


Kerala Tenders		eTendering System Government of Kerala	
Tender Details		Date : 22-Feb-2023 10:49 AM	
			
Basic Details			
Organisation Chain	ANERT		
Tender Reference Number	ANERT-TECH/184/2022-CTM		
Tender ID	2023_ANERT_560398_1		
Tender Type	Open Tender	Form of contract	EPC Contract
Tender Category	Works	No. of Covers	2
General Technical Evaluation Allowed	No	ItemWise Technical Evaluation Allowed	No
Payment Mode	Online	Is Multi Currency Allowed For BOQ	No
Is Multi Currency Allowed For Fee	No	Allow Two Stage Bidding	No
Payment Instruments		Cover Details, No. Of Covers - 2	
Online Bankers	S.No	Bank Name	
	1	SBI MOPS	
Cover No	Cover	Document Type	Description
1	Fee/PreQual/Technical	.pdf	Pre Qualification Documents
		.pdf	Technical Bid
		.pdf	Signed Tender Document
2	Finance	.xls	Financial Bid
		.pdf	Financial Bid
Tender Fee Details, [Total Fee in ₹ * - 29,500]		EMD Fee Details	
Tender Fee in ₹	29,500	EMD Amount in ₹	0.00
Fee Payable To	Nil	EMD through BG/ST or EMD Exemption Allowed	No
Tender Fee Exemption Allowed	Yes	Fee Payable At	Nil
		EMD Fee Type	fixed
		EMD Percentage	NA
		EMD Payable To	Nil
		EMD Payable At	Nil
Work / Item(s)			
Title	EoI for the selection of Vendors for the Installation of Rooftop Solar of various capacities under Phase-II of Grid Connected Rooftop Solar Scheme of MNRE for cumulative capacity of 100 MW in the proposed Solar City Thiruvananthapuram, Kerala, India		
Work Description	EoI for the selection of Vendors for the Installation of Rooftop Solar of various capacities under Phase-II of Grid Connected Rooftop Solar Scheme of MNRE for cumulative capacity of 100 MW in the proposed Solar City		
Pre Qualification Details	Please refer Tender documents.		
Independent External Monitor/Remarks	NA		
Tender Value in ₹	NA	Product Category	Solar Power Plants
Contract Type	Tender	Sub category	NA
Location	Thiruvananthapuram, Kerala, India	Bid Validity(Days)	500
Pre Bid Meeting Address	NA	Period Of Work(Days)	30
Should Allow NDA Tender	No	Pre Bid Meeting Date	NA
		Pre Bid Meeting Place	NA
		Bid Opening Place	ANERT HQ
		Allow Preferential Bidder	No
Critical Dates			
Publish Date	22-Feb-2023 10:00 AM	Bid Opening Date	15-Mar-2023 03:30 PM
Document Download / Sale Start Date	22-Feb-2023 10:00 AM	Document Download / Sale End Date	14-Mar-2023 03:00 PM
Clarification Start Date	NA	Clarification End Date	NA
Bid Submission Start Date	22-Feb-2023 10:00 AM	Bid Submission End Date	14-Mar-2023 03:00 PM
Tender Documents			

NIT Document	S.No	Document Name	Description	Document Size (in KB)
	1	Tendernotice_1.pdf		NIT and Abstract

Work Item Documents	S.No	Document Type	Document Name	Description	Document Size (in KB)
	1	Tender Documents	SolarCity100MW.pdf		Tender Document
2	BOQ	BOQ_825287.xls		Financial Bid	357.50

Tender Inviting Authority

Name	CEO ANERT
Address	Office of CEO, ANERT Law College Road, Vikas Bhavan. PO, Thiruvananthapuram - 695 033, Kerala



**AGENCY FOR NEW & RENEWABLE ENERGY
RESEARCH AND TECHNOLOGY (ANERT)**

Department of Power, Government of Kerala
Thiruvananthapuram, Kerala – 695 033;
www.anert.gov.in , projects@anert.in

E-TENDER DOCUMENT

Expression of Interest for the selection of Vendors for the Design, Supply, Erection, Testing and Commissioning including 5 year's Warranty of Grid-Connected Rooftop Solar Plant of various capacities under the Phase-II of Grid Connected Rooftop Solar Scheme of MNRE for a cumulative capacity of 100 MW in the proposed Solar City area of Thiruvananthapuram Corporation, Kerala, India

Ref. No.: ANERT-TECH/184/2022-CTM

Date of Publishing of Bids : - 21/02/2023

Last Date of Submission of Bids : - 14/03/2023

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**AGENCY FOR NEW & RENEWABLE ENERGY
RESEARCH AND TECHNOLOGY (ANERT)**

Department of Power, Government of Kerala
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E-TENDER DOCUMENT

Expression of Interest for the selection of Vendors for the Design, Supply, Erection, Testing and Commissioning including 5 year's Warranty of Grid-Connected Rooftop Solar Plant of various capacities under the Phase-II of Grid Connected Rooftop Solar Scheme of MNRE for a cumulative capacity of 100 MW in the proposed Solar City area of Thiruvananthapuram Corporation, Kerala, India

Ref. No.: ANERT-TECH/184/2022-CTM

VOL – 1: GENERAL CONDITIONS

Date of Publishing of Bids : - 21/02/2023

Last Date of Submission of Bids : - 14/03/2023

E-TENDER NOTICE

The EoI in two cover system with Earnest Money Deposit (Bid Security) and Price Bid are invited from experience and eligible bidders to participate in the ***Expression of Interest for the selection of Vendors for the Design, Supply, Erection, Testing and Commissioning including 5 year's Warranty of Grid-Connected Rooftop Solar Plant of various capacities under the Phase-II of Grid Connected Rooftop Solar Scheme of MNRE for a cumulative capacity of 100 MW in the proposed Solar City area of Thiruvananthapuram Corporation, Kerala, India.*** The EoI documents can be downloaded from the e-tendering website of Govt. of Kerala. Tender form will not be available in any other form.

For the implementation of above-mentioned work, Bidders should submit their bid proposal/application along with all supporting documents complete in all aspect through the e-tendering portal of Govt of Kerala – www.etenders.kerala.gov.in

Bid documents which include Eligibility criteria, “Technical Specifications”, various conditions of contract, formats, etc. can be downloaded from website www.etenders.kerala.gov.in. Any amendment (s)/corrigendum/clarifications with respect to this Bid shall be uploaded on the above website only. The Bidder should regularly follow up for any Amendment/Corrigendum/Clarification on the above website.

Thiruvananthapuram

CEO

21/02/2023

TENDER ABSTRACT

Ref. No.	ANERT-TECH/184/2022-CTM
Document Description	EoI for Empanelment of vendors for the Implementation of 100 MW Solar PV System with Grid connectivity in the proposed Solar City Project in Trivandrum Corporation, Kerala, India
Name of Work	Expression of Interest for the selection of Vendors for the Design, Supply, Erection, Testing and Commissioning including 5 year's Warranty of Grid-Connected Rooftop Solar Plant of various capacities under the Phase-II of Grid Connected Rooftop Solar Scheme of MNRE for a cumulative capacity of 100 MW in the proposed Solar City area of Thiruvananthapuram Corporation, Kerala, India
Site	Residential Consumers in Trivandrum, Kerala
Download of Tender Form	http://www.etenders.kerala.gov.in
Pre-Bid Meeting	To be intimated through ANERT website - www.anert.gov.in
Last date of submission of Tender	14/03/2023 @ 3.00 PM
Date and Time of Bid opening (Techno-Commercial)	15/03/2023 @ 11.00 AM
Empanelment Fee	Rs. 29,500 (Including GST)
Warranty period	5-year warranty and complete Operation & Maintenance
Availability of Tender Forms	Website http://www.etenders.kerala.gov.in
Place of opening of tender	Office of CEO, ANERT Law College Road, Vikas Bhavan. PO, Thiruvananthapuram – 695 033, Kerala

Thiruvananthapuram
21/02/2023

Sd/-
CEO

Important Note: Prospective Bidders are requested to remain updated for any notices/amendments/clarifications etc. to the RFS document through the website www.anert.gov.in/www.etenders.kerala.gov.in. No separate notifications will be issued for such notices/amendments/clarification etc. in the print media or individually.

DISCLAIMER

1. Though adequate care has been taken while preparing the NIT document, the Bidders shall satisfy themselves that the document is complete in all respect. Intimation regarding any discrepancy shall be given to this office immediately. If no intimation is received from any Bidder within Ten (10) days from the date of notification of NIT / issuance of e-Tender documents, it shall be considered that the document is complete in all respect and has been received / acknowledged by the Bidder(s).
2. Agency for New and Renewable Energy Research and Technology (ANERT) reserves the right to modify, amend or supplement this document.
3. While this tender document has been prepared in good faith, neither ANERT 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 document, even if any loss or damage is caused by any act or omission on their part.

GENERAL TERMS AND CONDITIONS FOR E-PROCUREMENT

This Expression of Interest is being published as the Expression of Interest for the selection of Vendors for the Design, Supply, Erection, Testing and Commissioning including 5 year's Warranty of Grid-Connected Rooftop Solar Plant of various capacities under the Phase-II of Grid Connected Rooftop Solar Scheme of MNRE for a cumulative capacity of 100 MW in the proposed Solar City area of Thiruvananthapuram Corporation, Kerala, India. This EoI is invited in two cover system from experienced manufacturers / EPC contractors through e-procurement portal of Government of Kerala (www.etenders.kerala.gov.in). Prospective bidders willing to participate in this tender shall necessarily register themselves with above mentioned e-procurement portal.

