergency. The closing and opening of the breaker shall also be possible from laptop through front serial port of the relay to facilitate commissioning activities.

6.2.9.11 6NO and 6NC auxiliary contacts per pole shall be provided as spare contacts.

6.2.9.12 Each panel shall have two separate limit switches, one for the service position and other for isolated position. Each of these limit switches shall have at least four (4) contacts which shall close in the respective positions.

6.2.10 Numerical Relays and Networking

6.2.10.1 All circuit breaker feeders shall be provided with communicable numerical relays (IED, i.e. Intelligent Electronic Device) complying with IEC-61850, having protection, control, measurement and monitoring features. These relays shall be networked and suitably interfaced with the Solar SCADA system for dynamic SLD display, status monitoring, measurements, event / alarm displays, reports, etc. The relays shall be flush mounted on panel front with connections from the inside. These numerical relays shall be of types as proven for the application and shall be subject to Employer's approval. Numerical relays shall have appropriate setting ranges, accuracy, resetting ratio and other characteristics to provide required sensitivity. All equipment's shall have necessary protections.

6.2.10.2 The numerical relay shall be capable of measuring and storing values of a wide range of quantities, events, faults and disturbance recording. The alarm/ status of each protection function and trip operation shall be communicated to solar SCADA. The numerical relays shall have built in features / hardware interface to provide such inputs to solar SCADA for analog / digital value.

6.2.10.3 All relays shall be rated for control supply voltage (AC OR DC) and shall be capable of satisfactory continuous operation between 80-120% of the rated voltage.

6.2.10.4 Failure of a control supply and de-energization of a relay shall not initiate any circuit breaker operation.

6.2.10.5 All numerical relays shall have freely programmable optically isolated binary inputs (BI) and potential free binary output (BO) contacts as per the requirement of control schematics. The quantities of such input / outputs shall be finalized during detailed engineering.

6.2.10.6 All the numerical relays shall have communications on two ports, local front port

communication to laptop/desktop and rear port on IEC 61850 to communicate with the interface equipment for connectivity with the Solar SCADA. Latest version of hardware and Software for interfacing the numerical relays with laptop/desktop has also to be provided.

6.2.10.7 All numerical relays shall have adequate processor memory for implementing the programmable scheme logic required for the realization of the protection/control schemes in addition to the built in protection algorithms.

6.2.10.8 All numerical relays shall have features for electrical measurements including voltage, current, power (active and reactive), frequency, and power factor and energy parameters. Measurement accuracy shall be 1% of rated RMS current and voltage.

6.2.10.9 Relays shall have event recording feature, recording of abnormalities and operating parameters with time stamping. Sequence of events shall 1ms resolution at device level.

6.2.10.10 Master trip (86) and non 86 trips shall be software configurable to output contacts and no separate master trip relay shall be used.

6.2.10.11 All numerical relays shall have provision of both current and voltage inputs. Relays shall be suitable for both residually connected CT input as well as CBCT input. Number of CT inputs shall be adequate for protections detailed elsewhere but not less than 4 sets, 3 nos. for phase fault & 1 no. for earth fault. The Numerical relays in the Incomers shall have at least 5 CT inputs. Relays shall be suitable for CT secondary current of 1A. All transformer feeder relays shall have provision for 3 VT inputs. Relays used in incomers, ties and bus couplers shall have provision of two sets of voltage signal inputs for the purpose of synchronization.

6.2.10.12 All CT terminals on the relays shall be of fixed type suitable for connection of ring-type lugs to avoid any hazard due to loose connection leading to CT open-circuit. In no circumstances Plug In type connectors shall be used for CT / VT connections.

6.2.10.13 All numerical relay shall have key pad/ keys to allow relay settings from relay front. All hand reset relays shall have reset button on the relay front.

6.2.10.14 Relays shall have self-diagnostic feature with self-check for power failure, programmable routines, memory and main CPU failures and a separate output contact for indication of any failure.

6.2.10.15 Relays shall have at least two sets or groups of two different sets of adoptable settings. Relays shall have multiple IEC/ ANSI programmable characteristics.

6.2.10.16 Design of the relay must be immune to any kind of electromagnetic interference. Vendor shall submit all related type test reports for the offered model along with the offer.

6.2.10.17 All cards / hardware of numerical relays shall be suitable for operation in Harsh Environmental conditions with respect to high temperature, humidity & dust.

6.2.10.18 All I/O s shall have galvanic isolation. Analog inputs shall be protected against switching surges, harmonics etc.

6.2.10.19 Numerical relays shall have feature for Time synchronization through the SCADA System / networking. The resolution of time synchronization shall be +/- 1.0 millisecond or better throughout the entire system.

6.2.10.20 Relays & Ethernet switches shall be suitable to accept both AC & DC supplies with range 120V or 240V with tolerance of 70 % to 120 % of rated voltage & shall be finalized during detailed engineering.

6.2.10.21 Disturbance Record waveforms, event records & alarms shall be stored in Non-volatile memory and failure of control supply shall not result in deletion of any of these data.

6.2.11 Bus-bars and Insulators

6.2.11.1 All bus bar and jumper connections shall be of high conductivity aluminium alloy. They shall be adequately supported on insulators to withstand electrical and mechanical stresses due to specified short circuit currents.

6.2.11.2 Bus bar cross-section shall be uniform throughout the length of switchgear. Bus bars and other high voltage connection shall be sufficiently corona free at maximum working voltage.

6.2.11.3 Contact surfaces at all joints shall be silver plated or properly cleaned and non-oxide grease applied to ensure an efficient and trouble free connection. All bolted joints shall have necessary plain and spring washers. All connection hardware shall have high corrosion resistance. Bimetallic connectors or any other technically proven method shall be used for aluminium to copper connections.

6.2.11.4 Bus bar insulators shall be of arc and track resistant, high strength, non-hygroscopic, non-combustible type and shall be suitable to withstand stresses due to over-voltages, and short circuit current. Bus bar shall be supported on the insulators such that the conductor expansion and contraction are allowed without straining the insulators.

6.2.11.5 Successful Bidder shall furnish calculation establishing adequacy of bus bar sizes for the specified continuous and short time current ratings.

6.2.12 Earthing and Earthing Devices

6.2.12.1 A copper / galvanized steel earthing bus of suitable cross section to carry the short circuit and short time fault currents to earth shall be provided at the bottom and shall extend throughout the length of each switch board. It shall be bolted/ welded to the framework of each panel and each breaker earthing contact bar.

6.2.12.2 All non-current carrying metal work of the switchboard shall be effectively bonded to the earth bus.

6.2.12.3 All metallic cases of relays, instruments and other panel mounted equipment shall be connected to earth by independent stranded copper wires of size not less than 2.5 sq. mm. Insulation colour code of earthing wires shall be green. Earthing wires shall be connected to terminals with suitable clamp connectors and soldering shall not be acceptable. Looping of earth connections which would result in loss of earth connection to other devices, when a device is removed is not acceptable. However, looping of earth connections between equipment to provide alternative paths of earth bus is acceptable.

6.2.12.4 VT and CT secondary neutral earthing shall be at one place only on the terminal block. Such earthing shall be made through links so that earthing of one secondary circuit may be removed without disturbing the earthing of other circuits.

6.2.12.5 Interlocks shall be provided to ensure that all safety features are taken care off. Details of the safety feature in-built shall be provided in the technical bid and technical data sheet.

6.2.12.6 All hinged doors shall be earthed through flexible earthing braid of suitable size.

6.2.13 Instrument Transformers

6.2.13.1 All current and voltage transformers shall be completely encapsulated cast resin insulated type, suitable for continuous operation at the ambient temperature prevailing inside the switchgear enclosure, when the switchboard is operating at its rated load and the outside ambient temperature is 50 deg. C. The class of insulation shall be E or better.

6.2.13.2 All instrument transformers shall withstand the power frequency and impulse test voltage specified for the switchgear assembly.

6.2.13.3 Current transformers may be multi or single core and shall be located in the cable termination compartment. All voltage transformers shall be single phase type and shall be supplied with a common marshalling box for a set of three single

phase units.

6.2.13.4 Polarity marks shall indelibly be marked on each instrument transformer and at lead terminals at the associated terminal block.

6.2.14 Surge Arrestor

6.2.14.1 The surge arrestors shall be of metal oxide, gapless type generally in accordance with IEC 60099-4 and suitable for indoor duty. These shall be mounted within the switchgear cubicle between line and earth, preferably in the cable compartment. Surge arrestor selected shall be suitable for un-earthed system and rating shall be in such a way that the value of steep fronted switching over voltage generated at the switchgear terminals shall be limited to the requirements of switchgear.

6.2.15 Control Supply

6.2.15.1 Each switchboard shall be provided at least two (02) Nos of 110/220V DC feeders for the control supply.

6.2.15.2 Each sub circuit shall have separate fuses. Fuse size shall be determined so as to achieve selective clearance between main circuit and sub circuit in case of fault. Potential circuits for protection and metering shall also be protected by separate fuse.

6.2.15.3 All fuses shall be of HRC link type conforming to IS: 13703 / 9385 mounted on suitable fuse bases. Fuses shall have operation indicators for indicating blown fuse condition. Fuse carrier base shall have imprints of the fuse rating and voltage. All accessible live connection to fuse bases shall be adequately shrouded.

6.2.16 Space Heater

6.2.16.1 Each switchgear panel shall be equipped with thermostatically control space heater(s), suitably located in breaker and cable compartments to prevent condensation within the enclosure. The space heater shall be connected to 240v single phase AC auxiliary supply available in the switchgear through switches and fuses provided separately for each panel.

6.2.16.2 In addition, a single phase 50 Hz AC plug point shall be provided in the interior of each cubicle with ON-OFF switch for connection of hand lamp.

6.2.17 Switchgear Wiring

6.2.17.1 All internal wiring shall be carried out with 650V grade, single core, 1.5 sq.mm stranded copper wires having minimum of seven strands per conductor and

colour coded, PVC insulation, and CT circuits shall be wired with 2.5 sq.mm wires. Extra flexible wires shall be used for wiring between fixed and moving parts such as hinged doors.

6.2.17.2 All wiring shall be properly supported neatly arranged, readily accessible and securely connected to equipment terminals and terminal blocks. Wiring troughs or gutters be used for this purpose. Internal wire terminals shall be made with solderless crimping type tinned copper lugs which shall firmly grip the conductor. Insulation sleeves shall be provided over the exposed parts of lugs.

6.2.17.3 Printed single tube ferrules marked to correspond with panel wiring diagram shall be fitted at both ends of each wire. The wire identification making shall be in accordance with IS: 375. Red Ferrules should be provided on trip circuit wiring.

6.2.18 Power Cable Termination

6.2.18.1 Cable termination compartment shall receive stranded aluminium conductor, XLPE insulated, shielded, armoured/ unarmoured, PVC sheathed, single/three core, unearthed/earthed grade power cable.

6.2.18.2 Minimum clearance of about 600mm shall be kept between the cable lug bottom ends and gland plates for stress cone formation for XLPE cables. Interphase clearance in the cable termination compartment shall be adequate to meet electrical and mechanical requirements besides ease of connection and disconnection of cables.

6.2.18.3 Cable termination compartment shall have provision for termination of power cables of sizes as finalize during detail engineering with removable undrilled gland plates. For all single core cable gland plates shall be nonmagnetic material. Cable entry shall be from bottom.

6.2.19 Name Plates and Labels

6.2.19.1 Each switch board shall have a name plate for its identification. All enclosure mounted equipment hall be provided with individual engraved name plates for clear equipment identification. All panels shall be identified on front as well as backside by large engraved name plates giving the distinct feeder description along with panel numbers. Back side name plates shall be fixed in panel frame and not on the rear removable cover.

6.2.20 Tests

6.2.20.1 Type Tests

All equipment to be supplied shall be of type tested design. During detailed

engineering, the contractor shall submit for Owner's approval the reports of all the following type tests carried out not earlier than ten years prior to the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.

A. Reports of the following type tests carried out on circuit breaker/ circuit breaker panels, of each voltage class and current rating shall be submitted:

1) Short circuit duty test on circuit breaker, mounted inside the panel offered along with CTs, bushing and separators

2) Short time withstand test on circuit breaker, mounted inside panel offered together with CTs, bushings and separators.

3) Power frequency withstand test on breaker mounted in side panel.

4) Lightning impulse withstand test on breaker mounted in side panel.

5) Temperature rise test on breaker and Panel together

6) Internal Arc Test as per IEC 62271-200

7) Measurement of resistance of main circuit.

8) Mechanical operation test.

B. Short circuit withstand test of earthing device (truck / switch).

6.2.20.2 **ROUTINE TESTS**: All acceptance and routine tests as per the specification and relevant standards IEC 62271-200 & IEC 62271-100 shall be carried out. Charges for these shall be deemed to be included in the equipment price.

6.2.20.3 **COMMISSIONING CHECKS/TEST**: After installation of panels, power and Control wiring and connections, Contractor shall perform commissioning checks as listed below to verify proper operation of switchgear / panels and correctness of all equipment in all respects. In addition, the Contractor shall carry out all other checks and tests recommended by the manufacturers.

GENERAL

a. Check name plate details according to specification.
b. Check for physical damage
c. Check tightness of all bolts, clamps and connecting terminals
d. Check earth connections.
e. Check cleanliness of insulators and bushings
f. Check heaters are provided
g. H.V. test on complete switchboard with CT & breaker in position.
h. Check all moving parts are properly lubricated.

i. Check for alignment of bus bars with the insulators to ensure alignment and fitness of insulators.
j. Check for interchange ability of breakers.
k. Check continuity and IR value of space heater.
l. Check earth continuity for the complete switchgear board.

Circuit Breakers

a. Check electrical and mechanical interlocks provided.
b. Checks on spring charging motor, correct operation of limit switches and time of charging
c. All functional checks.

Current Transformers

a. IR Value between windings and winding terminals to body.
b. Polarity tests.
c. Ratio identification checking of all ratios on all cores by primary Injection of current.
d. Magnetisation characteristics & secondary winding resistance.
e. Spare CT cores, if any to be shorted and earthed.