The tender timeline is available in the critical date section of this tender published in www.etenders.kerala.gov.in

1. ONLINE BIDDER REGISTRATION PROCESS:

- 1.1 Bidders should have a Class III or above Digital Signature Certificate (DSC) to be procured from any Registration Authorities (RA) under the Certifying Agency of India. Details of RAs will be available on www.cca.gov.in. Once, the DSC is obtained, bidders have to register on www.etenders.kerala.gov.in website for participating in this tender. Website registration is a one-time process without any registration fees. However, bidders have to procure DSC at their own cost.
- 1.2 Bidders may contact e-Procurement support desk of Kerala State IT Mission over telephone at 0471- 2577088, 2577188, 2577388 or 0484 – 2336006, 2332262 - through email: helpetender@gmail.com/etendershelp@kerala.gov.in for assistance in this regard

2. ONLINE TENDER PROCESS:

The tender process shall consist of the following stages:

- i. Downloading of tender document: Tender document will be available for free download on www.etenders.kerala.gov.in. However, tender document fees shall be payable at the time of bid submission as stipulated in this tender document.
- ii. Pre-bid meeting: To be updated in the ANERT website – www.anert.gov.in
- iii. Publishing of Corrigendum: All corrigenda shall be published on www.etenders.kerala.gov.in and shall not be available elsewhere.
- iv. Bid submission: Bidders have to submit their bids along with supporting documents to support their eligibility, as required in this tender document on www.etenders.kerala.gov.in. No manual submission of bid is allowed and manual bids shall not be accepted under any circumstances.
- v. In case bidder encounters any technical issues pertaining to e-Procurement system while acting on the tender, computer screen shot of the error message with date & time stamp on the web-browser along with the query shall be e-mailed by the bidder to the help desk (**helpetender@gmail.com**/**etendershelp@kerala.gov.in**), for resolution of the problem. At the same time, problem must be intimated to the concerned Tender Inviting Authority via email.
- vi. The time taken to ascertain, evaluate and suggest a solution for the problem reported by bidder may vary from case to case. Hence bidders are advised to submit the bid **at least 2 working days before the due date** and time of bid submission to avoid any last-minute issues that may come up.
- vii. Opening of Bid and Bidder short-listing: The single cover bids will be opened, evaluated and shortlisted as per the eligibility. Failure to submit the required documents online will attract disqualification. Price bids of the qualified bidders will open on the day to be intimated to all bidders and the work will be awarded.

3. DOCUMENTS COMPRISING BID:

- 3.1 The 2-cover bid shall contain the scanned copies of the following documents which every bidder has to upload:
 - i. The tender document duly signed and sealed downloaded from the website.
 - ii. Summary of Bid documents (Format 2)

- iii. Copy of Registration Certificate of the bidder firm
- iv. Copy of PAN card of the authorized signatory
- v. The Solar Grading certificate issued by M/s ICRA Analytics for Solar PV systems
- vi. The bidder must have an experience of successful commissioning of at least 500 kW SPV Power Plants with a Govt. Department / Govt. undertaking / PSU / Private sector in India.
- vii. Documents to prove the annual Turnover of the bidder (audited statement)
- viii. Certifications required for proving technical compliance
- ix. Declaration by the Bidder (format as in Annexure C)
- x. Declaration of relationship with ANERT employee (format as in Annexure D)
- xi. Summary of bidders Technical Information (Annexure A)
- xii. The Price Schedule as per BOQ in Excel format for this tender to be downloaded from e-tender website, duly digitally signed by the tenderer/authorized signatory of the tender.
- xiii. Bill of Material

3.2 The department doesn't take any responsibility for any technical snag or failure that has taken place during document upload.

3.3 The Bidder shall complete the Price bid as per format given for download along with this tender.

Note: The blank price bid should be downloaded and saved on bidder's computer without changing file-name otherwise price bid will not get uploaded. The bidder should fill in the details in the same file and upload the same back to the website.

4. EMPANELMENT FEE

4.1 The Bidder shall pay, an amount of Rs. 29,500/- incl GST as a non-refundable registration fee and once selected shall submit bid security in the form of Bank Guarantee for a period 6 years from the date of issue.

4.2 Online Payment modes: The registration fees are to be paid in through e-Payment facility provided by the e-Procurement system. Bidders can make payment only via Internet banking facility

State Bank of India Multi Option Payment System (SBI MOPS Gateway): Bidders are required to avail Internet Banking Facility in any of below banks for making tender remittances in eProcurement System.

A) Internet Banking Options (Retail)			
1	Allahabad Bank	32	Kotak Mahindra Bank
2	Axis Bank	33	Lakshmi Vilas Bank
3	Andhra Bank	34	Mehsana Urban Co-op Bank
4	Bandan Bank	35	NKGSB Co-operative Bank
5	Bank of Bahrain and Kuwait	36	Oriental Bank of Commerce
6	Bank of Baroda	37	Punjab and Maharashtra Cooperative Bank
7	Bank of India	38	Punjab National Bank
8	Bank of Maharashtra	39	Punjab and Sind Bank
9	Bassein Catholic Co-operative Bank	40	RBL Bank
10	BNP Paribas	41	Saraswat Cooperative Bank
11	Canara Bank	42	Shamrao Vithal Cooperative Bank
12	Catholic Syrian Bank	43	South Indian Bank
13	Central Bank of India	44	Standard Chartered Bank
14	City Union Bank	45	State Bank of India
15	Corporation Bank	46	Syndicate Bank
16	Cosmos Bank	47	Tamil Nadu Mercantile Bank
17	DCB Bank	48	Tamil Nadu Cooperative Bank
18	Dena Bank	49	The Kalyan Janata Sahakari Bank
19	Deutsche Bank	50	TJSB Bank
20	Dhanalaxmi Bank	51	UCO Bank
21	Federal Bank	52	Union Bank of India
22	HDFC Bank	53	United Bank of India
23	ICICI Bank	54	Vijaya Bank

24	IDBI Bank	55	YES Bank
25	Indian Bank		
26	Indian Overseas Bank		
27	IndusInd Bank		
28	Jammu & Kashmir Bank		
29	Janata Sahakari Bank		
30	Karnataka Bank		
31	Karur Vysya Bank		
B) Internet Banking Options (Corporate)			
1	Bank of Baroda	21	Laxmi Vilas Bank
2	Bank of India	22	Oriental Bank of Commerce
3	Bank of Maharashtra	23	Punjab & Maharashtra Coop Bank
4	BNP Paribas	24	Punjab & Sind Bank
5	Canara Bank	25	Punjab National Bank
6	Catholic Syrian Bank	26	RBL Bank
7	City Union Bank	27	Shamrao Vitthal Co-operative Bank
8	Corporation Bank	28	South Indian Bank
9	Cosmos Bank	29	State Bank of India
10	Deutsche Bank	30	Syndicate Bank
11	Development Credit Bank	31	UCO Bank
12	Dhanalaxmi Bank	32	Union Bank of India
13	Federal Bank	33	UPPCL
14	HDFC Bank	34	Vijaya Bank
15	ICICI Bank	35	Axis Bank
16	Indian Overseas Bank		
17	Janta Sahakari Bank		
18	Jammu & Kashmir Bank		
19	Karur Vysya Bank		
20	Kotak Bank		

During the online bid submission process, bidder shall select **SBI MOPS** option and submit the page, to view the **Terms and Conditions** page. On further submitting the same, the e-Procurement system will re-direct the bidder to MOPS Gateway, where two options namely **SBI** and **Other Banks*** will be shown. Here, Bidder may proceed as per below:

- a) **SBI Account Holders** shall click **SBI** option to with its Net Banking Facility., where bidder can enter their internet banking credentials and transfer the Tender Fee and Bid Security amount.
- b) **Other Bank Account Holders** may click **Other Banks** option to view the bank selection page. Here, bidders can select from any of the 54 Banks to proceed with its Net Banking Facility, for remitting tender payments.

**Transaction Charges for Other Banks vide SBI Letter No. LHO/TVM/AC/2016-17/47 – 1% of transaction value subject to a minimum of Rs. 50/- and maximum of Rs. 150/-*

** Bidders who are using Other Banks option under SBI MOPS Payment Gateway, are advised by SBI to make online payment 72 hours in advance before tender closing time.*

5. SUBMISSION PROCESS:

- 5.1 For submission of bids, all interested bidders have to register online as explained above in this document. After registration, bidders shall submit their technical bid and financial bid online on www.etenders.kerala.gov.in along with online payment of tender document fees and Bid Security.
- 5.2 For page by page instructions on bid submission process, please visit www.etenders.kerala.gov.in and click “Bidders Manual Kit” link on the home page.
- 5.3 It is necessary to click on “Freeze bid” link/ icon to complete the process of bid submission otherwise the bid will not get submitted online and the same shall not be available for viewing/ opening during bid opening process.

6. VALIDITY

- 6.1 The tender offer shall be kept valid for acceptance for a period of 3 months from the date of opening of offers. The offers with lower validity period are liable for rejection. Once opened, the rates will be valid until the end of the scheme or until revised by ANERT if required considering the prevailing market conditions.
- 6.2 Further, the tenderer may extend the validity of the Bids without altering the substance and prices of their Bid for further periods, if so required

7. DEVIATIONS

- 7.1 The offers of the bidders with Deviations in Commercial terms and Technical Terms of the Tender Document are liable for rejection.

8. BLACK LIST

- 8.1 All the intending tenderers shall agree that in the event of the documents furnished with the offer being found to be bogus or the documents contain false particulars, they shall be blacklisted for future tenders/ association with ANERT and Bid Security shall be forfeited against any losses incurred by ANERT.

9. BIDDER'S LOCATION

- 9.1 The tenderers are requested to furnish the exact location of their factories/godown with detailed postal address and pin code, telephone and fax nos. etc. in their tenders to arrange inspection by ANERT, if considered necessary.
- 9.2 All communication shall be made to the registered email of the bidder in the e-tendering systems and ANERT shall not be responsible for non-receipt or delay of any such communication.