Voltage Transformers

a. Insulation resistance test.
b. Ratio test on all cores.
c. Polarity test.
d. Line connections as per connection diagram.

Cubicle Wiring

a. Check all switch developments.
b. It should be made sure that the wiring is as per relevant drawings.
c. All interconnections between panels shall similarly be checked.
d. All the wires shall be checked for IR value to earth.
e. Functional checking of all control circuit e.g. closing, tripping interlock, supervision and alarm circuit including proper functioning of component / equipment.
f. Check terminations and connections.
g. Wire ducting.

7. Inverter Transformer and Auxiliary Transformer

7.1 Technical Requirements

Sr. No.	Parameters	INVERTER TRANSFORMER	AUXILIARY TRANSFORMER
1.	VA Rating & Quantity	As per system requirement and SLD	

2.	Voltage Ratio (KV)	As per system requirement and SLD	
3.	Duty, Service & Application	Continuous Solar Inverter application and converter Duty (outdoor)	Continuous application (Outdoor)
4	Winding	As per SLD	2
5	Frequency	50 Hz	50Hz
6	Nos. of Phase	3	3
7	Vector Group & Neutral earthing	As per system/inverter manufacturer requirement and SLD	
8	Cooling	ONAN	ONAN
9	Tap Changer	OCTC , No. of steps shall be as per the SLD and system requirement	
10	Impedance at75 ^{o}C	As per Inverter Manufacturer requirement and SLD	As per system requirement and SLD
	Principal Tap		
	Other Taps		
11	Permissible Temperature rise over an ambient of 50 ^{o}C (irrespective of tap)		
	Top Oil	50deg. C	50deg. C
	Winding	55deg. C	55deg. C
12	SC withstand time (thermal)	2 Sec.	2 sec.
13	Fault Level & Bushing CT	As per system requirement and SLD	
14	Termination	As per system requirement and SLD	
15	Bushing rating, Insulation class (Winding & bushing)	As per relevant IS/IEC(However Inverter Transformer LV side winding & bushing insulation class shall be of at least 3.6 kV)	
16	Noise level	AS PER NEMA TR-1	
17	Loading Capability	Continuous operation at rated power on any TAP with voltage variation of +/-10%, also transformer shall be capable of being loaded in accordance with IS: 6600/IEC60076-7	

18	Flux density	Not to exceed 1.9 Wb/sq.m. at any tap position with +/-10% voltage variation from voltage corresponding to the tap. Transformer shall also withstand following over fluxing conditions due to combined voltage and frequency fluctuations: a) 110% for continuous rating. b) 125% for at least one minute. c) 140% for at least five seconds. Bidder shall furnish over fluxing char. up to 150%
19	Air Clearance	As per CBIP

* Single Line Diagram (SLD) will be finalized during detailed engineering.

Note: -

- Auxiliary transformers shall be suitable for 3 phase, 4 wire system with additional LVN bushing for equipment earthing.
- Inverter Transformer shall have Shield winding between LV & HV windings. Each LV winding must be capable of handling non- sinusoidal voltage with voltage gradient as per relevant applicable standards. Also shield winding shall be taken out from tank with separate connection with 2 nos. shield bushings and same shall be brought down along with support insulator from tank & copper flat up to the bottom of the tank for independent grounding.
- Vector group of inverter transformer shall be as per the inverter manufacturer requirement.
- Auxiliary Transformer up to and including 100 KVA can be either Oil filled or Dry Type (refer relevant clauses for their detail specification).
- Transformer shall be designed for at least 5% total harmonic distortion to withstand distortion generated by the inverter as well as possible outside harmonics from the network.

7.2 Codes and Standards

Standard	Relevance
IS:2026, IS:6600, IEC:60076	Specification of Power Transformers
IS:2099, IEC:60137	Bushings for alternate voltage above 1000V

IEC 60296	Insulating oil
IS:2705,IEC60185	Bushing CTs
IS: 3639	Fittings and accessories for power Transformer
Indian Electricity Act 2003, BEE Guideline 3 star or better & CEA notifications	

7.3 Constructional Details

7.3.1 Windings

a. The bidder shall ensure that windings of all transformers are made in dust proof & conditioned atmosphere.
b. The conductors shall be of electrolytic grade copper free from scales & burrs.
c. All windings of the transformers shall have uniform insulation.
d. Tapping shall be so arranged as to preserve the magnetic balance of the transformer at all voltage ratio.

7.3.2 Core

a. The core shall be constructed from non-ageing, cold rolled, super grain oriented silicon steel laminations equivalent to M4 grade steels or better.
b. Core isolation level shall be 2 kV (rms.) for 1 minute in air.
c. Adequate lifting lugs will be provided to enable the core & windings to be lifted.

7.3.3 Insulating oil

No inhibitors shall be used in the transformer oil. The oil supplied with transformers shall be new and previously unused and must conform to following while tested at supplier's premises and shall have following parameters.

S.No.	Properties	Permissible values
1	Kinematic Viscosity, mm^2/s	=<12 at 40 deg.C =<1800 at (-)30 deg.C
2	Flash Point,deg. C	>=140 deg.C
3	Pour point, deg. C	=<(-)40 deg. C
4	Appearance	Clear, free from sediment and suspended matter
5	Density kg/dm3 at 20 deg. C	=<0.895
6	Interfacial Tension N/m at 25 deg. C	>=0.04
7	Neutralisation value, mgKOH/g	=< 0.01
8	Corrosive sulphur	Non Corrosive

9	Oxidation Stability -Neutralization value, mgKOH/g -Sludge, % by mass	 =<1.2 =<0.8
10	Breakdown voltage As delivered, kV After treatment, kV	 >=30 >=70
11	Water content mg/kg	=< 30 in bulk supply =<40 in drum supply
12	Anti-oxidants additives	Not detectable
13	Dissipation factor, at 90deg. C And 40 Hz to 60 Hz	=<0.005
14	PCA content	=<1%
15	Impulse withstand Level, kVp	>=145
16	Gassing tendency at 50 Hz after 120 min, mm^3/min	≤ 5

7.3.4 Bushings

a. Bushing below 52KV shall be oil communicating type with porcelain insulator.
b. No arcing horns to be provided on the bushings.
c. Inverter transformer LV bushing palms shall be silver/tin plated.

7.3.5 Bushing CTs

a. They shall be of adequate rating for protection as required, WTI etc. All CTS (except WTI) shall be mounted in the turret of bushings.
b. All CT terminals shall be provided as fixed type terminals on the Marshalling box to avoid loose connection leading to CT opening. Plug in type connectors shall be used for CT.

7.3.6 Valves

a. All valves up to and including 50 mm shall be gun metal or of cast steel. Sampling & drain valves should have zero leakage rate.

7.3.7 Gaskets

a. Gasket shall be fitted with weather proof, hot oil resistant, rubberized cork gasket.
b. If gasket is compressible, metallic stops shall be provided to prevent over compression.

c. The gaskets shall not deteriorate during the life of transformer if not opened for maintenance at site. All joints flanged or welded associated with oil shall be such that no oil leakage or sweating occurs during the life of transformer. The quality of these joints is considered established, only if the joints do not exhibit any oil leakage or sweating for a continuous period of at least 3 months during the guarantee period. In case any sweating / leakage is observed, contractor shall rectify the same & establish for a further period of 3 months of the same. If it is not established during the guaranteed period, the guaranteed period shall be extended until the performance is established.

7.3.8 Testing and Inspection

In case the bidder/contractor has conducted such specified type test(s) within last ten years as on the date of bid opening, he may submit the type test reports to the owner for waiver of conductance of such type test(s). These reports should be for the tests conducted on the equipment similar to those proposed to be supplied under this contract and test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.

In case the Bidder is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in case the type test report(s) are not found to be meeting the specification requirements, the Bidder shall conduct all such tests under this contract at no additional cost to the Employer and submit the reports for approval.

7.3.9 Routine Tests

a. All routine test shall be carried out in accordance with IEC 60076 & IEC 60076-1.
b. Magnetic Balance and Magnetising Current Test
c. Measurement of no load current with 415 V, 50 Hz AC supply
d. Load Loss & Short Circuit Impedance Measurement on principal & Extreme taps
e. Measurement of capacitance & tan delta to determine capacitance between winding & earth.
f. Induced overvoltage test.
g. IR measurement on wiring of Marshalling Box.

7.3.10 Type Test

Type test shall be carried out on one transformer of each rating.

a. Lightning impulse (Full & Chopped Wave) test on windings (as per IEC 60076-3)

b. Temperature Rise test at a tap corresponding to maximum losses as per IEC 60076. Gas Chromatography shall be conducted on oil sample taken before & immediately after Temperature Rise test. Gas analysis shall be as per IS: 9434 (based on IEC: 60567), results will be interpreted as per IS: 10593 (based on IEC:60599).

c. Measurement of harmonics of no load current (special test)

d. Measurement of acoustic noise level as per NEMA TR-1 (special test).

e. Tank Vacuum & Pressure Test (as per CBI norms)

NOTE: -

i) All the type and special tests shall be conducted after performing Short Circuit Test. If Tank Vacuum & Pressure Test is to be carried out then it shall be conducted before SC test.

ii) Inverter Transformer LV winding Di-electric tests shall be carried out corresponding to levels (as per IEC 60076) for 3.6 kV class.

iii) Type and Special tests are not applicable in case of auxiliary transformers of rating including 100 KVA and below.

7.3.11 Transformer efficiency shall be as per Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electrical Lines) regulation, 2010.

7.3.12 Name plate and Markings

7.3.12.1 Rating plate

- Name of manufacturer
- Serial number
- Year of manufacture
- Number of phases
- KVA or MVA rating
- Frequency
- Voltage ratings.
- Tap voltages.
- Connection diagram.
- Cooling class
- Rated temperature in °C
- Phasor or vector diagram
- % impedance between primary and secondary and between primary
- Approximate mass or weight of the transformer

- Type of insulating liquid.
- Conductor material of each winding.
- Oil volume (of each transformer Container/Compartment)

7.3.13 Valve schedule Plate

The name plate shall contain the information of all the valves, their locations, quantities and schematics for the valve.

7.3.14 OCTC plate

- Type
- Serial number
- Year of manufacture
- Phase
- Frequency
- Steps (Number)
- Steps voltages.
- Control voltage.
- Weight with and without oil

7.3.15 Marshalling Box

- Name of manufacturer
- Serial number
- Year of manufacture
- Purchase order No.
- Engraved drawing of control circuit, CT/ PT circuit and TB.

7.3.16 Oil filling instruction plate of conservator

•Step wise process for filling the oil in conservator

8. Earthing Of PV Arrays

8.1 Each Module Mounting Structure (MMS), SPV Module frames, mounting arrangement for String Monitoring Boxes, Metallic Junction Boxes, Metal frames/Panel, Metallic Pipes of the solar array shall be effectively earthed by two separate and distinct connections to earthing system. Earthing system for solar array shall consist of earth mat/Earth grid to be laid at the suitable depth below the ground. Earth mat shall be a mesh of interconnected Galvanizing Steel (GS) flat laid in the solar farm for the purpose of earthing/grounding. Equipment and structure in the solar farm shall be earthed in compliance to the IS: 3043 (Code of Practice for

Earthing) and Indian Electricity Rules/Acts.

8.2 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.

8.3 The Contractor shall furnish the detailed design and calculations for Owner's approval as per IEEE80-2000 to determine the number of earth pit and size of earth mat conductor.

8.4 Each PV Module frame shall be earthed in accordance with module manufacturer guidelines.

8.5 Earth pit shall be constructed as per IS: 3043. Electrodes shall be embedded below permanent moisture level. Minimum spacing between electrodes shall be 600mm. Earth pits shall be treated with salt and charcoal if average resistance of soil is more than 20 ohm meter.

8.6 Method and practice of laying of earthing conductor, earth pits and riser not mentioned herewith but bidders will submit detail drawing/sketch with write up for uniform implementation at site.

8.7 Based on the design of detail engineering, contractor shall have to arrange additional earth pit as mentioned below:

8.7.1 Earth pit for earthing of Inverter Transformer Shield. Number of shield earth pit shall be minimum two for each transformer. Shield earth pit shall be connected to inverter transformer shield bushing conductor with copper flat. Size of Cu flat shall be decided during detailed engineering but shall not be less than 25X6 Cu flat. Contractor has to comply with the guidelines of Inverter Transformer/Inverter manufactures (if any) for shield earthing.

8.7.2 Electronic/Isolated earth pit for SCADA/Electronic devices. No. and location of electronic earth pit shall be decided during detailed engineering however minimum no. of electronic earth pit shall be equal to the total Nos. of inverter rooms, pooling switchgear/s and/or Main control room.

9. Lightning Protection System

9.1 Codes and Standard

IS: 2309	Code of Practice for the protection of building and allied structures against lightning.
NFC 17-102 (Latest revision)	Protection from direct lightning stroke with Early Streamer Emission air terminal (ESEAT).

9.1.1 Lightning system shall comprise of air terminations, down conductors, test links, earth electrode etc. as per approved drawings.

9.1.2 Protection Level (i.e. level – I, II, III) should be site specific.

9.1.3 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.

9.1.4 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.

9.1.5 ESE air terminal shall be type tested in any national/ international approved lab for advance triggering time (ΔT) and lighting Impulse current test and type test report shall be submitted for approval.

9.1.6 Each ESE air terminal shall be provided with separate earthling termination and test link for equipotential bonding of lighting protection system as per OEM guidelines/ NFC 1ESE air terminal shall be equipped with lightning stroke counter to be fixed at suitable height in serial on the down conductor.

9.1.7 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.

9.1.8 Contractor needs to provide the lightning protection for each inverter, Switchyard building (if applicable) and MCR building in accordance to IS: 2309.

10. Metering System

10.1 ABT energy meter shall be provided as approved by state Utility under the metering scheme, 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 state utility.

10.2 Meter must be provided with the necessary data cables.

10.3 ABT compliant meters are to be provided at the interface points as per SERC regulation to measure import and export of energy.

10.4 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 as well as any state regulations.

10.5 Meter shall be suitable for interfacing for synchronizing the built-in clock of the meter by GPS time synchronization equipment either through a synchronization pulse received from the time synchronization equipment or through a remote PC synchronized to GPS clock.

10.6 All charges for testing and passing of the meter with relevant government agency shall be borne by Contractor, the Employer will assist Bidder for necessary document as and when required. Bidder has to intimate the required documents at least 7 days prior of such requirements.

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

10.7.1 Meters shall be microprocessor-based conforming to IEC 60687 / IEC 6205211/ IEC 62053-22 / IS 14697

10.7.2 Meters 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.

10.7.3 Meters 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 or as per state grid regulations.

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

10.7.5 Meters 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.

10.7.6 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.

10.7.7 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.

10.7.8 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		

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

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

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

10.7.12 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.

10.7.13 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.

10.7.14 Meters 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.

10.7.15 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.

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

11. SCADA

11.1 Contractor shall provide complete SCADA system with all accessories, auxiliaries and associated equipment and cables for the safe, efficient and reliable operation of entire solar plant and its auxiliary systems.

11.2 Bidder shall include in his proposal all the Hardware, Software, Panels, Power Supply, HMI, Laser Printer, Gateway, Networking equipment and associated Cable etc. needed for the completeness even if the same are not specifically appearing in this specifications.

11.3 SCADA System shall have the provision to perform the following functions:

11.3.1 Real-time acquisition and display of data, status, alarms and trends.

11.3.2 Display of status of major equipment in Single Line Diagram (SLD) format

11.3.3 Control of switchgears and Inverters

11.3.4 Display and storage of measured values

11.3.5 Display and storage of derived/calculated/integrated values

11.3.6 Display and Storage of Alarm, Event and Trends

11.3.7 Generate, store and retrieve user configurable Sequence of Event (SOE) Reports

11.3.8 Generate, store and retrieve user configurable periodic reports

11.3.9 Remote monitoring of essential parameters on the web using standard modem (Internet connection for transmitting data over world wide web shall be taken by Contractor in the name of Owner for O & M period. All associated charges under this head shall be borne by the Contractor).

11.3.10 Control and monitoring of status of all Breakers and Inverters

11.3.11 System self-supervision

11.4 It shall be possible to remove/replace redundant controller or various modules (like any I/O module, interface module, etc.) from its slot for maintenance purpose without switching off power supply to the corresponding rack without releasing any spurious signal to controller and causing disturbance or loss of controller functions for other controller.

11.5 The Control system shall be designed to operate in non-air conditioned area. However contractor shall provide a Package/Split AC of suitable capacity decided by heat load requirement in SCADA room at Main Control Room.

11.5.1 Programmable Logic Based Control System at Main Control Room:

Bidder shall provide PLC based SCADA at main control room. For other locations such as Inverter room, Sub Pooling Switchgear Room (if applicable) bidder may offer IO modules/RTU/PLC for completeness of SCADA.

11.5.2 PLC Processor

The processor unit shall be capable of executing the following functions: -

a. Receiving binary and analog signals from the field and providing command output to MCC/SWGR/Drive etc. through Input / Output modules and operator initiated commands from HMIS / control panel.
b. Implementing all logic functions for control, protection and annunciation of the equipment and systems.
c. Providing supervisory information for alarm, various types of displays, status information, trending, historical storage of data etc.
d. Performing self-monitoring and diagnostic functions

11.5.3 PLC unit shall be provided with two processors (Main processing unit and memories) one for normal operation and one as hot standby. In case of failure of working processor, there shall be an appropriate alarm and simultaneously the hot standby processor shall take over the complete plant operation automatically. The transfer from main processor to standby processor shall be totally bump less and shall not cause any plant disturbance whatsoever. In the event of both processors failing, the system shall revert to fail safe mode. It shall be possible to keep any of the processors as master and other as standby. The standby processor shall be updated in line with the changes made in working processor.

11.5.4 The memory shall be field expandable. The memory capacity shall be sufficient for the complete system operation and have a capability for at least 20% expansion in future. Programmed operating sequences and criteria shall be stored in non-

volatile semiconductor memories like EPROM. All dynamic memories shall be provided with buffer battery backup for at least 72 hours. The batteries shall be lithium or Ni-Cd type.

11.5.5 Priority of different comments shall be as follows:

11.5.6 Manual intervention shall be possible at any stage of operation. Protection commands shall have priority over manual commands and manual commands shall prevail over auto commands.

11.5.7 A forcing facility shall be provided for changing the states of inputs and outputs, timers and flags to facilitate fault finding and other testing requirements. It shall be possible to display the signal flow during operation of the programme.

11.5.8 The SCADA shall be OPC 2.05a or later version compliant and implement an OPC-DA 2.05a (or later version) server as per the specification of OPC Foundation. All data should be accessible through this OPC server. SCADA shall have OPC connectivity for other systems.

11.5.9 Graphical Interface Unit (GIU) / Operator work station (OWS) shall perform control, monitoring and operation of all devices interacting with PLC based control system.

11.5.10 All frequently called important functions including major displays shall be assigned to dedicated function keys on a soft keyboard for the convenience of the operator for quick access to displays & other operator functions. Navigation from one display to any other should be possible efficiently through paging soft keys as well as through targets defined on the displays. There should be no limitation on number of such targets.

11.5.11 The system shall have built-in safety features that will allow/disallow certain functions and entry fields within a function to be under password control to protect against inadvertent and unauthorized use of these functions. The system security shall contain various user levels with specific rights as finalized by the Employer during detailed engineering. However, no. of user levels, no. of users in a level and rights for each level shall be changeable by the programmer (Administrator).

11.5.12 GIU shall be ruggedly designed to withstand hard environments like high temperature, shock and vibration.

11.5.13 Bidder has to provide suitable hardware and software based firewall for network security to restrict unauthorized access to HMI/Solar SCADA PCs and system.

11.6 Software Requirement

11.6.1 All necessary software required for implementation of control logic, operator station displays / logs, storage & retrieval and other functional requirement shall be provided.

11.6.2 Industry standard operating system like WINDOWS (latest version) etc. to ensure openness and connectivity with other system in industry shall be provided. SCADA system shall support following standard protocols (included but not limited to) to communicate with different sub system/Devices:

i. Modbus (TCP/IP, RTU, ASCII)
ii. Sub Station Protocol like IEC-61850
iii. IEC 60870 -5-101//104
iv. Any other protocol on which the offered equipment (by Contractor) will communicate with SCADA.

11.6.3 The Contractor shall provide software locks and passwords to Employer for all operating & application software. Also the contractor shall provide sufficient documentation and program listing so that it is possible for the Employer to carry out modification at a later date.

12. Data Communication System (DCS) at Main Control Room

The DCS shall have the following minimum features:

12.1 Redundant communication controllers shall be provided to handle the communication between I/O Modules (including remote I/O) and PLCs and between PLCs and operator work station.

12.2 The design shall be such as to minimize interruption of signals. It shall ensure that a single failure anywhere in the media shall cause no more than a single message to be disrupted and that message shall automatically be retransmitted. Any failure or physical removal of any station/module connected to the system bus shall not result in loss of any communication function to and from any other station/module.

12.3 Built-in diagnostics shall be provided for easy fault detection. Communication error detection and correction facility (ECC) shall be provided at all levels of communication. Failure of one bus and changeover to the standby system bus shall be automatic and completely bump less and the same shall be suitably alarmed/logged.

12.4 Data transmitting speed shall be sufficient to meet the responses of the system in terms of displays, control etc. plus 25% spare capacity shall be available for future

expansion.

12.5 Contractor shall employ redundant Fibre optic backbone (Ring topology or better) for data communication between Inverter rooms and main control room.

12.6 The Contractor shall furnish details regarding the communication system like communication protocol, bus utilization calculations etc.

12.7 Operator Interface Displays/Logs/Reports

12.8 Suitable Operator Interface Displays/Logs/Reports for control operation & monitoring shall be provided. The details shall be furnished and finalized during detailed engineering stage.

12.9 Control & Power Supply Scheme

Contractor shall provide the UPS/DC Power supply of suitable rating to cater all the load requirements of SCADA system and its auxiliaries. The power backup for the entire system should be at least for 02 hours.

12.10 Control Cabinets / Panels / Desks at Main Control Room

12.10.1 The cabinets shall be IP-22 protection class. The Contractor shall ensure that the temperature rise is well within the safe limits for system components even under the worst condition and specification requirements for remote I/O cabinets.

12.10.2 The cabinets shall be totally enclosed, free standing type and shall be constructed with minimum 2 mm thick steel plate frame and 1.6 mm thick CRCA steel sheet or as per supplier's standard practice for similar applications.

12.11 Software Licences

The Contractor shall provide software license for all software being used in Contractor's System. The software licenses shall be provided for the project and shall not be hardware/machine-specific.

12.12 Hardware at MAIN CONTROL ROOM

12.12.1 The Hardware as specified shall be based on latest state of the art Workstations and Servers and technology suitable for industrial application & power plant environment.

12.12.2 All the peripherals shall conform to the following minimum requirement but the exact make & model shall be as approved by Employer during detailed engineering. The

LAN to be provided shall support TCP/IP protocol (Ethernet connectivity) with OPC RDI for interface with PLCs/other systems and shall have data communication speed of min. 100 MBPS. All network components of LAN and Workstations shall be compatible to the LAN, without degrading its performance.

Processor	**64 Bit**
Hard disk	500 GB -RAID 1
Memory	4 GB RAM upgradable to 8 GB
Monitor	Min 22" LCD Flat Monitor with non-interfaced refresh rate min. 75 Hz. Communication port-2 Serial bus, one parallel Dual 10/100/1000 Mbps. Ethernet Graphic Memory=16 MB Expansion slot=3
Removable Bulk Storage Media for above (with each server/ work-station)	10 nos.
DVD R/W	16x or higher
Intelligent UPS (on line) with remote monitoring for each workstation/ server	1 no. with 30 mins. Battery backup on machine load
Keyboard	ASCII
Pointing Device	Mouse
Colour Laser Printer	Heavy duty type with resolution of 600 dpi Resolution

12.12.3 FAT procedure shall be submitted by bidder for approval. SCADA shall communicate with all third devices which are part of solar plant and same shall be demonstrated during the FAT.

13. Plant Illumination System

13.1 Design Philosophy

A comprehensive illumination system shall be provided in the entire project. Each building shall be provided with adequate light fittings, 6A/16A socket, etc.

All outdoor lighting system shall be automatically controlled by synchronous timer or photocell. Provision to bypass the timer or photocell shall be provided in the panel.

13.2 Lighting System Description for CMCS and Inverter Room

13.2.1 Normal AC Lighting System: AC lighting system 415V, 3Phase, 4wire, will be fed from lighting panels Control Board (LPs) which in turn will be fed from the lighting distribution boards (LDBs) of AC Switch board MCC.

13.2.2 Emergency AC Lightning System: The emergency lighting system consisting of 20% of the lights shall be fed from UPS DB or DCDB as per scheme adopted by the Contractor. Load of the same has to be considered for UPS/ Battery and charger sizing.

13.2.3 Lighting Fixture, Lamps & Accessories

13.2.4 All lighting fixtures and accessories shall be designed for continuous operation for its life under atmospheric conditions existing at site.

13.2.5 AC lighting fixtures and accessories shall be suitable for operation on 240 V, AC, 50 Hz supply with supply voltage variation of +/-10%, frequency variation of +/- 5% and combined voltage and frequency variation (absolute sum) of 10% DC lighting fixtures and accessories shall be suitable for operation on 220 V, with variation between 190 V & 240 V.

13.2.6 Codes and Standards

16101:2012	General Lighting. LEDs and LED modules Terms and definitions
16102(Part 1):2012	2012 Self Ballasted LED Lamps for General Lighting Services. Part-1 Safety Requirements.
16102(Part 2):2012	Self-Ballasted LED Lamps for General lighting Services. Part-2 Performance Requirements.
16103(Part I):2012	LED modules for General lighting Safety Requirements.

13.2.7 Junction Boxes, Conduits, Fitting & Accessories

13.2.7.1 Junction box for indoor lighting shall be made of fire retardant material. Material of JB shall be Thermoplastic or thermosetting or FRP type.

13.2.7.2 Junction boxes for street lighting poles and lighting mast if applicable, shall be deep drawn or fabricated type made of min. 1.6 mm thick CRCA Sheet. The box shall be hot dip galvanized. The degree of protection shall be IP55.

13.2.7.3 All switches and receptacles up to 16A shall be modular type. These shall be provided with pre-galvanized/galvanized modular switchbox.

13.2.7.4 Heavy duty PVC conduits conforming to IS: 9537 Part-III along with various

accessories shall be used for indoor wiring in the buildings. These conduits shall be concealed in the wall/floor/roof. However, in PEB's, conduits can be fixed on surface.

13.2.7.5 Pull out boxes shall be provided at suitable interval in a conduit run. Boxes shall be suitable for mounting on Walls, Columns, etc. Pull-out boxes shall have cover with screw. Pull out boxes used outdoor shall be weather proof type suitable for IP: 55 degree of protection and those used indoor shall be suitable for IP: 52 degree of protection.

13.2.8 Lighting Wires

Lighting wires shall be 1100 V grade, light duty PVC insulated unsheathed, stranded copper/aluminium wire for fixed wiring installation. Colour of the PVC insulation of wires shall be Red, Yellow, Blue and Black for R, Y, B phases & neutral, respectively and white & grey for DC positive & DC negative circuits, respectively. Minimum size of wire shall not be less than 1.5. Sq.mm. for copper and 4 sq.mm. for aluminium.

13.2.9 Lighting Poles

13.2.9.1 The Street Light system and peripheral lighting shall be designed generally in line with design guidelines. Height of the poles should be chosen so as not to affect working of Solar panels. The poles shall be hot-dip galvanized as per relevant IS2629/ IS2633/ IS4759. The average coating thickness of galvanizing shall be min. 70 micron. The System shall be capable of withstanding the appropriate wind load etc. as per IS 875 considering prevailing soil/ site condition considering all accessories mounting on pole.