CONDITIONS OF CONTRACT

10. GENERAL CONDITIONS

- 10.1 The EoI should be submitted online at www.etenders.kerala.gov.in.
- 10.2 The empanelment tender should be as per the prescribed form which should be downloaded from the e-tender website. The cost of tender forms should be paid online, and once paid will not be refunded. Tender forms are not transferable. Tenders that are not in the prescribed form are liable to be rejected.
- 10.3 Intending tenderers should submit their tenders on or before the due date and time mentioned in the tender abstract. Late tender will not be accepted.
- 10.4 The rates quoted should be only in Indian currency. Tenders in any other currency are liable to rejection. The rates quoted should be for the unit specified in the schedule attached.
- 10.5 The tenderer shall submit a copy of PAN card.
- 10.6 Tenders subject to conditions will not be considered. They are liable to be rejected on that sole ground.
- 10.7 The tenders will be opened on the specified day and time in the office of the CEO, ANERT in the presence of such of those tenderer's representatives who may be present with proper authorisation issued by the tenderer.
- 10.8 If any tenderer withdraws from his e-tender before the expiry of the period fixed for keeping the rates firm for acceptance, the earnest money if any, deposited by him, will be forfeited.
- 10.9 The final acceptance/rejection of the tenders rests entirely with CEO, ANERT who do not bind themselves to accept the lowest or any tender.
- 10.10 In the case of materials of technical nature, the successful tenderer should be prepared to guarantee satisfactory performance for a period of guarantee under a definite penalty. Communication of acceptance of the e-tender normally constitutes a concluded contract. Nevertheless, the successful tenderer shall also execute an agreement for the due fulfilment of the contract within the period to be specified in the letter of acceptance. The contractor shall have to pay all stamp duty, Lawyer's charges and other expenses incidental to the execution of the agreement.

Failure to execute the agreement within the period specified will entail the penalties set out below:

- 10.10.1 The selected bidders shall **submit Bank Guarantee @ 3% of the cost of for the volume of works quoted by the agency in the tender, valid till the completion of Installation works and warranty period (6 years in total considering the time for installation and warranty period). The deposit shall be in the form of a BG which shall be returned after the warranty of the installation made by the vendor.** There will be no exemption for MSE's in depositing this security amount. If the successful bidder fails to deposit the security and execute the agreement as stated above, the earnest money deposited by him will be forfeited to ANERT; and contract arranged elsewhere at the defaulter's risk and any loss incurred by ANERT on account of the purchase will be recovered from the defaulter who will however not be entitled to any gain accruing thereby.
- 10.10.2 In cases where a successful tenderer, after having made partial supplies fails to fulfil the contracts in full, all or any of the materials not supplied may at the discretion of the Purchasing Officer be purchased by means of another tender/quotation or by negotiation or from the next higher tenderer who had offered to supply already, and the loss if any caused to ANERT shall thereby together with such sums as may be fixed by ANERT towards damages be recovered from the defaulting tenderer.
- 10.11 Return the Security deposit shall, subject to the conditions specified herein to the contractor within three months after the expiration of the contract. But in the event of any dispute arising between ANERT and the contractor, ANERT shall be entitled to deduct out of the deposits or the balance thereof, until such dispute is determined the amount of such damages, costs, charges and expenses as may be claimed. The same may also be deducted from any other sum, which may be due at any time from ANERT to the contractor. In all cases where there are guarantee for the goods supplied, the security deposit will be released only after the expiry of the guarantee period.

10.12 The contractor shall not assign or make over the contract on the benefits or burdens thereof to any other person or body corporate. The contractor shall not underlet or sublet to any person or persons or body corporate the execution of the contract or any part thereof without the consent in writing of the purchasing officer who shall have absolute power to refuse such consent or to rescind such consent (if given) at any time if he is not satisfied with the manner in which the contract is being executed and no allowance or compensation shall be made to the contractor or the subcontractor upon such rescission. Provided always that if such consent be given at any time, the contractor shall not be relieved from any obligation, duty or responsibility under this contract.

10.13 In case the contractor becomes insolvent or goes into liquidation, or makes or proposes to make any assignment for the benefit of his creditors or proposes any composition with his creditors for the settlement of his debts, carries on his business or the contract under inspection or behalf of or his creditors or in case any receiving order(s) for the administration of his estate are made against him or in case the contractor shall commit any act of insolvency or in case in which under any clause or clauses any act of insolvency or in case in which under any clause(s) of this contract the contractor shall have rendered himself liable to damages amounting to the whole of his security deposits, the contract shall, thereupon, after notice given by the Purchasing Officer to the contractor, be determined and ANERT may complete the contract in such time and manner and by such persons as ANERT shall think fit. But such determination of the contract shall be without any prejudice to any right or remedy of ANERT against the contractor or his sureties in respect of any breach of contract committed by the contractor. All expenses and damages caused to ANERT by any breach of contract by the contractor shall be paid by the contractor to ANERT and may be recovered from him under the provisions of the Revenue Recovery Act in force in the State.

10.14 Any sum of money due and payable to the contractor (including security deposit returnable to him) under this contract may be appropriated by the CEO or any other person authorised by ANERT and set off against any claim of ANERT for the payment of a sum of money arising out of or under any other contract made by the

contractor with ANERT or any other person authorised by ANERT. Any sum of money due and payable to the successful tenderer or contractor from ANERT shall be adjusted against any sum of money due to ANERT from him under any other contracts.

- 10.15 Every notice hereby required or authorised to be given may be either given to the contractor personally or left at his residence or last known place of abode or business, or may be handed over to his agent personally, or may be addressed to the contractor by post at his usual or last known place of abode or business and if so addressed and posted, shall be deemed to have been served on the contractor on the date on which in the ordinary course of post, a letter so addressed and posted would reach his place of abode or business.
- 10.16 The tenderer shall undertake the installation and commissioning of the system according to the standards and specification.
- 10.17 No representation for enhancement of rate once accepted will be considered.
- 10.18 Special conditions, if any, of the tenderers attached with the tenders will not be applicable to the contract unless they are expressly accepted in writing by the purchaser.
- 10.19 Conditions in the technical document, technical specifications and special conditions of this tender document would override these general conditions, wherever applicable.
- 10.20 ANERT, by notice sent to the Supplier, may terminate the contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination be for ANERT's convenience, the extent to which performance of the Supplier under the contract is terminated, and the date upon which such termination becomes effective.
- 10.21 The E-tender shall be opened at the time and date announced in the tender notice, and the price bid will be evaluated as intimated vide auto generated email only.
- 10.22 In case any difference or dispute arises in connection with the contract, all legal proceedings relating to the matter shall be instituted in the Court within whose jurisdiction the CEO, ANERT voluntarily resides.

10.23 The Courts situated at the place where the headquarters of ANERT is situated viz, Thiruvananthapuram alone will have jurisdiction to entertain civil suits and all other legal pertaining to this contract.

11. SPECIAL CONDITIONS

11.1 Each bidder should submit only one (1) bid. Any bidder who submits/participates in more than one bid for the work shall be disqualified.

11.2 The tenders will be opened at the date and time advised in the Bidding Document. If the due date for receiving and opening the tender happens to be declared holiday, then the tender will be received and opened on the very next day, for which no prior intimation will be given.

11.3 During the tender evaluation, ANERT may seek more clarifications/details from any or all of the tenderers, if felt necessary.

11.4 **The rate quoted should be all-inclusive including delivery of materials, Cost of materials and labour for the civil works, installation and commissioning, Warranties, Application fees, KSEB and Electrical inspectorate related expenses and fees, GST and all other expenses.**

11.5 The tender offer shall be kept valid for acceptance for a period of 3 months from the date of opening of bid. The offers with lower validity period are liable for rejection. The finalised rates will be valid till the end. Once opened, the rates will be valid till the end of the allotted capacity or as decided by ANERT for revision based on the then prevailing market conditions.

11.6 The evaluation of the price bid will be based on the grand total of all-inclusive amount quoted excluding GST.



**AGENCY FOR NEW & RENEWABLE ENERGY
RESEARCH AND TECHNOLOGY (ANERT)**

Department of Power, Government of Kerala
Thiruvananthapuram, Kerala – 695 033;
www.anert.gov.in , projects@anert.in

E-TENDER DOCUMENT

Expression of Interest for the selection of Vendors for the Design, Supply, Erection, Testing and Commissioning including 5 year's Warranty of Grid-Connected Rooftop Solar Plant of various capacities under the Phase-II of Grid Connected Rooftop Solar Scheme of MNRE for a cumulative capacity of 100 MW in the proposed Solar City area of Thiruvananthapuram Corporation, Kerala, India

Ref. No.: ANERT-TECH/ /2023 -PE2 (RTS)

VOL – 2: SCHEDULE AND SCOPE OF WORKS

Date of Publishing of Bids : - 21/02/2023

Last Date of Submission of Bids : - 04/03/2023

REGISTRATION / EMPANELMENT PROCESS

- 12.1 ***Expression of Interest for the selection of Vendors for the Design, Supply, Erection, Testing and Commissioning including 5 year's Warranty of Grid-Connected Rooftop Solar Plant of various capacities under the Phase-II of Grid Connected Rooftop Solar Scheme of MNRE for a cumulative capacity of 100 MW in the proposed Solar City area of Thiruvananthapuram Corporation, Kerala, India***
- 12.2 ANERT is in receipt of sanction of 100MW Solar Power plant installation under the Phase-II of Solar Rooftop programme of the Ministry of New & Renewable Energy. For the purpose of implementing the said works, ANERT shall be referred to as 'Implementing Agency'
- 12.3 ANERT, therefore, invites bids from eligible bidders to participate in the EoI for empanelment in the e-tendering platform for Design, Manufacture, Supply, Erection, Testing and Commissioning including Warranty, Operation and Maintenance of Solar PV Power System on the Rooftop of Individual Residents / Group Housing Societies / Residential Welfare Associations (GHS/RWA) etc at the proposed Solar City area of Thiruvananthapuram.
- 12.4 For the implementation of above-mentioned work, Bidders should submit their bid proposal online complete in all aspect on or before Last date of Bid Submission.
- 12.5 Bid documents, which include Eligibility Criteria, Technical Specifications, various Conditions of Contract, and Formats etc., can be downloaded from Kerala Tenders portal. Any amendment(s)/corrigendum/clarification(s) with respect to this Bid shall be uploaded on www.etenders.kerala.gov.in. The Bidder should regularly check for any Amendment(s) / Corrigendum / Clarification(s) on the above website only.