13.2.9.2 The street light poles shall have loop in loop out arrangement for cable entry and light fixture / wiring protected with suitably rated MCB.

13.2.9.3 Hot dipped Galvanized with 80 mm thickness hexagonal/Octagonal lighting pole with inbuilt JB shall also be acceptable

13.2.10 Earthing

13.2.10.1 Lighting panels, etc. shall be earthed by two separate and distinct connections with earthing system. Switch boxes, junction boxes, lighting fixtures, fans, single phase receptacles etc. shall be earthed by means of separate earth continuity conductor. The earth continuity conductor 14 SWG GI wire shall be run along with each conduit run. Cable armours shall be connected to earthing system at both the ends.

13.2.10.2 Alternately Vendor may offer technically superior and proven product subject to

approval of employer.

13.2.11 Average Illumination Level

Location	Average Illumination Level (Lux)	Type of Fixture
Control Room	300	LED Luminaries
Store Room	200	LED Luminaries
Switchgear Room, HT Breaker Room	150	LED Luminaries
Inverter Room	150	LED Luminaries
Street lighting-Roads	10	LED Luminaries
Switchyard and Substation	20(general) 50(on strategic equipment)	LED Luminaries
Security Room Lighting	50	LED Luminaries

14. Auxiliary Power Supply System

14.1 Each inverter room shall have its own auxiliary power supply system comprising of AC distribution board (ACDB) which shall be fed from inverter output through suitably rated transformers. All ACDB"s shall receive at least two incomers from different sources. All Auxiliary loads like illumination, SMU etc. shall be fed from this ACDB. However auxiliary power supply for Power Conditioning Unit and other emergency loads (SCADA, control and protection requirement of switchgears and emergency lighting etc.) shall be taken through suitably rated UPS fed from this ACDB. Size and rating of UPS shall be chosen based on criteria specified elsewhere in the specification. In case the PCU does not require any external Auxiliary power supply, Contractor may choose to supply suitable DC system in place of the above UPS for feeding of control and protection loads of switchgear, SCADA, Emergency lighting and other emergency loads.

E. Performance Measurement procedure

15. Performance Ratio Test Procedure

15.1 PR - Provisional Acceptance Test Verification Procedure

The Performance ratio test aims at the comparison of the actual PV plant energy production with the guaranteed value for a limited operation time of the PV plant of

30 consecutive days.

15.2 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.

15.3 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.

15.4 The test will consist of guaranteeing the correct operation of plant over 30 days, by the way of the efficiency rate (performance ratio) based on the reading of the energy produced and delivered to the grid and the average incident solar radiation.

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

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

Where;

Y_A = Final PV system yield (representing the number of hours that the system would need to operate at its rated output power 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 $\mathbf{Y_R = I_{R\ Site} / I_{R\ STC}}$

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 Standard Test Conditions (1000 W/m^2)

$T_{cellavg}$ = 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)

15.6 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/ LT panel incomer for reference only.
- One no. calibrated pyranometer to determine irradiance on the plane of array (with a target measurement uncertainty of ± 2).
- One no. calibrated pyranometer to determine irradiance on horizontal plane (with a target measurement uncertainty of ± 2)
- Two nos. of thermocouples to measure module temperature with a measurement uncertainty of ±1 °C.
- Shielded ventilated thermocouple with a measurement accuracy of ±1°C.

15.7 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.

15.8 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).

15.9 Capacity Utilization Factor (CUF) shall be calculated as per the following formula:

$$CUF = E_N / (8760 * P_{nom})$$

E_N = No. of units recorded at the ABT meter excluding the auxiliary consumption

P_{nom} = Installed DC capacity

F. Civil Works

16. Detailed Contour Survey & Soil Investigation of the Site

The Employer shall carry out cutting, filling and levelling of land at project site (see Annexure 1: Site Details) and hand over to the Contractor for implementation of the Project. The Contour plan and soil investigation data for the sites shall be provided by Employer to the Contractor on request. However the Employer does not take responsibility of either the completeness or accuracy of the data provided. The contractor should satisfy himself about the authenticity or accuracy of the data by using his own resources for taking into his design consideration.

16.1 Other investigations

Successful Bidder shall obtain and study earthquake and wind velocity data for design of module mounting structure, equipment and building foundations after 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.

16.2 Land Development for site activities

Bidder shall take reasonable care to ensure that the plant is aesthetically designed.

16.3 Foundations:

16.3.1 The contractor is responsible for the detailed soil investigation and subsequent foundation design of all the structures in the plant. The foundation of the module mounting structures, equipment, buildings and other important structures must be approved by Employer prior to construction. The contractor must provide the detailed design and calculations of the foundation. The foundation designs must be approved by Charted Structural Engineer.

16.3.2 The foundations should be designed considering the weight and distribution of the structure and assembly, and a maximum wind speed of 250 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.

16.4 Not Used

16.5 Buildings

Buildings are required to be constructed for housing the electrical equipment/ panel, central control room with office and a store room for the operation & maintenance of Solar Photovoltaic Power Plant. 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-

16.5.1 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.

16.5.2 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.

16.5.3 Doors & Windows:

Steel framed doors, Windows and ventilators shall conform to IS – 1081 with necessary float 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.

16.5.4 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.

16.5.5 Flooring (as per relevant IS codes for selection and laying)

Store area: Cement flooring in concrete mix (1:2:4) using 10 mm aggregates as per IS 2571: 1970

Control Room cum Office Room: Heavy Duty Vitrified tiles 8 mm thickness

SCADA Room: Heavy Duty Vitrified tiles 8 mm thickness

Equipment room: Heavy Duty Vitrified tiles 8 mm thickness

Battery Room: Acid/ Alkali resistant tiles of suitable thickness

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.

16.5.6 Roofing

The roof of the building shall be insulated and waterproofing shall be done as per relevant IS standard.

16.5.7 Plinth Protection

Plinth protection 1000mm wide shall be provided around all the buildings as per relevant standards using brick bats.

16.5.8 White washing & colour washing.

White washing and colour washing work shall conform to relevant IS codes. The right of selection of colour/ shades shall lies with the Employer. Bidder has to follow respective and relevant IS codes of practice for the finishing process.

- Internal walls: Acrylic distempering
- External walls: Heat reflective synthetic enamel
- MMS foundations and Earth pit enclosures: Cement painting
- Steel/ Al doors, windows and ventilators: Powder coated paint

16.5.9 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.

16.5.10 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.

16.5.11 Electrification of Building

Electrification of buildings shall be carried out as per relevant IS 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. It is encouraged that bidder shall use the latest energy efficient equipment for the electrification and illumination.

16.5.12 Air Conditioner for Control Room:

The air conditioned control room shall be equipped with appropriate numbers of fans for effective heat dissipation. The SCADA cabin shall have split type air conditioning units.

16.5.13 Fire Extinguishers:

Liquefied CO_2 / foam/ ABC type 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.

16.5.14 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.

16.5.15 Sign Boards:

The sign board containing brief description of major components of the power plant as well as the complete power plant in general shall be installed at appropriate locations of the power plant as approved by Employer.

- The Signboard shall be made of steel plate of not less than 3 mm. Letters on the board shall be with appropriate illumination arrangements.
- Safety signs, building evacuation plan and direction signs, assembly points shall also be placed at strategic locations.
- The Contractor shall provide to the Employer, detailed specifications of the sign boards.

16.6 Water supply & Cleaning

16.6.1 Water used for cleaning purpose shall be fit for cleaning the PV modules, cleaning procedure and pressure requirement shall be as per the recommendation of PV module manufacturer.

16.6.2 A suitable arrangement of water shall be ensured to cater the day-to-day requirement of drinking water and needs of Solar Photovoltaic plant during entire O&M period.

16.6.3 The Bidder shall estimate the water requirements for cleaning the photovoltaic modules at least once in every week or as per the soiling conditions prevailing at site, in order to operate the plant at its guaranteed plant performance. Also, bidder is required to plan the water storage accordingly.

16.6.4 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 pertaining to module cleaning system.

16.6.5 Bidder has to plan and install the effective module cleaning system as per the prevailing conditions at Site. The system may include the storage water tanks, pumps, laying of GI/ HDPE/ UPVC pipes, flexible pipes, taps/ valves, pressure gauges etc.as per the planning by the bidder. Bidder has to submit the drawing/ plan for the proposed module cleaning system.

16.6.6 All the pipes thus laid must be buried in ground at least 150mm below FGL. In case of road crossings and drain crossings, the pipes must be passed through GI/ Hume pipes as applicable.

16.7 Roads within Solar Power Plant

16.7.1 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.

16.7.2 All roads within the solar plant are to be constructed with sufficient width (minimum 3.5m) 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.

16.7.3 All roads within the solar plant shall be WBM road except Main Gate to Control room road with bituminous carpet on top. Also, all cable crossings and other crossings shall be provided with GI/ Hume pipes.

16.8 Peripheral Fencing:

16.8.1 The objective to provide a peripheral fencing is to demarcate the boundary and to keep away the unauthorized access to plant. The contractor shall provide GI Chain Link fencing all around the periphery of the plant. The fencing height must be minimum of 2 meter from the FGL and shall have additional tilted projection from top with minimum 3 runs of barbed wire spaced at 100mm. The boundary fencing must be provided with a rugged main entry gate (s). The construction of peripheral fencing and the main entry gate must conform to the IS 2721 (2003) and good practices.

16.8.2 Material: G.I. Chain link fabric fencing shall be in mesh size of 50mm x 50mm x 4mm dia.

16.8.3 Fixing : GI chain link shall be stretched and fixed in specified width, strengthening with 2 mm dia wire or nuts bolts & washers as required to be done complete as per the direction of Engineer-in-Charge. The selvage type for finishing shall be knuckle.

16.8.4 Measurements: The length and width shall be measured correct to a cm. The area shall be calculated in square metre, correct to two places of decimal.

16.8.5 All posts and angle posts should be hot dipped galvanized with an average thickness of 85 microns and shall be done after fabrication.

16.8.6 Intermediate post for the fencing shall be at 3 m spacing and straining posts at 30m (after every 10^{th} intermediate post).

16.8.7 All the drawings/ specifications for the peripheral fencing and main entry gate design/ planning must be submitted to Employer for approval prior to construction for their accord.

16.9 Drainage

16.9.1 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.

16.9.2 Bidder is to provide RCC Hume pipe of appropriate size at the crossing of road and drains and at required locations wherever cross drainage is required. The peripheral drain may 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. Alternate suitable drain can also be explored. Drains are required to provide weep holes with PVC pipes at an interval of 2m. Bidder shall submit the drain plan and drain section details for the complete plot as required for the effective water evacuation to nearest outfall point for suggestion/ approval.

16.10 Painting & Finish:

16.10.1 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.

16.10.2 After Phosphate treatment, two (2) coats of yellow zinc chromate primer will 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.

16.10.3 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.

16.11 Overhead PVC water Tank

Contractor has to estimate the water requirement for cleaning the modules with a frequency as per the soiling conditions prevailing at site but not less than once a week. The frequency of cleaning shall be mutually agreed and approved during the detail engineering in order to achieve the guaranteed performance. The bidder is required to install overhead PVC water tank of minimum 2000 ltrs capacity along with as per IS 12701. Suitable sized pump shall also be installed to maintain the water pressure for cleaning purposes. The design shall take approval from Employer before the construction/installation of water storage tank and module cleaning system.

G. Inspection & Testing

17. Inspection:

17.1 Employer 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. Employer 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.

17.2 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.

17.3 A detailed 'QAP' for Manufacturing and Inspection shall be submitted by the Bidder for Employer'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.

17.4 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.

17.5 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.

17.6 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

18. Load Trials & Reliability test at Site

18.1 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

18.2 All the tests which are mentioned in the load test of Solar Power Plant will be carried out in presence of Employers' Representative at Site under site conditions and the parameters checked in accordance with the data sheet and guaranteed parameters given by the Contractor.

18.3 All the equipment supplied by the vendor will be tested as per relevant standard/ Quality assurance plan at site conditions and the performance monitored.

19. Quality Considerations

19.1 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.

19.2 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.

19.3 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.

19.4 Bidder will to allow Employer 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 Employer informed all progress of work in this contract on monthly basis.

19.5 Contractor will associate/fully witness in each inspection being carried out at their/their sub-vendor's works by our authorized inspection engineer(s).

19.6 Employer 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.

20. Performance and Functional Warranty / Guarantees

20.1 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.

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

20.3 The mechanical structures, electrical works and overall workmanship of the grid connected solar power plant must be warranted for a minimum of 7 years.

20.4 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.

20.5 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.
- Power Conditioning Units (PCU): PCUs shall be warranted for a period of minimum 5 years or guarantee period provided by the OEM, whichever is higher.
- Transformers, associated switch gear and others: Bidder must furnish in detail its warranties / guarantees for these items.
- All other associated equipment, not mentioned, but otherwise included in the scope of the contract must be warrantied for minimum 5 years against its performance and workmanship.

20.6 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.

20.7 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.

20.8 The performance of the plant will be determined by the performance ratio (PR). The same shall be measured and recorded for a period of one month for operational acceptance of the plant as mentioned under TS Clause 7.

20.9 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.

20.10 During the O&M period, the bidder, in concurrence with the Employer, is encouraged to carry out the PR test in similar fashion for a period of 7 days, at regular intervals, in order to check the continued performance of the plant and to determine the necessary steps to meet the CUF commitment. However, for the O&M period committed CUF shall be considered only. CUF shall be determined for every year for the performance obligations of the Contract.