13. INTRODUCTION, BID DETAILS AND INSTRUCTIONS TO THE BIDDERS

13.1 INTRODUCTION

The Ministry of New and Renewable Energy, Government of India (MNRE) is implementing Phase-II of Grid Connected Rooftop Solar (GCRTS) Programme wherein central financial assistance (CFA) is being provided for installation of rooftop solar (RTS) projects in residential buildings. To implement the RTS activities in respect of the aforesaid programme, Government of Kerala, has decided that ANERT shall be the tendering agency for allocation provided for the proposed Solar City of Thiruvananthapuram and will identify L1 rates and register / empanel vendors for implementation of the programme.

- i. This EoI document is in accordance with MNRE Phase II guidelines vide notification 318/331/2017 dated 20.08.2019. The guidelines/scheme documents/amendments for Phase-II of GCRTS programme can be seen on SPIN portal (www.solarrooftop.gov.in).
 - ii. ANERT will register interested applicants for RTS installation under the scheme and the same may be shared with empanelled vendors for installation. However, the entire responsibility of finding the applicants/ consumers lies with the vendors. ANERT/MNRE bears no responsibility in this regard.
 - iii. This scheme with an aggregate capacity of **100 MW** for the proposed Solar City of Thiruvananthapuram envisages installation of grid-connected Rooftop solar projects on the roofs of consumers as specified by MNRE vide Order No. 318/331/2017 - Grid Connected Rooftop Dated 20th August 2019 and their amendments issued from time to time
- ie. broadly in following categories:

Sl. No.	Category	Coverage of Buildings
1	Residential	All types of Residential buildings and Group Housing Societies/Residential Welfare Associations (GHS/RWA)

The Ministry of New and Renewable Energy (MNRE), Government of India has notified the Benchmark cost for Rooftop Solar Plants for FY 2021-22 as under:

S.No.	Capacity Range*	Benchmark Cost (INR/Wp)	
		General Category States /UTs	Special Category States States including Sikkim, Uttarakhand, Himanchal Pradesh, Jammu & Kashmir, Ladakh, Andaman & Nicobar and Lakshadweep Island**
1.	1 kWp	51100	56210
2.	2 kWp	46980	51670
3.	3 kWp	45760	50330
4.	Above 3-10 kWp	44640	49100
5.	Above 10-100 kWp	41640	45800
6.	Above 100-500 kWp	39080	42980

*The project capacity shall be considered as Inverter capacity or the SPV module array capacity, whichever is lower, for the purpose of determining CFA. **The separate benchmark cost for Special Category States will be applicable for projects under phase II of the programme only.

Note:

- i. All the above benchmark costs are inclusive of total system cost including Photo-Voltaic solar modules, inverters, balance of systems including cables, Switches/Circuit Breakers /Connectors/ Junction Boxes, mounting structure, earthing, lightning arrester, local connectivity cost, cost of civil works, foundations etc. and its installation, commissioning, transportation, insurance, comprehensive maintenance charges for five years, other applicable fees and taxes if any (excluding GST) etc.
- ii. The above-mentioned benchmark costs are excluding net metering cost and battery back-up costs.
- iii. The above-mentioned benchmark cost is indicative only. Prevailing MNRE benchmark cost should NOT be considered as the ceiling rate for any bidding agency.
- iv. The benchmark cost for financial year 2021-22 will be applicable for all LoAs to be issued/ empanelment of developers/vendors to be done after Date of issuance of

Benchmark Order, by the implementing agencies in States/UTs. Moreover, if revised benchmark cost is issued by the Ministry before the final date of bid submission in any tender, the final date of bid submission shall be extended by minimum 15 days so that the bidders may submit revised bids in accordance with the revised benchmark cost. For such cases, bidders shall not be asked to re-submit any fees/bond, already submitted. The benchmark cost indicated in the LOA issued to an empanelled vendor will be applicable till the project completion timeline specified by MNRE in the sanction order or as specified in the LOA, whichever is earlier.

The CFA structure applicable is as Tabulated below (As per MNRE Guidelines or as applicable at the time of commissioning of the project):

Type of Residential Sector	Central Financial Assistance (CFA) (as percentage of benchmark cost or cost discovered through competitive process, whichever is lower)
Residential sector (maximum up to 3 kW capacity)	40 % of Benchmark Cost/discovered cost, whichever is lower
Residential sector (above 3 kW capacity and up to 10 kW capacity)	40 % up to 3 kW Plus 20% for RTS system above 3 kW and up to 10 kW. (Percentage of benchmark cost/discovered cost, whichever is lower)
Group Housing Societies/Residential Welfare Associations (GHS/RWA) etc. for common facilities up to 500 kWp (@ 10 kWp per house), with the upper limit being inclusive of individual rooftop plants already installed by individual residents in that GHS/RWA at the time of installation of RTS for common activity.	20% of Benchmark Cost/discovered cost, whichever is lower

Note: Central Financial Assistance (CFA) disbursement will be governed as per MNRE Office Memorandum No.318/331/2017-GCRT Dated 3rd September 2019 on "Clarification on applicability of CFA individual residential households for installation of rooftop solar system under Phase-II of Grid-connected Rooftop Solar Programme".

- iv. ANERT hereby invites interested vendors to participate in the bidding process for the selection of Empanelment of vendors for implementation of Grid-connected Rooftop Solar Projects for 100 MWp aggregate capacity as per this EoI.
- v. The bidders who are techno-commercially qualified wish to provide their services on the project cost discovered through transparent E-bidding process, shall be empanelled for implementation of the said project. The CFA shall be calculated as indicated in the above table on the basis of discovered price or MNRE benchmark cost, whichever is lower. The tenure of empanelment shall be 18 Months from the date of empanelment letter issued by ANERT or up to exhaustion of the allocated capacity by MNRE. The implementing agencies shall ensure that the tenure of empanelment shall be in synchronization with the timelines of MNRE sanction. Depending on requirement/contingencies and with prior approval of MNRE, ANERT may extend the tenure of empanelled vendors for implementation of the project.
- vi. The Bidders are advised to read carefully all instructions and conditions appearing in this document and understand them fully. All information and documents required as per the bid document must be furnished. Failure to provide the information and/ or documents as required may render the bid technically nonresponsive.
- vii. The bidder shall be deemed to have examined the bid document and MNRE scheme, to have obtained his own information in all matters whatsoever that might affect carrying out the works in line with the scope of work specified elsewhere in the document at the offered rates and to have satisfied himself to the level of sufficiency. The bidder shall be deemed to be in knowledge of the scope, nature and magnitude of the works and requirement of materials, equipment, tools and labour involved, wage structures and as to what all works, he has to complete in accordance with the bid documents irrespective of any defects, omissions or errors that may be found in the bid documents.

13.2 SIZE OF THE PROJECTS AND BID DETAILS:

i. The size of each project shall be in the range for each part as under:

Range		Capacity	Min Capacity (MWp)	Max Capacity (MWp)
Part A	:	> 1 to 2 kWp	20	100
Part B	:	> 2 to 3 kWp	30	
Part C	:	> 3 to 10 kWp	20	
Part D	:	>10 to 100 kWp	25	
Part E	:	>100 to 500 kWp	5	

The above capacity ranges are indicative and implementing agencies shall decide on the capacity ranges. One part may however comprise of several rooftop units. Each Rooftop unit can separately connect with the grid and may have separate meters. Entire allocated capacity is bifurcated into different parts, bidders may quote one or more than one part:

The bids are invited from the prospective bidders for the tendered capacity based on the Project Cost. In this part, bidders are to be required to quote the Project Cost for the capacity proposed by the bidder (*in between the minimum and maximum range*). CFA shall be provided to the successful bidders as per the provisions laid down in the MNRE scheme.

However, MNRE vide Office Memorandum No. 318/331/2017- Grid Connected Rooftop Dated 19th February 2021 has kept a provision of minimum 10% of the total allocated capacity under the tender to L1 bidder and in the case L1 vendor does not execute the allocated capacity, as a penalty his/her bank guarantee will be encashed and he/she shall be blacklisted for 5 years from all Government Tenders.

- ii. Bids not in conformity with above provisions & sub-clauses of Clause will not be considered and shall be treated as nonresponsive/incomplete, and will be summarily rejected by ANERT.
- iii. Offer of the Vendors who will quote less than the minimum tendered capacity in

respective category will be treated as non-responsive and shall be summarily rejected. However, Offer of the Vendors who have quoted more than the maximum tendered capacity in respective category will be limited to the maximum category wise tendered capacity.

13.3 Components/Package of Grid Connected Rooftop Solar PV System:

The bidders shall quote price of the complete package essentially covering - “Design, Supply, Erection, Testing and Commissioning including warranty and 05 years of comprehensive operation & maintenance of Grid-connected Rooftop Solar PV plant. For the purpose of this tender, the components of a Grid Connected Rooftop Solar PV System shall essentially comprise but not be limited to crystalline solar PV Panels/modules of required number, Inverters/PCU, module mounting structures of minimum 300mm ground clearance at the lowest point from the roof surface, total Cable/wiring up to 30 m in length, cable conduits, required array junction boxes, DC distribution box, AC distribution box, various connectors, nut- bolts, civil and mechanical works, Protection-Earthing, lightning, surges, drawing & manual and other miscellaneous works. However, the price quoted by the bidders shall be exclusive of GST (Goods and Services Tax).

The empanelled vendor shall not be allowed to charge any extra amount other than the L1 price for the package of Grid Connected Rooftop Solar PV system as indicated above. However, in case of any customization desired by the beneficiary/consumer, the vendor is allowed to charge extra amount to the beneficiary/consumer, on actual basis, subject to signing of a declaration in this regard in the format attached at Annexure-I. ANERT/MNRE shall not be held responsible for any dispute arising out of this agreement.

13.4 INSTRUCTIONS TO THE BIDDERS

- i. Bidders should not be blacklisted from any of the agency with direct or indirect control of Central Government Ministries/ Departments/ Public Sector Units (PSUs)/ Institutions, State Government Departments/ Organizations /Institutions etc.
- ii. Bidder should have valid PAN & GST Registration Numbers as per statutory requirement.

- iii. Bidder must meet the eligibility criteria independently as Bidding Company or as a Bidding Consortium with one of the members acting as the Lead Member of the Bidding Consortium. Bidder will be declared as a Qualified Bidder based on meeting the eligibility criteria (Technical and Financial) and as demonstrated based on documentary evidence submitted by the Bidder during the bidding process.
- iv. In case of a Bidding Consortium the Financial Eligibility criteria like Annual turnover or Net worth as indicated in Clause 14, shall be fulfilled by the Lead Member or Parent Company of the Lead Member while the Technical Eligibility Criteria shall be fulfilled by consortium members. In case bidder is a consortium, a Consortium Agreement along with Resolution shall be furnished.
- v. Bidder including its member of the consortium can submit only one bid against RFP.
- vi. Bidder can however use the technical and financial strength of its Parent Company to fulfil the Technical and/or Financial Eligibility criteria. In such case, Bidders shall submit an Undertaking from the Parent Company and also furnish a certificate of relationship of Parent Company or Affiliate with the Bidding Company, Company Secretary certificate towards shareholding pattern of the Parent Company and the Bidding Company along with a Board resolution from the Parent Company.

13.5 The eligibility of capacity for installation of single plant and total allocation per batch (allotment) will be based on the grading provided by the grading agency appointed by ANERT.

13.6 The grading agency selected for this purpose is “ICRA Analytics Limited” Securities and Exchange Board of India (SEBI) approved Agency for “Assessing and Grading of Integrators/ Contractors for supporting registration process of agencies under Solar Programme implemented in the state of Kerala.

13.7 The grading will be done by M/s ICRA Analytics Ltd at the rates finalised by ANERT as below:

#	Rate For Undertaking Grading Services	AMOUNT (incl GST)
1	Initial Grading	23,600/-
2	Renewal of Grading post one year	9,440/-

13.8 The contact details of the ICRA Analytics Limited mentioned below and personnel dedicated for ANERT functionalities are as below:

**ICRA Analytics Ltd,
Infinity Benchmark, 17th Floor, Plot - G-1,
Block GP, Sector V, Salt Lake, Kolkata - 700091**

Name	Contact Details	Email id
Mr. Mamun	+91 98307 38030	anert.grading@icraanalytics.com
Mr. Indranil Chakraborty	+91 99033 77455	

13.9 The EPC should provide **all-inclusive rate including delivery of materials at the site of installation, loading, unloading charges and the cost of materials and labour for the civil and electrical works, installation and commissioning, Warranties, Application fees, KSEB and Electrical inspectorate related expenses and fees, O&M charges, GST and all other expenses.**

BID QUALIFICATION REQUIREMENTS

14. ELIGIBILITY CRITERIA

14.1 General

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

14.2 Technical Eligibility Criteria:

The Bidder should have completed installation of Grid connected Solar PV Power Plant having of cumulative capacity of 500 kW, which should have been commissioned at least six months prior to Techno-Commercial Bid Opening date. The list of projects commissioned at least 6 months prior to Techno-Commercial Bid Opening date, indicating whether the project is grid connected, along with a copy of the Commissioning certificate and Work order / Contract / Agreement/ from the Client/Owner shall be submitted. The bidder shall also be listed in the National Solar Rooftop Portal of MNRE.

14.3 Financial eligibility criteria

The Bidder should have an Annual Turnover or Net worth as indicated below.

- i. The Minimum Average Annual turnover of Rupees 1 Crore in any two of the last 5 financial years preceding the Bid Deadline subject to the condition that the Bidder should at least have completed two financial years.
- ii. In case, the bidder quotes for capacity more than 1MW in the EoI, they must have turnover of additional 50 Lakhs per MW as per the condition given above. Further, their allocation will also be limited to their ICRA Solar Grading certification.

14.4 Bid submission by the bidder

- i. The Bidder shall submit the information and/or documents as per the formats specified in Volume-IV.
- ii. Strict adherence to the formats wherever specified, is required. Wherever, information has been sought in specified formats, the Bidder shall refrain from referring to brochures /pamphlets. Non-adherence to formats and / or submission of incomplete information may be a ground for declaring the Bid as non-responsive. Each format has to be duly signed and stamped by the authorized signatory of the Bidder.
- iii. The Bidder shall furnish documentary evidence in support of meeting Eligibility Criteria as indicated in Clause no. 13 to the satisfaction of ANERT.

14.5 Amendments to RFS

- i. At any time prior to the deadline for submission of Bids, ANERT may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the RFS document by issuing clarification(s) and/or amendment(s).
- ii. The clarification(s) / amendment(s) (if any) may be notified on ANERT website www.anert.gov.in at least Two (2) days before the proposed date of submission of the Bid. If any amendment is required to be notified within Two (2) days of the proposed date of submission of the Bid, the Bid Deadline may be extended for a suitable period.
- iii. ANERT will not bear any responsibility or liability arising out of non-receipt of the information regarding Amendments in time or otherwise. Bidders must check the website for any such amendment before submitting their Bid.
- iv. In case any amendment is notified after submission of the Bid (prior to the opening of Techno-Commercial Bid.
- v. All the notices related to this Bid which are required to be publicized shall be uploaded on website www.etenders.kerala.gov.in

14.6 Bidding process

14.6.1 Bid formats

The Bid shall comprise of the following:

(A) Cover I - Techno-Commercial documents

- i. Covering Letter as per the prescribed Format-1
- ii. Copy of PAN and TAN certificates of Bidding company
- iii. Original power of attorney issued by the Bidding Company in favour of the authorized person signing the Bid, in the form attached hereto as Format-2 or standard power of attorney in favour of authorized person signing the Bid. (Power of Attorney must be supplemented by Board Resolution to above effect for the company). However, ANERT may accept general Power of Attorney executed in favour of Authorised signatory of the Bidder, if it shall conclusively establish that the signatory has been authorized by the Board of CEOs to execute all documents on behalf of the Bidding Company.
- iv. General particulars of bidders as per Format-3
- v. Document in support of meeting Eligibility Criteria as per Clause no. 13.
- viii. Details for meeting Financial Eligibility Criteria as per Clause no. 13 along with documentary evidence for the same.
- ix. Signed and stamped Copy of RFS Documents including amendments & clarifications by Authorised signatory on each page.

(B) Cover II- Price bid for bid submission

The Bidder shall inter-alia take into account the following while preparing and submitting the Price Bid digitally signed by the authorized signatory. The Bidder shall submit Price Bid in the provided excel format in the e-tender website.

14.7 Validity of Bid

- i. The bid and the Price Schedule included shall remain valid for a period of 3 months from the date of techno-commercial bid opening, with bidder having no

right to withdraw, revoke or cancel his offer or unilaterally vary the offer submitted or any terms thereof. In case of the bidder revoking or cancelling his offer or varying any term & conditions in regard thereof or not accepting letter of allocation, ANERT shall forfeit the Bid Bond furnished by him.

- ii. In exceptional circumstances when letter of acceptance is not issued, ANERT may solicit the Bidder's consent to an extension of the period of validity. The request and the responses thereto shall be made in writing. The Bid Security provided shall also be suitably extended. A Bidder may refuse the request without forfeiting its Bid Bond. A Bidder granting the request will neither be required nor permitted to modify its Bid in any manner.

14.8 Cost of bidding

The bidder shall bear all the costs associated with the preparation and submission of his offer, and ANERT will in no case be responsible or liable for those costs, under any conditions. The Bidder shall not be entitled to claim any costs, charges and expenses of and incidental to or incurred by him through or in connection with his submission of bid even though ANERT may elect to modify / withdraw the invitation of Bid.

14.9 Right to withdraw the RFS and to reject any bid

- i. This RFS may be withdrawn or cancelled by ANERT at any time without assigning any reasons thereof. ANERT further reserves the right, at its complete discretion, to reject any or all of the Bids without assigning any reasons whatsoever and without incurring any liability on any account.
- ii. ANERT reserve the right to interpret the Bid submitted by the Bidder in accordance with the provisions of the EoI and make its own judgment regarding the interpretation of the same. In this regard ANERT shall have no liability towards any Bidder and no Bidder shall have any recourse to ANERT with respect to the selection process. ANERT shall evaluate the Bids using the evaluation process specified in Volume - III, at its sole discretion. ANERT's decision in this regard shall be final and binding on the Bidders.

- iii. ANERT reserves its right to vary, modify, revise, amend or change any of the terms and conditions of the Bid before submission. The decision regarding acceptance or rejection of bid by ANERT will be final.

14.10 Zero Deviation

This is a ZERO Deviation Bidding Process. Bidder is to ensure compliance of all provisions of the Bid Document and submit their Bid accordingly. Tenders with any deviation to the bid conditions shall be liable for rejection.

14.11 Examination of Bid document

- i. The Bidder is required to carefully examine the Technical Specification, terms and Conditions of Contract, and other details relating to supplies as given in the Bid Document.
- ii. The Bidder shall be deemed to have examined the bid document including the agreement/contract, to have obtained information on all matters whatsoever that might affect to execute the project activity and to have satisfied himself as to the adequacy of his bid. The bidder shall be deemed to have known the scope, nature and magnitude of the supplies and the requirements of material and labour involved etc. and as to all supplies he has to complete in accordance with the Bid document.
- iii. Bidder is advised to submit the bid on the basis of conditions stipulated in the Bid Document. Bidder's standard terms and conditions if any will not be considered. The cancellation / alteration / amendment / modification in Bid documents shall not be accepted by ANERT.
- iv. Bid not submitted as per the instructions to bidders is liable to be rejected. Bid shall confirm in all respects with requirements and conditions referred in this bid document.