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 (Crystalline- Mono/ Multi)		
3	Product Code (commercial)		
4	No. of PV cells per Module	cells	60 / 72
5	Mounting arrangement for Solar Module		
6	Solar Module frame material (if framed)		
7	Module dimensions		
8	Output Cables (viz., Polarized Weather Proof DC rated multi-contact connector)		
9	Availability of Reverse Blocking Diode and Bypass Diode		
10	Construction Front glass description and thickness Back sheet details Encapsulating details		60 / 72
11	Cell efficiency	%	
12	Module efficiency	%	
13	Nominal Wattage (P_{nom})	W	
14	Power Tolerance (≤+5W)	W	
15	Peak power voltage (V_{mp})	V	
16	Peak power current (I_{mp})	A	
17	Open circuit voltage (V_{oc})	V	
18	Short circuit current (I_{sc})	A	
19	Weight of each module	kg	
20	Fill Factor	%	
21	Standards/Approvals from International Agencies	IEC 61215 IEC 61730 IEC 61646 IEC 61701 IEC 62716 Others	
22	Module is suitable to operate up to 50^{o} ambient	Yes/No	

SHEET-2

Technical Particular Data Sheet for Power Conditioning Unit

(To be furnished by the bidder)

Particulars	Unit	Value
Make		
Capacity		
Origin		
AC Side		
Nominal AC power @ 25°C	kW	
Nominal AC power @ 50°C	kW	
Output AC voltage	V	
Output AC Current	A	
Frequency (and Variation)	Hz	
Total Harmonic Distortion (< 3%)	%	
AC over/under voltage, over/under frequency protection		
Phase shift (cos phi)		
DC Side		
Maximum Input DC power	kW	
Maximum DC voltage	V	
MPPT voltage range	V	
Maximum DC current	A	
DC over voltage protection		
DC voltage ripple	%	
Others		
Maximum Efficiency	%	
Euro Efficiency	%	
Ambient temperature range	°C	
Humidity (non-condensing)	RH	
Quiescent power	kW	
Degree of protection	IP	
Dimensions approx. (HXWXD)	mm	
Weight	kg	
Compliances (Reference Standards)		

SHEET -3

TECHNICAL PARTICULARS OF 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 a) Top of oil by thermometer °C b) Womdomg by resistance °C	
17.	Terminal details a) HV side b) LV side	
18.	Losses (at 75°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	

S. No.	Description	Guaranteed particulars to be filled in by the manufacturer
19.	Efficiency at 75°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 °C	
21.	Shipping dimensions a) Height m b) Breadth m c) Length m	
22.	Painting	
23.	Reference Standards	

SHEET- 4

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	

DESIGN, ENGINEERING, PROCUREMENT & SUPPLY, CONSTRUCTION & ERECTION, TESTING, COMMISSIONING
AND
COMPREHENSIVE OPERATION & MAINTENANCE FOR
7 (SEVEN) YEARS OF 240 kW (AC) SOLAR PV PLANT
AT KAMARAJAR PORT LIMITED, ENNORE, DISTRICT – CHENNAI,
TAMIL NADU

Section – VI

Forms and Formats

(NIT NO. – SECI/SD/2/NIT/2016/KPL)

SOLAR ENERGY CORPORATION OF INDIA LIMITED

(A Government of India Enterprise)

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

Tel: 011 – 71989239, Fax: 011 – 71989241

Forms and Formats	
(i)	Appendix 1: Format for Bid Letter
(ii)	Appendix 2: Format for Details of Bidder
(iii)	Appendix 3: Bid Evaluation Criteria (BEC)
(iv)	Appendix 4: Details of Power Plant Performance Guaranteed parameters
(v)	Appendix 5: Performa for Financial Proposal
(vi)	Appendix 6: Details of qualified technical staff for EPC and O&M separately.
(vii)	Appendix 7: Format for Declaration of Compliance
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(ix)	Appendix 9: Format for Declaration on Bidder's relation to Directors
(x)	Appendix 10: Format for Execution Timeline
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(xii)	Appendix 12(a): Format of Bank Guarantee for Bid Security
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(xvii)	Appendix 13: Not Used
(xviii)	Appendix 14: Format for Contract Agreement
(xix)	Appendix 15: Format for Power of Attorney for signing of Bid
(xx)	Appendix 16: Format for Satisfactory Operation
(xxi)	Appendix 17: Format for Indemnity Bond to be executed by The Contractor for The Removal / Disposal of Scrap/Disposal of Surplus Material
(xxii)	Appendix 18: Format for Indemnity Bond to be executed by the contractor for the plant handed over to Employer for Performance of its O&M Contract (Entire Solar PV Plant)
(xxiii)	Appendix 19 (a): Format for Indemnity bond to be executed by the contractor for the equipment handed over by the employer for performance of its contract (entire equipment consignment in one lot)
(xxiv)	Appendix 19(b): Format for indemnity bond to be executed by the contractor for the equipment handed over in instalments by the employer for performance of its contract
(xxv)	Appendix 21: Format for Power of Attorney for Joint Venture.
(xxvi)	Appendix 22: Format for form of undertaking by the Joint Venture partners.

Appendix 1: (on Bidders' letter head)

Date: --/--/----

To,

General Manager (Solar)
Solar Energy Corporation of India Limited
1st Floor, A-Wing, Religare Building
D-3, District Centre, Saket, New Delhi – 110017

Subject: Submission of the bid (NIT No. SECI/SD/2/NIT/2016/KPL) for Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning and Comprehensive Operation & Maintenance for 7 (Seven) Years of 240 kW (AC) Solar PV Plant at Kamarajar Port Limited, Ennore, District – Chennai, Tamil Nadu.

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 Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning and Comprehensive Operation & Maintenance for 7 (Seven) Years of 240 kW (AC) Solar PV Plant at Kamarajar Port Limited, Ennore, District – Chennai, Tamil Nadu. All the above shall be as per NIT Document No. SECI/SD/2/NIT/2016/KPL dated _____.

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 subject project using PV technology on a turnkey basis at Kamarajar Port Limited in the state of Tamil Nadu 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 for 240 kW (AC) Solar PV Plant not later than (150) One Hundred and Fifty Days from the date of issue of NTP/ LOI shall as per the completion schedule mentioned under SCC Clause 8. 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 and 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 18% at the end of first year from the date of

Commissioning and further 0.75% degradation in module output for successive years form second year onwards for remaining 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 (on Bidders' Letter head)

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 method:

1. Contract Value i.e., Total sum of the price mentioned under different work package heads viz. Supply, Erection and Civil works package including all taxes and duties as provided in the Table 5A and 5B of the financial proposal.
2. Net Present Value (NPV) of O&M Contract Price excluding taxes for seven years to be calculated at a Discount rate of 10.81 % p.a.

Evaluated Bid value (EBV) = (1) EPC price + (2) NPV of O&M Contract Price

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.
- The evaluated price shall be inclusive of all taxes and duties as price quoted by the bidder (except for O&M part). However, the award shall be placed excluding of taxes and duties. In case the bidder has quoted the taxes wrongly in the financial bid format, other than the applicable taxes, employer will consider the applicable taxes on the date of techno - commercial bid opening for the purpose of evaluation.
- In case, any of the item/ component from the entire supplies is imported by the bidder than the price break up of those items shall be mentioned separately along with the applicable taxes and duties. Further in case, any concession/ exemption is desired to be availed by the bidder in accordance with provisions of GCC Clause 8.5, and as applicable by the permissible law/ rule/ regulations then the same shall be mentioned by the bidder.
- In Table 5B, Summary of Taxes and Duties, if bidder does not mention any tax amount against any type of tax and writes –Extra at actuals or leave blank or writes-NIL or writes any other comment, the same shall be considered as ZERO and it is presumed that bidder has incorporated effect of these Taxes somewhere else in the price bid.

Appendix 4: Power Plant Performance Guarantee

- 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 18% at the end of first year from the date of Operational Acceptance, and a linear degradation of 0.75% per year in module output from second year onwards for the remaining O&M period.

Table 4A: Solar Plant Performance Parameters

Particulars	**Proposal**
Solar PV module Technology proposed	
DC installed Capacity Proposed (in kW)	
Mounting structures proposed	Fixed tilt
PR at the time of Operational Acceptance	0.78
Guaranteed CUF	18%

Note:

- CUF shall be demonstrated against the DC Capacity to be installed at STC
- 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 Operational Acceptance 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 (on Bidders' Letter head)

Date:--/--/----

To,

General Manager (Solar)
Solar Energy Corporation of India Limited
1st Floor, D-3, A Wing, Religare Building
District Centre, Saket, New Delhi - 110017

Sub: Submission of the Financial Proposal (NIT No. SECI/SD/2/NIT/2016/KPL) for Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning and Comprehensive Operation & Maintenance for 7 (Seven) Years of 240 kW (AC) Solar PV Plant at Kamarajar Port Limited, Ennore, District – Chennai, Tamil Nadu.

Sir,

I,_____, present the financial proposal for the Bid for "Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning and Comprehensive Operation & Maintenance for 7 (Seven) Years of 240 kW (AC) Solar PV Plant at Kamarajar Port Limited, Ennore, District – Chennai, Tamil Nadu in response to NIT document No. SECI/SD/2/NIT/2016/KPL dated _____, 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.

Signature: **Designation:**

Name: **Organization:**

Address:

Phone:

Email:

Seal Of the Company

TABLE 5A: Total EPC Contract Price(including Taxes/Duties and other Levies)			
S. No.	**Item**	**Final Price** (INR)	**Direct / Bought out (To be indicated)**
Part - A:Supply Works package(Delivery at site basis)			
1	PV Modules up to site (mention quantity & wattage)		
2	Mandatory Spares (see SCC Clause 26)		
3	Inverters (mention Quantity and Capacity)		
4	Supply of Balance of System includes all equipment, materials, spares, accessories, MMS etc. excluding 1,2 &3 above up to site		
5	Transformer & switchgear for interconnection up to designated substation as per specifications		
Part - B: Erection Works Package			
6	General works including erection, commissioning, testing etc. of entire plant including MMS erection, excluding 7 below		
Part - C: Civil and allied Works Package			
7	Complete Civil and allied works including construction of buildings, MMS foundations, perimeter etc.		
8	Total (1+2+3+4+5+6) (In Figures)		
Total Contract Price (including taxes) (in Words)			

Note: Quotes in Indian rupees only.

Table 5B: Summary of Taxes and Duties (Included in Table 5A, Part-B Supply Work Package)		
S. No.	Items No.	Total Price (INR)
1	**TOTAL EXCISE DUTY**	
	Total Excise Duty for Direct transaction between the contractor and the Employer (identified in Table 5A as 'Direct'), as applicable	
2	**TOTAL SALES TAX**	
	Total Sales tax for Direct transaction between the contractor and the Employer (identified in Table 5A as 'Direct'), as applicable	
3	**TOTAL VAT**	
	Total VAT for Direct transaction between the contractor and the Employer (identified in Table 5A as 'Direct'), as applicable	
4	**TOTAL OCTROI**	
	Total Octroi as applicable for destination site/ state on all items of supply on all items under BOQ of the scope of contract, as applicable	
5	**TOTAL ENTRY TAX**	
	Total Entry Tax as applicable for destination site/ state on all items of supply on all items of the BOQ under the scope of contract, as applicable	
6	**TOTAL OTHER TAXES AND DUTY**	
	*Total other levies payable in India (please specify) as applicable for the destination site/ state on all items of supply, as per the provisions of bidding documents, on all items of BOQ under the scope of contract, as applicable	
7	**TOTAL CUSTOM DUTY**	
	Total Custom Duty on all the imported items	
8	**GRAND TOTAL [1+2+3+7] (in Fig.)** This total does not include Octroi, entry tax, other tax & duties quoted by bidder at S. No. 4, 5 & 6	
	(in Words)	
9	**GRAND TOTAL [4+5+6] (in Fig.)** This total includes Octroi, entry tax, other tax & duties quoted by bidder at S. No. 4, 5& 6	
	(in Words)	

NOTES:

1. The reimbursement of Excise duty, Custom Duty, sales tax/ VAT and other levies as per S. No. 1, 2, 3 & 4 in table 5A subject to only direct transactions between the contractor and the Employer, for which the mode of transaction indicated in Table 5A is 'Direct'. In case the of those items mentioned in the said Table 5A against which the mode of transaction is left blank, the same shall be deemed to be 'Bought out' for the purpose of evaluation and award of contract and the price indicated in Table 5A against such items shall be deemed to be inclusive of all such taxes, duties and levies.
2. Total evaluated price (sum of all work packages viz. Supply, Erection and Civil & Allied Works) shall be inclusive of all taxes, duties and levies except for O&M part, as prices quoted by the bidder. However, the award shall be placed without taxes, duties and levies for Supply Part (i.e. Part-A) and O&M Contract. Award of work for Erection and Civil & allied Works Package shall be inclusive of tax.
3. No variation due to change in forex rate shall be admissible.
4. Payment shall be made in Indian National Rupees (INR) only. Bidder(s) has to quote their rate in INR only.
5. Arithmetical errors will be rectified on the following basis: 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.
6. The payments as mentioned under amended SCC Clause 14 will be for the purpose of on account running payment instalments, which shall finally be reconciled with the final bill of items of this sheet along with invoice taxes and duties.
7. Taxes, duties and levies shall be reimbursable by the Employer based on the documentary evidence submitted by the bidder subject to maximum of which have been mentioned by the bidder and considered during evaluation.
8. Bidder is required to ascertain correctness of Taxes, Duties and other levies, as Taxes, Duties and other levies mentioned by the bidder shall be considered during evaluation. In case the bidder has mentioned these wrongly in the financial bid format other than the applicable taxes, duties and levies, Employer will consider the mentioned taxes, duties and levies by the bidder and the same shall be payable/ recoverable based on the documentary evidence submitted by the bidder, subject to maximum of which have been mentioned by the bidder and considered during evaluation.

9. Bidders are required to mention all taxes as applicable in Table 5B and include the same while quoting in Table 5A and same shall not be payable separately. Statutory variation in respect of Service tax/WCT as applicable, only will be considered on documentary evidence during the contract execution period.
10. In case, any of the item/ component from the entire supplies, is imported by the bidder, then the price break up of those items shall be mentioned separately along with the applicable taxes and duties. Further, in case any concession/ exemption is desired to be availed by the bidder in accordance with the provisions of GCC Clause 8.5 and as per applicable law/ rules/ regulations, then same shall be mentioned by the bidder.