14.12 Extra cost to supply and Install Monocrystalline Panels

The bidder should provide the additional **cost of supply** for Monocrystalline Solar panels adhering to ALMM list and DCR content as per MNRE guidelines. This cost

should be provided in Rs/ kWp as an extra cost inclusive of GST and uploaded as PDF in the price bid.

14.13 Cost of extra structure Modification

Any extra structure modification at site required as per customer requirement may be done in accordance with the extra costs agreed between customer and EPC. ANERT will not be held responsible for this payment under any circumstances. However, if a Structure stability certificate is requested by ANERT, the EPC should be able to provide the same from a certified Chartered Structural engineer

14.14 Penalty Provisions

Penalty will be imposed on bidder by *ANERT*, if following conditions are encountered:

- i. If L1 bidder fails to execute 10% of the total allocated capacity under this tender, as a penalty his/her bank guarantee will be encashed, and he/she shall be blacklisted for 5 years from all Government Tenders.
- ii. If bidders demand for additional amount/remuneration against the installation of work on and above the discovered L1 rate for the identified package. This shall however not be applicable for cases of customized installations such as raised structure etc, as indicated in earlier para.
- iii. If bidders are defaulting in submission of Bank Guarantee/Required Relevant Documents during the bidding/empanelment process.
- iv. If bidders denied implementing projects in allocated districts/regions/clusters etc.
- v. If bidders are failed to comply with DCR, ALMM and other mandatory requirements of Phase-II Guidelines and issued Amendments.
- vi. Penalties may lead to withholding CFA amount or encashment of Partial/full Performance Bank Guarantee and subsequently debarring or blacklisting from the future State/Central Government Tender.
- vii. To ensure the performance of the empanelled vendors, and declaration to take the liabilities of paying /submitting 10% CPG apart from other penal provisions of the tender in the event of non-performance of failure to fulfilment of contract

obligations or terms and conditions of RFP required to be submitted on appropriate value of non-judicial stamp paper.

SCOPE OF WORK

15. SCOPE OF WORKS

ANERT will empanel eligible vendors participating in this registration process and wish to provide their services on the price/rate discovered through transparent bidding process. The CFA available from MNRE would be limited to 40% of the prevailing Benchmark Cost or Discovered Rate, whichever is lower, for project capacity up to 3 kW. For project capacity above 3 kW and up to 10 kW, the available CFA would be 20% of the prevailing Benchmark Cost or Discovered Rate, whichever is lower. Group Housing Societies/Residential Welfare Associations (GHS/RWA) etc. are allowed to install RTS projects up to 500 kW capacity (@ 10 kWp per house), with the upper limit being inclusive of individual rooftop plants already installed by individual residents in that GHS/RWA at the time of installation of RTS for common activity.

ANERT will not be responsible in case any empanelled vendors do not get any work order. The consumers under this scheme shall be free to install their projects from any empanelled vendors subject to the condition that project shall have to be installed/commissioned as per the MNRE Phase-II Guidelines and subsequent amendments.

The empanelled vendors will carry out the Design, Supply, Erection, Testing and Commissioning including warranty, Comprehensive Operation & Maintenance for a period of 05 years for CAPEX Model of grid interactive rooftop solar PV power plant and shall make all necessary arrangement for evacuation and injection of surplus power to the grid at the interconnection point/ points as agreed with DISCOM (KSEBL).

The detailed Scope of Work for empanelled vendors shall essentially cover but not be limited to:

- i. Identification of prospective beneficiaries and providing necessary assistance to the prospective beneficiary in submitting online applications for installation of RTS project. This is to be done through ANERTs BuyMySun portal – www.buymysun.com, which is linked with the Solar Rooftop National Portal.

- ii. Preparation of Project Report of the proposed Proposal of Rooftop Solar Power Plant for prospective beneficiaries.
- iii. Obtaining Net-metering approval from concerned DISCOM(KSEBL) for providing grid connectivity/net-metering by paying the requisite Application and Registration fee.
- iv. Submission of proposal with all required documents to ANERT through the BuyMySun portal.
- v. Execution of the work shall be carried out in an approved manner as per the technical specification mentioned in this EoI. In case of any dispute, relevant MNRE/BIS/ISI/NABL/ISO/IEC/IS specification shall be followed and work shall be carried out to the reasonable satisfaction of the engineer in charge.
- vi. The vendor shall complete the work of Design, supply, civil work, erection, testing and commissioning of SPV grid connected Power Plant within 2 Months from the issuance of the sanction letter or the last date of the project timeline specified by ANERT from the issue of work orders from prospective beneficiaries. In event of failure to install and commission the RTS system within the mentioned timeframe, the entire Performance Bank Guarantee will be forfeited and may also lead to disqualification of the vendor at the sole discretion of ANERT. The penalty for non-completion will be on pro-rata basis.
- vii. The work covers Design, supply, installation, commissioning and Comprehensive Maintenance Contract (CMC) for 05 (Five) Years.
- viii. Empanelled vendors shall establish a service Centre to cater the 05 Years CMC within Thiruvananthapuram corporation limits and the details shall be included in the bid. In case if it is not economically viable for an individual vendor then Group of vendors can establish a common service Centre. The details of all such service centres (address, contact no. etc.) will be made available on the website of the ANERT.
- ix. All the material required for the installation of solar power plant as per the work order issued shall be kept at site in custody of the vendor, ANERT shall not be responsible for any loss or damage of any material during the installation. The

vendor shall be responsible and take an insurance policy for transit-cum- storage-erection for all the materials.

- x. The vendor shall take entire responsibility of electrical safety of the installations including connectivity with the grid and follow all the safety rules and regulations applicable as per Indian Electricity Act-2003 and prevailing CEA guidelines and amendments, it shall be responsibility of the vendor to take NOC from concerned authority and engage person as per provisions as per in CEA Rules and Regulations.
 - xi. The Empanelled vendor shall ensure proper safety of all the workmen, material, plants and equipment belonging to him/her. In case any accident occurs during the construction / erection or during guarantee period for work undertaken by Empanelled Vendor thereby causing any minor or major or fatal accident will be the responsibility of the Empanelled Vendor. The successful Vendors shall follow and comply with the employer's safety rules relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment. The Empanelled vendors shall also arrange all certificates and test reports of the module and inverter and other equipment.
- 15.1 The CFA claims of the systems installed and commissioned shall be processed with following documents:
- i. Dated Claim letter from the bidder on its letter head certifying that the SPV Modules and Cells deployed in the systems installed are Indian Made (DCR Undertaking as prescribed MNRE Format as Annexure-H), and all the technical specifications of the components supplied and installed are in accordance with the specifications given in this document and adhere to MNRE requirement and all the information / documents provided along with the claim letter are is correct and factual.
 - ii. Invoice of the System billed to the beneficiary.
 - iii. Photograph of the system with placard held by the beneficiary showing the Name of the beneficiary, ANERT Registration Number / BuyMySun ID of the consumer and system capacity. Photo-shopped/edited images shall not be uploaded on the portal.

- iv. Certificate of the beneficiary that the system is installed and commissioned in all respect with the date of commissioning, system and inverter capacity, etc. and that he has been provided the 05 (Five) Year Warranty Card and the O&M Manual.
- v. Overwritten certificates/ documents shall be outrightly rejected and will not be processed for CFA payment.
- vi. Self-certified copies of documents will be submitted in support of claims made by the Empanelled Vendors.
- vii. The CFA shall be released subject to availability and release of funds from MNRE, GoI directly to the beneficiary.
- viii. Third party Inspection may also be carried for disbursement of CFA. Third party Inspection will be carried out by the Agency nominated by MNRE or ANERT.

15.2 LOCATION DETAILS

The location of installation of the proposed power plant is within the 100 wards of Thiruvananthapuram corporation which is part of the proposed Solar City area of Thiruvananthapuram, Kerala, India.

15.3 SUBMITTALS

On commencement of the Project, the Contractor shall submit the following to ANERT:

- a. Prior to the technical submittals, the contractor shall submit detailed baseline program and methodology indicating the proposed overall schedule for documentation such as calculations, shop/ working drawings, plan/ procedures and records. Submission of samples, process of fabrication / delivery to site storage yard for the approval of the Employer. Also, Contractor shall submit Method statements and Quality Assurance plan for each activity to be done and get approval from ANERT before commencing the work. Contractor shall maintain the necessary Quality and Quantity documentation. All the documents shall be submitted to Employer for their review and records.
- b. Detailed work procedures and schedules shall be submitted by contractor at least one month before start of work and shall get necessary approval from ANERT

authorities and various entities. If required meeting shall be called to settle all the open issues. Contractor to ensure that all issues are closed one month prior to start of work.

- c. Complete fabrication drawings, materials list, cutting lists, bolt lists, welding schedules and QC schedules, based on the design drawing furnished to him and in accordance with the approved schedule. It is highlighted that structural steel members, dimensions thereof indicated in tender drawings are tentative only, and may be modified during final design stage.
- d. Results of any tests, as and when conducted and as required by ANERT
- e. A detailed list of all constructional Plant & Equipment, such as cranes, derricks, winches, welding sets etc. their makes, model, present condition and location, available to the contractor and the ones he will employ on the job to maintain the progress of work in accordance with the contract.
- f. The total number of experienced personnel of each category, like fitters, welders, riggers etc., which he intends to deploy on the project.

16. PROJECT COST

16.1 The Project cost shall include all the costs related to above Scope of Work. Bidder shall quote for the entire facilities on a “single responsibility” basis such that the total Bid Price covers all the obligations mentioned in the Bidding Documents in respect of Design, Supply, Erection, Testing and Commissioning including Warranty, Operation & Maintenance for a period 5 years under CAPEX model, goods and services including spares required if any during O&M period. The Bidder has to take all permits, approvals and licenses, Insurance etc., provide training and such other items and services required to complete the scope of work mentioned above.

16.2 The Project cost shall remain firm and fixed and shall be binding on the Successful Bidder till completion of work. No escalation will be granted on any reason whatsoever. The bidder shall not be entitled to claim any additional charges, even

though it may be necessary to extend the completion period for any reasons whatsoever.

- 16.3 The cost shall be inclusive of all duties and taxes, insurance etc. The prices quoted by the firm shall be complete in all respect and no price variation /adjustment shall be payable during the 5-year period.
- 16.4 The Power plant capacity will be considered as rounded values like 2kW, 3kW, 4kW likewise upto 500kW and the CFA will also be considered in that pattern. The power plant capacity will be the lowest among the AC and DC capacity for that system.
E.g: For a Power plant with 3.25 kWp DC capacity with 3 kW inverter will be considered as a 3 kW Power plant. The cost for the power plant as well as CFA will be considered for 3 kW only and not for 3.25 kWp. Bidders are requested to consider the same while quoting and no requests for enhancement or consideration of the excess DC capacity will be entertained.
- 16.5 The Operation & Maintenance of Solar Photovoltaic Power Plant would include wear, tear, overhauling, machine breakdown, insurance, and replacement of defective modules, invertors / Power Conditioning Unit (PCU), spares, consumables & other parts for a period of 5 years.
- 16.6 The cost shall be specified in sanction letter based on Successful Bidder's quote for the project. The project cost shall be in accordance with all terms, conditions, specifications and other conditions of the Contract as accepted by ANERT and incorporated into the sanction letter.

17. INSURANCE

- 17.1 The Bidder shall be responsible and take an Insurance Policy for transit-cum-storage-cum-erection for all the materials to cover all risks and liabilities for supply of materials on site basis, storage of materials at site, erection, testing and commissioning. The bidder shall also take appropriate insurance during O&M period.

17.2 The Bidder shall also take insurance for Third Party Liability covering loss of human life, engineers and workmen and also covering the risks of damage to the third party/material/equipment/properties during execution of the Contract. Before commencement of the work, the Bidder will ensure that all its employees and representatives are covered by suitable insurance against any damage, loss, injury or death arising out of the execution of the work or in carrying out the Contract. Liquidation, Death, Bankruptcy etc., shall be the responsibility of bidder.

18. WARRANTIES AND GUARANTEES

The Bidder shall warrant that the goods supplied under this contract are new, unused, of the most recent or latest technology and incorporate all recent improvements in design and materials. The bidder shall provide system warranty covering the rectification of any and all defects in the design of equipment, materials and workmanship including spare parts for a period of the 5-years from the date of commissioning. The successful bidder has to transfer all the Guarantees /Warranties of the different components to the Owner of the project. The responsibility of operation of Warranty and Guarantee clauses and Claims/ Settlement of issues arising out of said clauses shall be joint responsibility of the Successful bidder and the owner of the project and ANERT will not be responsible in any way for any claims whatsoever on account of the above.

19. TYPE AND QUALITY OF MATERIALS AND WORKMANSHIP

19.1 The Design, Engineering, Manufacture, Supply, Installation, Testing and Performance of the equipment shall be in accordance with latest appropriate IEC/Indian Standards as detailed in the Vol- III (Technical specifications) of the bid document. Where appropriate Indian Standards and Codes are not available, other suitable standards and codes as approved by the MNRE / authorised Government agency shall be used.

19.2 The specifications of the components should meet the technical specifications mentioned in Volume III.

19.3 Any supplies which have not been specifically mentioned in this Contract but which are necessary for the design, engineering, manufacture, supply & performance or completeness of the project shall be provided by the Bidder without any extra cost and within the time schedule for efficient and smooth operation and maintenance of the SPV plant.

20. OPERATION & MAINTENANCE

- i. The bidder shall be responsible for Operation and Maintenance of the Solar PV system for the 5-year period, during which ANERT will monitor the project for effective performance in line with conditions specified elsewhere in the bid document. During this period, the bidder shall be responsible for supply of all spare parts as required from time to time for scheduled and preventive maintenance, major overhauling of the plant, replacement of defective modules, inverters, PCU's etc and maintaining log sheets for operation detail, deployment of staff for continuous operations and qualified engineer for supervision of O&M work, complaint logging & its attending.
- ii. If any Operation & Maintenance issues are not resolved within 7 days, then complaint may be raised to ANERT, pursuant to which a penalty as decided by CEO, ANERT will be imposed.

21. METERING AND GRID CONNECTIVITY

Metering and grid connectivity of the solar PV system under this project would be the responsibility of the Bidder in accordance with the prevailing guidelines of the concerned DISCOM and / or CEA (if available by the time of implementation). The bidder need to connectivity and the entire responsibility lies with bidder only.

22. PLANT PERFORMANCE EVALUATION

The successful bidder shall be required to meet minimum guaranteed generation with Performance Ratio (PR) at the time of commissioning and related Capacity Utilization Factor (CUF) as per the GHI levels of the location during the O&M period. PR

should be shown minimum of 75% at the time of inspection for initial commissioning acceptance. Minimum CUF shall not be less than 21% for a period of 5 years. The bidder should send the periodic plant output details to ANERT for ensuring the CUF. The PR will be measured at Inverter output level during peak radiation conditions.

23. SUBMISSION OF PROJECT COMPLETION REPORT (PCR)

The Empanelled Vendor shall submit the Project Completion Report in (soft copy and signed copy to be uploaded in the BuyMySun portal) after commissioning of the project as per the Scope of this EoI to ANERT as per the Format given in Annexure C. Non submission of the report shall be considered as “Breach of Contract” and shall attract punitive actions as per the relevant provisions of the Contract including non-release of CFA to the beneficiary. However, the decision of Engineer-in -charge shall be final in this regard.

24. INVOICE TO CONSUMER

The selected bidders shall raise the GST invoice to the consumers after completion of the project. The tax invoice should contain all invocable items with the applicable tax as per GoI GST slabs. The net invoice amount shall not exceed per kW discovered rate, exclusive of GST. If additional charges have been levied on the consumer for any customization, it shall be clearly specified in the invoice.

25. RELEASE OF CFA TO BENEFICIARY

The eligible CFA amount will be transferred to the beneficiary via Direct Beneficiary Transfer mode and hence the empanelled agencies can collect the full discovered L1 amount from the beneficiaries including any additional costs required for the customer specific modifications, if any. It is the responsibility of the vendor to get all the documentation ready for uploading in the portal to enable CFA disbursement to the beneficiary.

26. PROJECT INSPECTION

The project progress will be monitored by ANERT and the projects will be inspected for quality at any time during commissioning or after the completion of the project either by officer(s) from ANERT or any authorized agency/ experts.

27. APPLICABLE LAW

The Contract shall be interpreted in accordance with the laws of the Union of India and in the Jurisdiction of Trivandrum, Kerala.

28. SETTLEMENT OF DISPUTE

- 28.1 If any dispute of any kind whatsoever arises between ANERT and Successful bidder in connection with or arising out of the contract including without prejudice to the generality of the foregoing, any question regarding the existence, validity or termination, the parties shall seek to resolve any such dispute or difference by mutual consent.
- 28.2 If the parties fail to resolve, such a dispute or difference by mutual consent, within 45 days of its arising, then the dispute shall be referred by either party by giving notice to the other party in writing of its intention to refer to arbitration as hereafter provided regarding matter under dispute. No arbitration proceedings will commence unless such notice is given.

29. FORCE MAJEURE

- 29.1 Notwithstanding the provisions of clauses contained in this RFS document; the contractor shall not be liable to forfeit (a) Security deposit for delay and (b) termination of contract; if he is unable to fulfill his obligation under this contract due to force majeure conditions.
- 29.2 For purpose of this clause, "Force Majeure" means an event beyond the control of the contractor and not involving the contractor's fault or negligence and not foreseeable, either in its sovereign or contractual capacity. Such events may include but are not restricted to Acts of God, wars or revolutions, fires, floods, epidemics, quarantine restrictions and fright embargoes etc. Whether a "Force majeure"

situation exists or not, shall be decided by ANERT and its decision shall be final and binding on the contractor and all other concerned.

29.3 In the event that the contractor is not able to perform his obligations under this contract on account of force majeure, he will be relieved of his obligations during the force majeure period. In the event that such force majeure extends beyond six months, ANERT has the right to terminate the contract in which case, the security deposit shall be refunded to him.

29.4 If a force majeure situation arises, the contractor shall notify ANERT in writing promptly, not later than 14 days from the date such situation arises. The contractor shall notify ANERT not later than 3 days of cessation of force majeure conditions. After examining the cases, ANERT shall decide and grant suitable additional time for the completion of the work, if required.

30. LANGUAGE

All documents, drawings, instructions, design data, calculations, operation, maintenance and safety manuals, reports, labels and any other data shall be in English Language. The contract agreement and all correspondence between ANERT and the bidder shall be in English language.

31. OTHER CONDITIONS

31.1 The Successful bidder shall not transfer, assign or sublet the work under this contract or any substantial part thereof to any other party without the prior consent of ANERT in writing.

31.2 The Successful bidder shall not display the photographs of the work and not take advantage through publicity of the work without written permission of ANERT and Beneficiary

31.3 The Successful bidder shall not make any other use of any of the documents or information of this contract, except for the purposes of performing the contract.

31.4 Successors and Assigns:

In case ANERT or Successful bidder may undergo any merger or amalgamation or a scheme of arrangement or similar re-organization & this contract is assigned to any entity (ies) partly or wholly, the contract shall be binding mutatis mutandis upon the successor entities & shall continue to remain valid with respect to obligation of the successor entities.

31.5 Severability:

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.

31.6 Counterparts

This contract may be executed in one or more counterparts, each of which shall be deemed an original & all of which collectively shall be deemed one of the same instruments.

31.7 Rights and Remedies under the contract only for the parties

This contract is not intended & shall not be construed to confer on any person other than the ANERT & Successful bidder hereto, any rights and / or remedies herein.