Table 5C: Price Quote for O&M Contract excluding Taxes

TABLE 5C: Total Price for O&M Contract (excluding taxes)		
Sr. No.	**Item**	**Price (excluding tax) (in INR)**
1	Operation and Maintenance of the 240 kW (AC) Solar PV Plant for **First YEAR**	
2	Operation and Maintenance of the 240 kW (AC) Solar PV Plant for **SECOND YEAR**	
3	Operation and Maintenance of the 240 kW (AC) Solar PV Plant for **THIRD YEAR**	
4	Operation and Maintenance of the 240 kW (AC) Solar PV Plant for **FOURTH YEAR**	
5	Operation and Maintenance of the 240 kW (AC) Solar PV Plant for **FIFTH YEAR**	
6	Operation and Maintenance of the 240 kW (AC) Solar PV Plant for **SIXTH YEAR**	
7	Operation and Maintenance of the 240 kW (AC) Solar PV Plant for **SEVENTH YEAR**	
Total O&M Contract Price (in figures)		
Total O&M Contract Price (in Words)		

Note: Service tax and cess extra, as applicable

Signature: **Designation:**

Name: **Organization:**

Address: **Phone:**

Email: **Seal Of the Company**

Also Bidders have to upload price bid in excel sheet which is provided on TCIL portal.

Appendix 6: Details of qualified technical staff (On bidders' Letter head)

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 (On bidders' Letter head)

Date:--/--/----

To,

General Manager (Solar)

Solar Energy Corporation of India Limited

1st Floor, D-3, A Wing, Religare Building

District Centre, Saket, New Delhi - 110017

Sub: Declaration of Compliance (NIT No. SECI/SD/2/NIT/2016/KPL) for Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning and Comprehensive Operation & Maintenance for 7 (Seven) Years of 240 kW (AC) Solar PV Plant at Kamarajar Port Limited, Ennore, District – Chennai, Tamil Nadu.

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 (On bidders' Letter head)

Date:

To

General Manager (Solar)
Solar Energy Corporation of India Limited
1st Floor, D-3, A Wing, Religare Building
District Centre, Saket, New Delhi - 110017

Sub: No Deviation Certificate (NIT No. SECI/SD/2/NIT/2016/KPL) for Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning and Comprehensive Operation & Maintenance for 7 (Seven) Years of 240 kW (AC) Solar PV Plant at Kamarajar Port Limited, Ennore, District – Chennai, Tamil Nadu.

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 (On bidders' Letter head)

This has reference to our proposed bid/ Contract regarding Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning and Comprehensive Operation & Maintenance for 7 (Seven) Years of 240 kW (AC) Solar PV Plant at Kamarajar Port Limited, Ennore, District – Chennai, Tamil Nadu to be entered into Agreement with Employer (KPL and SECI).

We certify that to the best of my/our knowledge;

- I am not a relative of any Director of KPL and SECI ;
- We are not a firm in which a Director of KPL and SECI or its relative is a partner;
- I am not a partner in a firm in which a Director of KPL and SECI, or its relative is a partner;
- We are not a private company in which a Director of KPL and SECI is a member or director;
- We are not a company in which Directors of KPL and 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 (on Bidders' letter head)

DETAILED PROJECT SCHEDULE

** Bidder shall enclose Gantt chart / PERT chart for the schedule of activities*

1. Complete installation plan (in detail)

NOTE: The Bidder shall ensure that the entire work is completed within (150) One Hundred and Fifty days of issue of LOI/NTP.

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 TCIL's website

Appendix 12(a): Format of Bank Guarantee for Bid Security

(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/EMD BANK GUARANTEE FORMAT FOR TENDER /NIT No. SECI/SD/2/NIT/2016/KPL

In consideration of the ----------[Insert name of the Bidder] (hereinafter referred to as 'Bidder') submitting the response to NIT inter alia for Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning and Comprehensive Operation & Maintenance for 7 (Seven) Years of 240 kW (AC) Solar PV Plant at Kamarajar Port Limited, Ennore, District – Chennai, Tamil Nadu, in response to the NIT No. SECI/SD/2/NIT/2016/KPL dated _____ issued by Solar Energy Corporation of India Limited (SECI) on behalf of Kamarajar Port Limited (hereinafter referred to as KPL) & Solar Energy Corporation of India Limited (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 Solar Energy Corporation of India Limited (SECI) [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 up to 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 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 the name of the Bank]__

Banker's Stamp and Full Address.

Dated this ___ day of ___, 20__

Witness:

1. ……..
   Signature
   Name and Adress

2. ……
   Signature

   Name and Adress

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 BG has been executed. 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 General Manager, Solar Energy Corporation of India Limited, 1st Floor, D-3, A Wing, Religare Building, 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(e): Bank Guarantee Verification, duly filled in, should be enclosed with The Bank Guarantee.

  Note:-

Appendix 12(b): Format for Performance Bank Guarantee for Performance Security during EPC

(**Note**: Performance Guarantee is to be submitted in Bank Guarantee as per the ITB Clause 1.2.3 at respective times)

[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 Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning and Comprehensive Operation & Maintenance for 7 (Seven) Years of 240 kW (AC) Solar PV Plant at Kamarajar Port Limited, Ennore, District – Chennai, Tamil Nadu., in response to the NIT dated…… issued by Solar Energy Corporation of India Limited (SECI) on behalf of Kamarajar Port Limited (hereinafter referred to as KPL) & Solar Energy Corporation of India Limited (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 KPL at [*Insert Name of the Place from the address of KPL*] forthwith on demand in writing from KPL 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*]. KPL 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 KPL 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 KPL, made in any format, raised at the above mentioned address of the Guarantor Bank, in order to make the said payment to KPL.

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 KPL to justify the invocation of this BANK GUARANTEE, nor shall the Guarantor Bank have any recourse against KPL 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 KPL 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 KPL 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 KPL and may be assigned, in whole or in part, (whether absolutely or by way of security) by KPL to any entity to whom KPL 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 KPL 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 BG has been executed. 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 CHAIRMAN, Kamarajar Port Limited, 4th Floor, Super Specialty Diabetic Centre (erstwhile DLB building), Near Clive Battery Bus Stop, Rajaji Salai, Chennai - 600 001" 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(e): 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 Solar Energy Corporation of India Limited (SECI) on behalf of Kamarajar Port Limited ("KPL") (hereinafter, the "Beneficiary") for Operation and Management of Performance of Solar Power Project.

And WHEREAS a Bank Guarantee for Rupees *[……..]* valid till …….. *[Insert date 7 years from the date of Operational 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 CHAIRMAN, Kamarajar Port Limited, 4th Floor, Super Specialty Diabetic Centre (erstwhile DLB building), Near Clive Battery Bus Stop, Rajaji Salai, Chennai - 600 001 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(e): Bank Guarantee Verification, duly filled in, should be enclosed with The Bank Guarantee.

Appendix 12(d): 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 Kamarajar Port Limited 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 BG has been executed. 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 CHAIRMAN, Kamarajar Port Limited, 4th Floor, Super Specialty Diabetic Centre (erstwhile DLB building), Near Clive Battery Bus Stop, Rajaji Salai, Chennai - 600 001.

- 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(e): Bank Guarantee Verification, duly filled in, should be enclosed with The Bank Guarantee.

Appendix12 (e): Bank Guarantee Verification

CHECKLIST			Yes	No
I.		Does the bank guarantee Compare verbatim with Standard KPL 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 KPL having their Head Office at "Kamarajar Port Limited, 4th Floor, Super Speciality Diabetic Centre (erstwhile DLB building), Near Clive Battery Bus Stop, Rajaji Salai, Chennai - 600 001" only. (Hereinafter called "KPL" which expression shall unless excluded by or repugnant to the context include its successors or assigns) of the other part.

WHEREAS the aforesaid KPL has accepted the tender of the aforesaid Contractor for ---------- ---------- as per KPL'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 KPL 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 KPL 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, KPL 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 KPL 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 KPL'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

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 KPL, Kamarajar Port Limited, 4th Floor, Super Specialty Diabetic Centre (erstwhile DLB building), Near Clive Battery Bus Stop, Rajaji Salai, Chennai - 600 001.

In the presence of Name, Full Address & Signature:

i) ----------

ii) ----------

Appendix 15: Power of Attorney for signing of Bid

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 Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning and Comprehensive Operation & Maintenance for 7 (Seven) Years of 240 kW (AC) Solar PV Plant at Kamarajar Port Limited, Ennore, District – Chennai, Tamil Nadu, pursuant to the NIT document no. _____issued by Kamarajar Port Limited ("KPL"),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 KPL.

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 Apostille certificate.

Appendix 16: Format for Satisfactory operation (on Owners' letter head):

Appendix 16: Performance Certificate

Date:_ _/_ _/_ _

TO WHOMSOEVER IT MAY CONCERN

This is to certify that the *(plant detail and location)* was commissioned on *(Date of commissioning)* by *(Bidder Details)* against the LOI/ WO No. (*Details of LOI/ WO with complete scope)*.

The project is under operation since the date of commissioning and has been working satisfactorily as per the estimated output. The cumulative generation (Net) of the plant recorded for the previous year is (*Number of units generated)*.

Regards,

Appendix 17: 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

Kamarajar Port Limited, a Government of India Enterprise, having its registered office at 4th Floor, Super Speciality Diabetic Centre (erstwhile DLB building), Near Clive Battery Bus Stop, Rajaji Salai, Chennai - 600 001.

1. KPL 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 KPL 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 KPL 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 KPL and keep KPL indemnified from and against all claims, demands, actions, liabilities and expenses which may be made or taken against or incurred by KPL by reason of the issue of necessary approval by KPL 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 KPL 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 KPL 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 KPL.

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 18: Indemnity Bond to be executed by the contractor for the plant handed over by KPL for Performance of its O&M Contract

(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 KPL, a Company incorporated under the Companies Act, 1956 having its Registered Office at “Kamarajar Port Limited, 4th Floor, Super Speciality Diabetic Centre (erstwhile DLB building), Near Clive Battery Bus Stop, Rajaji Salai, Chennai - 600 001” its Project at .....(hereinafter called "KPL" which expression shall include its successors and assigns) :

WHEREAS KPL/ 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 KPL 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 KPL for the Solar Photo Voltaic Plant handed over to it by KPL 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 KPL 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 Limited as a "Trustee" for and on behalf of KPL.

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 KPL. The Contractor undertakes to keep KPL 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 KPL 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, KPL 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 KPL 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 KPL 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 KPL without any demur, reservation or protest. This is without prejudice to any other right or remedy that may be available to KPL 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 KPL, 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 19(a): Indemnity bond to be executed by the contractor for the equipment handed over by the employer for performance of its contract (entire equipment consignment in one lot)

(On non-Judicial stamp paper of appropriate value) INDEMNITY BOND

THIS INDEMNITY BOND is made this .....day of..... 20..... by..... *(Contractor's Name)* a Company registered under the Companies Act, 1956/Joint Venture/Partnership firm/Proprietary concern having its Registered Office at..... (hereinafter called as 'Contractor' or "Obligor" which expression shall include its successors and permitted assigns) in favour of ..... *(Name of Employer)*, a Company incorporated under the Companies Act, 1956 having its Registered Office at..... and its project at ..... (hereinafter called "....."..*{Abbreviated name of the Employer}*" which expression shall include its successors and assigns):

WHEREAS .....@..... has awarded to the Contractor a Contract for.....vide its Notification of Award/ Contract No.....dated ..... and its Amendment No. ..... and Amendment No....., *(applicable when amendments have been issued)* (hereinafter called the Contract") in terms of which .....@..... is required to hand over various Equipment to the Contractor for execution of the Contract.

And WHEREAS by virtue of Clause No..... of the said Contract, the Contractor is required to execute an Indemnity Bond in favour of.....@..... for the Equipment handed over to it by .....@..... for the purpose of performance of the Contract/Erection portion of the contract (hereinafter called the "Equipment")

AND THEREFORE, This Indemnity Bond witnesseth as follows:

1. That in consideration of various Equipment as mentioned in the Contract, valued at *(Currency and amount in Figures)*..... *(Currency and amount in words)*..... Handed over to the Contractor for the purpose of performance of the Contract, the Contractor hereby undertakes to indemnify and shall keep .....@..... indemnified, for the full value of the Equipment. The Contractor hereby acknowledges actual receipt of the Equipment etc. as per despatch title documents handed over to the Contractor as detailed in the Schedule appended hereto. The Contractor shall hold such Equipment

etc. in trust as a "Trustee" for and on behalf of .....@.....

@ Fill in abbreviated name of Employer

2. That the Contractor is obliged and shall remain absolutely responsible for the safe transit/protection and custody of the Equipment at .....@..... project site against all risks whatsoever till the Equipment are duly used/erected in accordance with the terms of the Contract and the plant/package duly erected and commissioned in accordance with the terms of the Contract is taken over by .....@..... . The Contractor undertakes to keep .....@..... harmless against any loss or damage that may be caused to the Equipment.

3. The Contractor undertakes that the Equipment shall be used exclusively for the performance/execution of the Contract strictly in accordance with its terms and conditions and no part of the equipment shall be utilised for any other work of purpose whatsoever. It is clearly understood by the Contractor that non-observance of the obligations under this Indemnity Bond by the Contractor shall inter-alia constitute a criminal breach of trust on the part of the Contractor for all intents and purpose including legal/penal consequences.

4. That ..... is and shall remain the exclusive owner of the equipment free from all encumbrances, charges or liens of any kind, whatsoever. The Equipment shall at all times be open to inspection and checking by the Project Manager or other employees/agents authorised by him in this regard. Further, ... shall always be free at all times to take possession of the Equipment in whatever form the Equipment may be, if in its opinion, the equipment are likely to be endangered, misutilised or converted to uses other than those specified in the Contract, by any acts of omission or commission on the part of the Contractor or any other person or on account of any reason whatsoever and the Contractor binds himself and undertakes to comply with the directions of demand of ..... to return the Equipment without any demur or reservation.

5. That this Indemnity Bond is irrevocable. If at any time any loss or damage occurs to the Equipment or the same or any part thereof is mis-utilised in any manner whatsoever, then the Contractor hereby agrees that the decision of the Project Manager of ..... as to assessment of loss or damage to the Equipment shall be final and binding on the Contractor. The Contractor binds itself and undertakes to replace the lost and/or damaged Equipment at its own cost and/or shall pay the amount of loss to

.....@..... without any demur, reservation or protest. This is without prejudice to any other right or remedy that may be available to .....@..... against the Contractor under the Contract and under this Indemnity Bond.

6. NOW THE CONDITION of this Bond is that if the Contractor shall duly and punctually comply with the terms and conditions of this Bond to the satisfaction of .....@....., THEN, the above Bond shall be void, but otherwise, it shall remain in full force and virtue.

@ Fill in abbreviated name of Employer

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 handed over	**Quantity**	**Particulars of Despatch**		**Value of the Equipment**	**Signature of Attorney in token of receipt**
		RR/GR/ Bill of lading No & Date	**Carrier**		

For and on behalf of

M/s. .....

WITNESSES

I. 1. Signature ---------- Name ----------

2. Name ---------- Signature ----------

3. Address ---------- Designation ----------

Authorised representative*

II. 1. Signature ----------

2. Name ---------- Common Seal
3. Address ---------- (In case of Company)

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* 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 (b): Form of indemnity bond to be executed by the contractor for the equipment handed over in instalments by the employer for performance of its contract

(On non-Judicial stamp paper of appropriate value)
INDEMNITY BOND

THIS INDEMNITY BOND is made this.....day of..... 20..... by..... *(Contractor's Name)* a Company registered under the Companies Act, 1956/Partnership firm/Proprietary concern having its Registered Office at..... (hereinafter called as 'Contractor' or "Obligor" which expression shall include its successors and permitted assigns) in favour of .....*(Name of Employer),* a Company incorporated under the Companies Act, 1956 having its Registered Office at ..... and its project at ..... (Hereinafter called ".....*"{Abbreviated name of the Employer}*" Which expression shall include its successors and assigns):

WHEREAS .....@..... has awarded to the Contractor a Contract for .....vide its Notification of Award/Contract No.....dated..... And it's Amendment No. ..... and Amendment No....., *(applicable when amendments have been issued)* (hereinafter called the Contract") in terms of which .....@..... is required to hand over various Equipment to the Contractor for execution of the Contract.

And WHEREAS by virtue of Clause No..... of the said Contract, the Contractor is required to execute an Indemnity Bond in favour in .....@..... for the Equipment handed over to it by .....@..... for the purpose of performance of the Contract/Erection portion of the contract (hereinafter called the "Equipment")

NOW THEREFORE, This Indemnity Bond witnesseth as follows:

1. That in consideration of various Equipment as mentioned in the Contract, valued at (*Currency and amount in figures)*..... *(Currency and amount in words)* ..... to be handed over to the Contractor in instalments from time to time for the purpose of performance of the Contract, the Contractor hereby undertakes to indemnify and shall keep .....@..... indemnified, for the full value of the Equipment. The Contractor hereby acknowledges actual receipt of the initial instalment of the Equipment etc. as per details in the Schedule appended

hereto. Further, the Contractor agrees to acknowledge actual receipt of the subsequent instalments of the Equipment etc. as required by .....@..... in the form of Schedules consecutively numbered which shall be attached to this Indemnity Bond so as to form integral parts of this Bond. The Contractor shall hold such Equipment etc. in Limited as a "Trustee" for and on behalf of .....@.....

2. That the Contractor is obliged and shall remain absolutely responsible for the safe transit/protection and custody of the Equipment at .....@..... project site against all risks whatsoever till the Equipment are duly used/erected in accordance with the terms of the Contract and the plant/package duly erected and commissioned in accordance with the terms of the Contract, is taken over by .....@..... . The Contractor undertakes to keep .....@..... harmless against any loss or damage that may be caused to the Equipment.

3. The Contractor undertakes that the equipment shall be used exclusively for the performance/execution of the Contract strictly in accordance with its terms and conditions and no part of the equipment shall be utilised for any other work of purpose whatsoever. It is clearly understood by the Contractor that non-observance of the obligations under this Indemnity Bond by the Contractor shall inter-alia constitute a criminal breach of trust on the part of the Contractor for all intents and purpose including legal/penal consequences.

4. That .....@..... is and shall remain the exclusive owner of the Equipment free from all encumbrances, charges or liens of any kind, whatsoever. The Equipment shall at all times be open to inspection and checking by the Project Manager or other employees/agents authorised by him in this regard. Further, ...@..... shall always be free at all times to take possession of the Equipment in whatever form the Equipment may be, if in its opinion, the equipment are likely to be endangered, misutilised or converted to uses other than those specified in the Contract, by any acts of omission or commission on the part of the Contractor or any other person or on account of any reason whatsoever and the Contractor binds himself and undertakes to comply with the directions of demand of .....@..... to return the Equipment without any demur or reservation.

5. That this Indemnity Bond is irrevocable. If at any time any loss or damage occurs

to the Equipment or the same or any part thereof is mis-utilised in any manner whatsoever, then the Contractor hereby agrees that the decision of the Project Manager of .....@..... as to assessment of loss or damage to the Equipment shall be final and binding on the Contractor. The Contractor binds itself and undertakes to replace the lost and/or damaged Equipment at its own cost and/or shall pay the amount of loss to .....@..... without any demur, reservation or protest. This is without prejudice to any other right or remedy that may be available to .....@..... against the Contractor under the Contract and under this Indemnity Bond.

6. NOW THE CONDITION of this Bond is that if the Contractor shall duly and punctually comply with the terms and conditions of this Bond to the satisfaction of .....@....., THEN, the above Bond shall be void, but otherwise, it shall remain in full force and virtue.

@ Fill in abbreviated name of Employer

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 No.1

Particulars of the Equipment handed over	Quantity	Particulars of Despatch title Documents		Value of the Equipment	Signature of Attorney in token of receipt
		RR/GR/ Bill of lading No & Date	Carrier		

(Please number subsequent schedules)

For and on behalf of

.....

.....

(Contractor's Name)

WITNESSES:

1. Signature..... Signature.....

2. Name..... Name.....

3. Address..... Designation of.....
Authorised representative *

Signature..... (Common Seal)
(In case of Company)
.....
..

Name.....
.....

---

* Indemnity Bond are to be executed by the authorised person and (i) in case of contracting Company under common seal of the Company or (ii) having the Power of Attorney issued under common seal of the company with authority to execute Indemnity Bond, (iii) In case of (ii), the original Power of Attorney if it is specifically for this Contract or a photostat copy of the Power of Attorney if it is General Power of Attorney and such documents should be attached to Indemnity Bond

APPENDIX-21: FORM OF POWER OF ATTORNEY FOR JOINT VENTURE

KNOW ALL MEN BY THESE PRESENTS THAT WE, the Partners whose details are given hereunder ..... have formed a Joint Venture under the laws of..... and having our Registered Office(s)/Head Office(s) at ..... (hereinafter called the 'Joint Venture' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) acting through M/s ..... being the Partner in-charge do hereby constitute, nominate and appoint M/s..... a Company incorporated under the laws of .....…….... and having its Registered/Head Office at ..... as our duly constituted lawful Attorney (hereinafter called "Attorney" or "Authorised Representative" or "Partner In-charge") to exercise all or any of the powers for and on behalf of the Joint Venture in regard to (NIT NO. – SECI/SD/2/NIT/2016/KPL..... the bids for which have been invited by ……. (insert name of the Employer along with address) ……. (hereinafter called the 'Employer') to undertake the following acts :

i) To submit proposal and participate in the aforesaid Bid Specification of the Employer on behalf of the "Joint Venture".

ii) To negotiate with the Employer the terms and conditions for award of the Contract pursuant to the aforesaid Bid and to sign the Contract with the Employer for and on behalf of the "Joint Venture".

iii) To do any other act or submit any document related to the above.

iv) To receive, accept and execute the Contract for and on behalf of the "Joint Venture".

It is clearly understood that the Partner In-charge (Lead Partner) shall ensure performance of the Contract(s) and if one or more Partner fail to perform their respective portions of the Contract(s), the same shall be deemed to be a default by all the Partners.

It is expressly understood that this Power of Attorney shall remain valid binding and irrevocable till completion of the Defect Liability Period in terms of the Contract.

The Joint Venture hereby agrees and undertakes to ratify and confirm all the whatsoever the said Attorney/Authorised Representatives/Partner in-charge quotes in

the bid, negotiates and signs the Contract with the Employer and/or proposes to act on behalf of the Joint Venture by virtue of this Power of Attorney and the same shall bind the Joint Venture as if done by itself.

IN WITNESS THEREOF the Partners Constituting the Joint Venture as aforesaid have executed these presents on this ..... day of ……..... under the Common Seal(s) of their Companies.

for and on behalf of the
Partners of Joint Venture

.....

.....

.....

The Common Seal of the above Partners of the Joint Venture:

The Common Seal has been affixed there unto in the presence of:

WITNESS

1. Signature.....

   Name .....

   Designation .....

   Occupation .....

2. Signature.....

Name .....….....

Designation .....….....

Occupation .....….....

Note :

1. For the purpose of executing the Agreement, the non-judicial stamp papers of appropriate value shall be purchased in the name of Joint Venture.

2. The Agreement shall be signed on all the pages by the authorised representatives of each of the partner(s) and should invariably be witnessed.

APPENDIX-22: FORM OF UNDERTAKING BY THE JOINT VENTURE PARTNERS

THIS JOINT DEED OF UNDERTAKING executed on this……. day of…….. Two Thousand and……..... by …….. a company incorporated under the laws of …….. and having its Registered Office at .....(hereinafter called the "Party No.1" which expression shall include its successors, executors and permitted assigns) and M/s……a company incorporated under the laws of ……..…… and having its Registered Office at ……..…… (hereinafter called the "Party No.2" which expression shall include its successors, executors and permitted assigns) and M/s.. .. .. a Company incorporated under the laws of …….. and having its Registered Office at ……. (hereinafter called the "Party No.3" which expression shall include its successors, executors and permitted assigns) for the purpose of making a bid and entering into a contract [hereinafter called the "Contract" {in case of award)] against the NIT NO. – SECI/SD/2/NIT/2016/KPL……..…….. for …… (insert name of the project ……. of …….. (insert names of the Employer) …….., a Company incorporated under the Companies Act of 1956 having its registered office at …….(insert registered address of the Employer)……. (hereinafter called the "Employer").

WHEREAS the Party No.1, Party No.2 and Party No.3 have entered into an Agreement dated.....

AND WHEREAS the Employer invited bids as per the above mentioned Specification for the procurement of land, design, manufacture, supply, erection, testing and commissioning of Equipment/ Materials stipulated in the bidding documents under …… (insert name of the project) …….

AND WHEREAS Clause 4, Section-IFB (documents establishing the Qualification of Bidder) & Qualification Criteria forming part of the bidding documents, inter-alia stipulates that an Undertaking of two or more qualified firms/partner(s), meeting the requirements of Qualification Criteria, as applicable, may bid, provided, the Joint Venture fulfils all other requirements under Clause 4 of IFB and in such a case, the Bid Forms shall be signed by all the partner(s)s so as to legally bind all the Partners of the Joint Venture, who will be jointly and severally liable to perform the Contract and all obligations hereunder.

The above clause further states that this Undertaking shall be attached to the bid and the Contract performance guarantee will be as per the format enclosed with the bidding document without any restrictions or liability for either party.

AND WHEREAS the bid is being submitted to the Employer vide proposal No……..dated ……..... by Party No.1 based on this Undertaking between all the parties; under these presents and the bid in accordance with the requirements of as per bidding documents, has been signed by all the parties.

NOW THIS UNDERTAKING WITNESSETH AS UNDER:

In consideration of the above premises and agreements all the parties of this Deed of Undertaking do hereby declare and undertake:

1. In requirement of the award of the Contract by the Employer to the Joint Venture Partners, we, the Parties do hereby undertake that M/s……. the Party No.1, shall act as Lead Partner and further declare and confirm that we the parties to the Joint Venture shall jointly and severally be bound unto the Employer for the successful performance of the Contract and shall be fully responsible for the procurement of land, design, manufacture, supply and successful performance of the project in accordance with the Contract:

2. In case of any breach or default of the said Contract by any of the parties to the Joint Venture, the party(s) do hereby undertake to be fully responsible for the successful performance of the Contract and to carry out all the obligations and responsibilities under the Contract in accordance with the requirements of the Contract.

3. Further, if the Employer suffers any loss or damage on account of any breach in the Contract or any shortfall in the performance of the project/equipment in meeting the performances guaranteed as per the specification in terms of the Contract, the Party(s) of these presents undertake to promptly make good such loss or damages caused to the Employer, on its demand without any demur. It shall not be necessary or obligatory for the Employer to proceed against Lead Partner to these presents before proceeding against or dealing with the other Party(s), the Employer can proceed against any of the parties who shall be jointly and severally liable for the performance and all other liabilities/obligations under the Contract to the Employer.

4. The financial liability of the Parties of this Deed of Undertaking to the Employer, with respect to any of the claims arising out of the performance or non-performance of the obligations set forth in this Deed of Undertaking, read in conjunction with the relevant conditions of the Contract shall, however not be limited in any way so as to restrict or limit the liabilities or obligations of any of the Parties of this Deed of Undertaking.

5. It is expressly understood and agreed between the Parties to this Undertaking that the responsibilities and obligations of each of the Parties shall be as delineated in Appendix – I (to be suitably appended by the Parties along with this Undertaking in its bid) to this Deed of Undertaking. It is further undertaken by the parties that the above sharing of responsibilities and obligations shall not in any way be a limitation of joint and several responsibilities of the Parties under the Contract.

6. It is also understood that this Undertaking is provided for the purposes of undertaking joint and several liabilities of the partner(s) to the Joint Venture for submission of the bid and performance of the Contract and that this Undertaking shall not be deemed to give rise to any additional liabilities or obligations, in any manner or any law, on any of the Parties to this Undertaking or on the Joint Venture, other than the express provisions of the Contract.

7. This Undertaking shall be construed and interpreted in accordance with the provisions of the Contract.

8. In case of an award of a Contract, we the parties to this Deed of Undertaking do hereby agree that we shall be jointly and severally responsible for furnishing a Contract performance security from a bank in favour of the Employer in the currency of the Contract.

9. It is further agreed that this Deed of Undertaking shall be irrevocable and shall form an integral part of the bid and shall continue to be enforceable till the Employer discharges the same or upon the completion of the Contract in accordance with its provisions, whichever is earlier. It shall be effective from the date first mentioned above for all purposes and intents.

IN WITNESS WHEREOF, the Parties to this Deed of Undertaking have through their authorised representatives executed these presents and affixed Common Seals of their companies, on the day, month and year first mentioned above.

Common Seal of …….
has been affixed in my/ our
presence pursuant to Board of
Director's Resolution dated ……..

Name ……..

Designation ……

Signature ……

For Lead Partner (Party No.-1)
For and on behalf of M/s
……..

(Signature of the authorized representative)

WITNESS :

I. ……

II. ……

Common Seal of …….
has been affixed in my/ our
presence pursuant to Board of
Director's Resolution dated ……..

Name ……..
Designation ……

Signature ……

For Party No.-2
For and on behalf of M/s……..

(Signature of the authorized representative)

WITNESS :

I. ……

II. ……

Common Seal of …….
has been affixed in my/ our
presence pursuant to Board of
Director's Resolution dated ……..

For Party No.-3
For and on behalf of M/s.
……..

Name ……..

Designation ……

Signature …….

(Signature of the authorized representative)

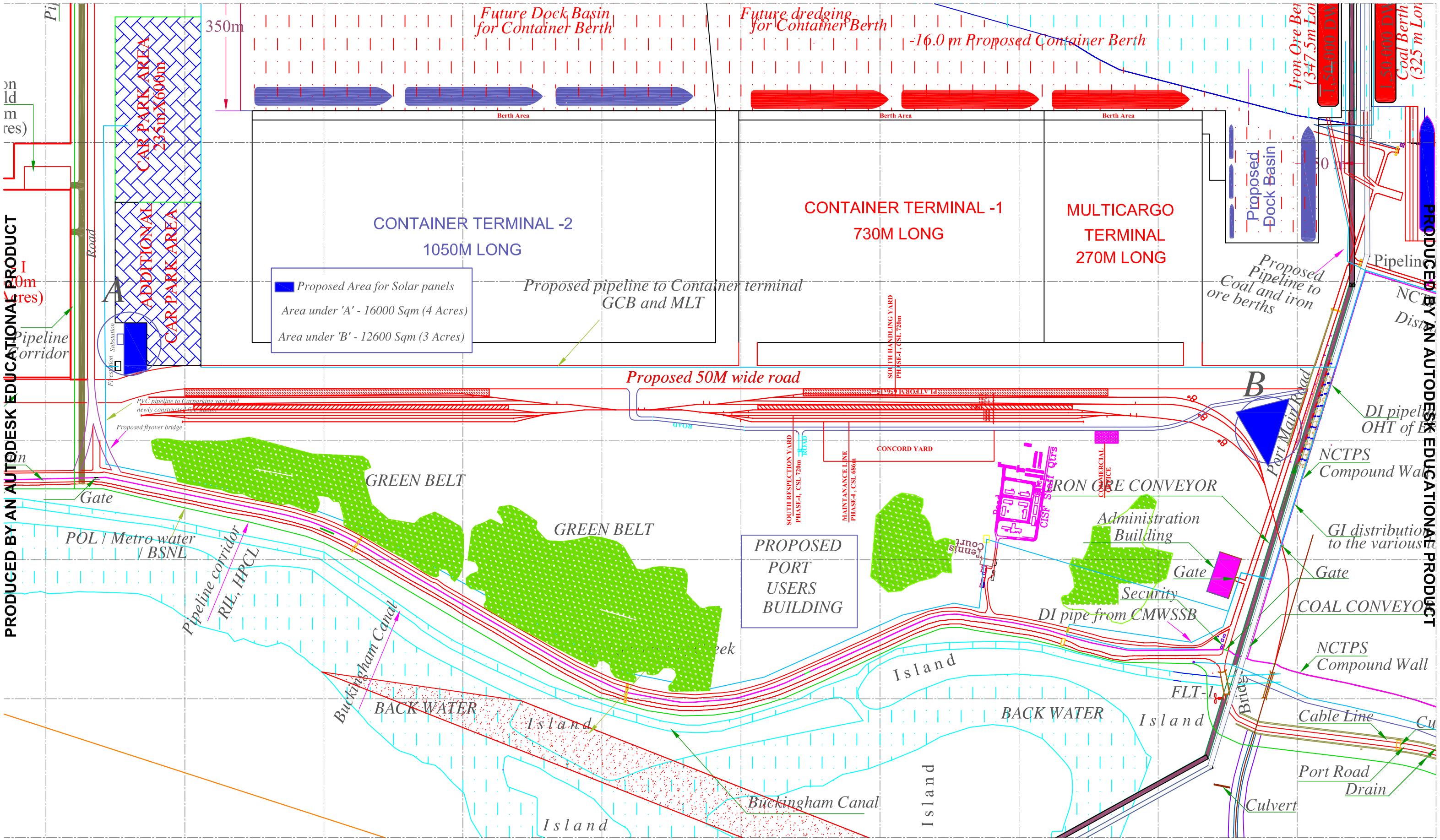
WITNESS :

I. ……

II. ……

Note :

1. For the purpose of executing the Agreement, the non-judicial stamp papers of appropriate value shall be purchased in the name of Joint Venture.
2. The Undertaking shall be signed on all the pages by the authorised representatives of each of the partner(s) and should invariably be witnessed.



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Annexure 1: Details of Site

1. **Site Location:**

   i. The proposed power project shall be located at Kamarajar Port Limited (KPL), Ennore, Chennai in the state of Tamil Nadu.

   Site Geographical Co-ordinates:

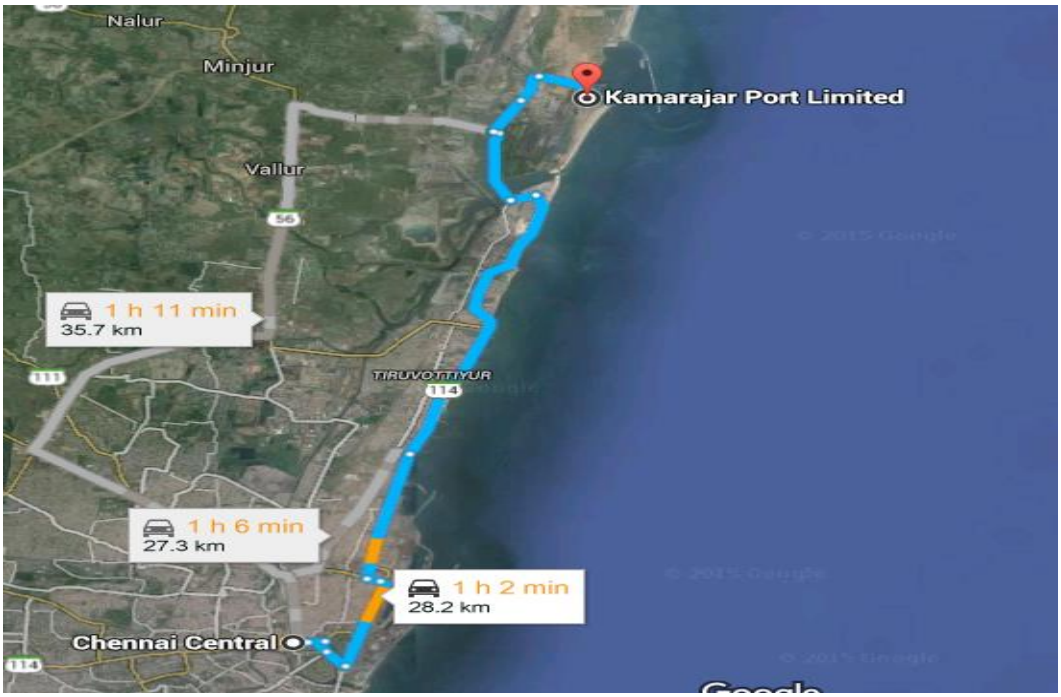
   - Latitude 13°15'52.84"N and Longitude 80°19'56.01"E.

   The nearest urban area from the site is Minjur, approx. 15 kms from Ennore.

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

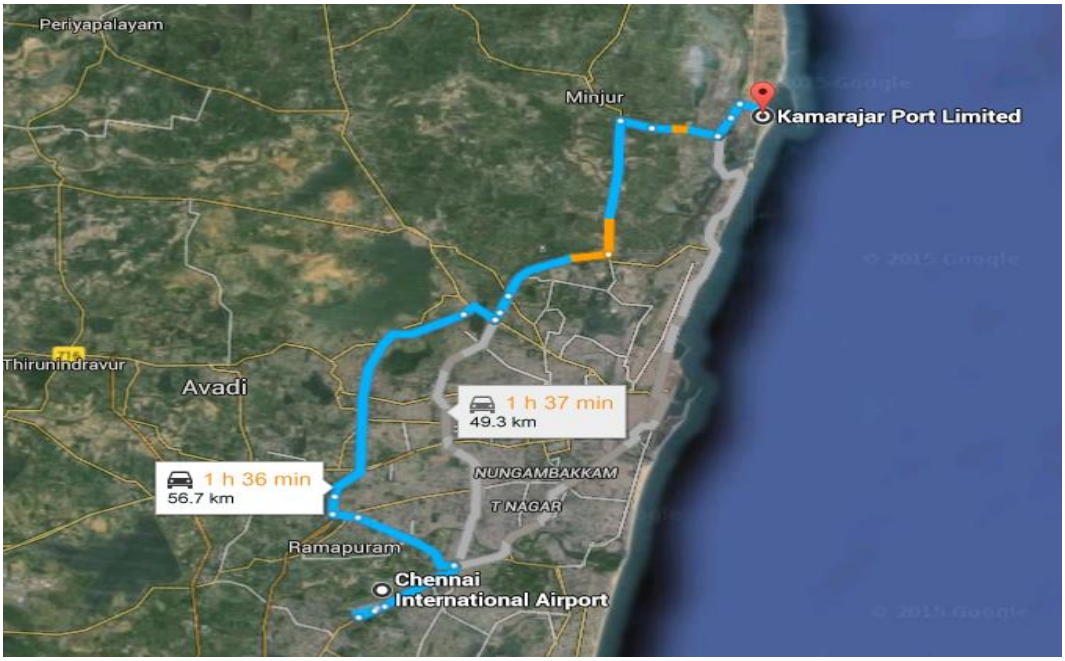
i. By Train

Chennai Central Railway Station – approx. 28 km.



ii. By Air:

The nearest Airport: Chennai International Airport, GST Rd, Meenambakkam, Chennai- approx. 57 km (via Chennai Bypass Road) or approx. 46 km via Ennore High Road.



3. **Land**

i. The project site is Triangular in shape with total area of approximately 1.5 acre and a perimeter of approx. 290m (see Site Map - B)

ii. The land for the proposed Project is under possession of Kamarajar Port Trust and access rights shall be given to the Contractor for the purpose of execution of the Contract.

iii. The levelling and filling of project site shall be carried out by KPL and handed over to the Contractor on as is where is basis for execution of the Project.

iv. The scope of works shall include but not limited to making necessary approaches, drainage and measures to minimize soiling.

v. KPL shall provide soil investigation Report for designing of the civil foundations, structures, control room building, invertor building etc.

vi. The point of interconnection (KPL Administrative Building Indoor 11kV/415 V substation) lies approx. 200 m from the site.

4. **Supply specific Local Conditions:**

Item	Characteristic
Location	Kamarajar Port Limited (Marked B in the Site map below)
Site characteristics:	
Annual Temperature Range	Minimal variations in seasonal temperature ranging from a maximum of 38–42 °C in summer to a minimum of 18–20 °C in winter.
Climatic conditions	Hot and humid for most of the year with a tropical wet and dry type of climate
Precipitation	Seasonal rainfall in the region from September to December from retreating monsoon, and occasional cyclones. Total annual rainfall is about 1400 mm (55 in).
Seismic Zone	Seismic Zone III as per IS 1893 (Part 1) - 2002
Maximum Wind Speeds	250 kmph
Electrical infrastructure: AC system interconnection requirement at Point of Interconnection	11kV/415V Indoor substation

Future Dock Basin for Container Berth
Future dredging for Container Berth
-16.0 m Proposed Container Berth
350m
CAR PARK AREA 235mx600m
ADDITIONAL CAR PARK AREA
CONTAINER TERMINAL -2
1050M LONG
CONTAINER TERMINAL -1
730M LONG
MULTICARGO TERMINAL
270M LONG
Proposed Area for Solar panels
Area under 'A' - 16000 Sqm (4 Acres)
Area under 'B' - 12600 Sqm (3 Acres)
Proposed pipeline to Container terminal GCB and MLT
Proposed Dock Basin
Proposed Pipeline to Coal and iron ore berths
Proposed 50M wide road
Pipeline corridor
Gate
GREEN BELT
GREEN BELT
POL / Metro water / BSNL
Pipeline corridor
RIL, HPCL
Buckingham Canal
BACK WATER
Island
PROPOSED PORT USERS BUILDING
CONCORD YARD
IRON ORE CONVEYOR
Administration Building
Gate
Security
DI pipe from CMWSSB
COAL CONVEYOR
NCTPS Compound Wall
Cable Line
Port Road Drain
Culvert
Buckingham Canal
Island
Island
Island
BACK WATER
Island
PROPOSED PORT USERS BUILDING
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