BID EVALUATION

32. BID EVALUATION

The evaluation process comprises the following four steps:

Step I - Responsiveness check of Techno Commercial Bid

Step II - Evaluation of Bidder's fulfilment of Eligibility Criteria as per Clause 16

Step III - Evaluation of Price Bid

Step IV - Successful Bidders(s) selection

I. Responsiveness check of Techno Commercial Bid

The Techno Commercial Bid submitted by Bidders shall be scrutinized to establish responsiveness to the requirements laid down in the EoI subject to conditions specified in this tender. Any of the following may cause the Bid to be considered "non-responsive", at the sole discretion of ANERT:

- a. Bids that are incomplete, i.e. not accompanied by any of the applicable formats inter alia covering letter, power of attorney supported by a board resolution, applicable undertakings, format for disclosure, valid Bid Bond, etc.;
- b. Bid not signed by authorized signatory and /or stamped in the manner indicated in this RFS;
- c. Material inconsistencies in the information /documents submitted by the Bidder, affecting the Eligibility Criteria;
- d. Information not submitted in the formats specified in this RFS;
- e. Bid being conditional in nature;
- f. Bid not received by the Bid Deadline;
- g. Bid having Conflict of Interest;
- h. More than one Member of a Bidding Company using the credentials of the same Parent Company /Affiliate;
- i. Bidder delaying in submission of additional information or clarifications sought by ANERT as applicable;
- j. Bidder makes any misrepresentation.

Each Bid shall be checked for compliance with the submission requirements set forth in this RFS before the evaluation of Bidder's fulfilment of Eligibility Criteria is taken up. Clause 16.2 shall be used to check whether each Bidder meets the stipulated requirement.

32.1 Preliminary Examination

32.1.1 ANERT will examine the Bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed and stamped and whether the Bids are otherwise in order.

32.1.2 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total Amount that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total amount shall be corrected. If there is a discrepancy between words and figures, the amount written in words will prevail.

II. Evaluation of Bidder's fulfilment of eligibility criteria

Evaluation of Bidder's Eligibility will be carried out based on the information furnished by the Bidder as per the prescribed Formats and related documentary evidence in support of meeting the Eligibility Criteria as specified in Clause 16.2. Non-availability of information and related documentary evidence for the satisfaction of Eligibility Criteria may cause the Bid to be non-responsive.

III. Evaluation of Price Bid

The Price Bid of only the Qualified Bidders shall be opened in presence of the representatives of such Qualified Bidders, who wish to be present, on a date as may be intimated by ANERT to the Bidders through ANERT. The evaluation of Price Bid shall be carried out based on the information furnished in the BoQ. The Price Bid submitted by the Bidders shall be scrutinized to ensure conformity with the RFP. Any Bid not meeting any of the requirements of this RFS may cause the Bid to be considered "non-responsive" at the sole decision of the ANERT.

IV. Successful Bidder(s) Selection

- i. Bids qualifying in Clause 13 and 31 shall only be evaluated in this stage.
- ii. The Price Bids of Qualified Bidders shall be ranked from the lowest to the highest. The lowest bidder will be declared as the L1 bidder in each category. The Bidders L2, L3, L4..... up to 25% of L1 will be given chance to match with the L1 price and the empanelment list will be prepared.
- iii. ANERT at its own discretion, has the right to reject any or all the Bids without assigning any reason whatsoever, at its sole discretion

V. Letter of Allocation

- i. The Letter of Acceptance (LOA) shall be issued to Successful Bidder selected as per the provisions of this Clause 31
- ii. The Successful Bidder shall acknowledge the LoA and return duplicate copy with signature & stamp of the authorized signatory of the Successful Bidder to ANERT within 5 days of issue of LoA.
- iii. If the Successful Bidder, to whom the Letter of Acceptance has been issued does not fulfil any of the conditions specified in Bid document, ANERT reserves the right to annul/cancel the award of the Letter of Acceptance of the Successful Bidder and forfeit the Bid security.
- iv. The selection process shall stand completed once the Tender Capacity has been achieved through the summation of the capacity offered by the Successful Bidders.
- v. At any step during the selection of Successful Bidder(s) in accordance with the provision laid down in this document, ANERT reserves the right to increase/decrease the Tender Capacity of the capacity indicated to achieve the balance Tender Capacity and select the Successful Bidder with the lowest Project Cost/ lowest evaluated price amongst the remaining Bids.
- vi. If the Empanelled Vendor, to whom the LoI has been issued does not fulfil any of the conditions specified in Bid document, the ANERT reserves the right to annul/cancel the award of the LoI of such Empanelled Vendor.

- vii. The vendors have to submit the Performance Bank Guarantee (PGB) of appropriate value as per Clause No. 10.10 (As per Format-4) along with submission of signed copy of LOI for further issuance of Letter of Allocation.
- viii. The ANERT at its own discretion, has the right to reject any or all the Bids without assigning any reason whatsoever, at its sole discretion.

33. PERFORMANCE BANK GUARANTEE

Performance Bank Guarantee for Installation and Commissioning (I&C): The bidder shall furnish the performance bank guarantee for installation and commissioning based on the allocated capacity.

PBG amount = INR cost discovered in Lakhs * 3% * Allocated Capacity in MWp.

The PBG shall be submitted within 30 days from the date of issue of LOI/LOA/Work Order, whichever is issues first, and be valid for 18 months. Bidders should submit Single PBG based on the allocated capacity in each category. The Performance Bank Guarantee shall be released after completion of the empanelment period with the compliance of entire obligations in the contract.

Further, any delay in submission of PBG for I & C period beyond 60 days, ANERT at its sole discretion may cancel the allocated capacity and forfeit 100% of Bid bond. Such Vendors (who have not submitted PBG) shall be debarred from participating in ANERTs is future tenders for a period as decided by Competent Authority.

It is suggested to take 3% PBG for Installation and Commissioning, in parts, as follows:

- i. The entire capacity allocated to a vendor may be divided into "x" kW. The "x" kW should be 500 kW or 250 kW or smaller. However, the "x" can also be made greater than 50, if a particular vendor desires so.
- ii. 3% PBG corresponding to the first "x" kw may be taken in the beginning, instead of taking 3% PBG for the entire allocated capacity to the Vendor.
- iii. The Vendor needs to complete installation of this "x" kW. After this, the Vendor will be allocated next "x" kW capacity and will be required to submit 3% PBG for this "x" kW. The PGB for "x" kW submitted originally in point no. 2 may be

considered and reused for this, instead of taking new PBG.

- iv. If the Vendor desires to take applications and start work for next “x” kW, before completing the work for previous “x” kW, he may be allowed to do so, on submission of additional 3% PBG corresponding to this “x” kw capacity.

The PBG shall be submitted within 30 days from the end of the empanelment period and be valid for 05 year + 6 months. Bidders should submit Single PBG based on the installed capacity in each category. The Performance Bank Guarantee shall be released after completion of the O&M period with the compliance of entire obligations in the contract.

Further, any delay in submission of PBG for O&M period beyond 60 days, ANERT at its sole discretion may forfeit 100% of PBG for the I&C period. Such Vendors (who have not submitted PBG) shall be debarred from participating in ANERTs future tenders for a period as decided by Competent Authority. Part PBG shall not be accepted.

Notwithstanding the above-mentioned clauses on submission of PBG, the implementing agency shall be at liberty to make suitable provisions in the tender to deduct PBG from payment of CFA to empanelled vendor for each system and return the deducted amount upon submission of PBG.

34. REQUIREMENT OF APPROVALS ON MAKES OF THE COMPONENTS:

The PV Modules used in the project should be manufactured in India only and inverter must have BIS certificate. Rest of the components can be procured from any source. However, these items should meet the technical specification and standards mentioned in EoI and if certifications are asked bidder must provide.

35. PENALTY FOR DELAY IN PROJECT IMPLEMENTATION

- 35.1 The Bidder shall complete the project identification, Design, Engineering, Manufacture, Supply, Storage, Civil work, Erection, Testing & Commissioning of the project within 45 days from the date of issue of LOA.

35.2 If the bidder fails to commission the project capacity within 45 days from date of issue of allocation letter; Penalty on per day basis calculated for the Performance Security period would be levied.

36. TIME OF COMPLETION OF WORKS:

36.1 Individual Project completion shall be 45 days from the date of issue of LOA. Failure of non-compliance of same shall lead to forfeiture of PBG.

36.2 The period of construction given in Time Schedule includes the time required for mobilisation as well as testing, rectifications if any, retesting and completion in all respects to the entire satisfaction of the ANERT.

36.3 A joint programme of execution of the Work will be prepared by the ANERT or its representative nominated for the purpose and Successful bidders based on priority requirement of this project. This programme will take into account the time of completion mentioned in clause 38.1 above and the time allowed for the priority Works by the ANERT.

36.4 Monthly/Weekly implementation programme will; be drawn up by the ANERT jointly with the Successful bidder, based on availability of Work fronts. Successful bidder shall scrupulously adhere to these targets /programmes by deploying adequate personnel, tools and tackles and he shall also supply himself all materials of his scope of supply in good time to achieve the targets/programmes. In all matters concerning the extent of targets set out in the weekly and monthly programmes and the degree of achievements, the decision of the ANERT will be final and binding.

37. QUALITY ASSURANCE

The successful bidder shall establish a Quality Assurance system for the Work as per standards and specifications mentioned in the tender document and shall be subject to the approval of the ANERT or authorised personnel designated. Strict compliance with the approved, proven & established quality assurance systems and procedures during the different stages of the plant starting from sizing, selection of make, storage (at site), during erection, testing and commissioning have to be ensured by the successful bidder.

- a. The material to be supplied for the plant should be tested as per the technical specification of the tender. The successful bidder in the presence of the authorized personnel designated shall carry out all factory acceptance tests of equipment as per the specification and relevant standards. The successful bidder shall arrange for the same through online mode and this will be applicable for major components such as PV modules and inverters. Random factory tests shall be arranged for other components of the plant
- b. ANERT at his own discretion may undertake the quality checks during the manufacturing stages also.
- c. All works shall be undertaken with the highest levels of quality and workmanship. Work shall be carried out in conformity with quality and safety norms.
- d. 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 successful bidder's cost.
- e. The successful bidder shall furnish a detailed quality assurance plan (QAP) for the plant. 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 successful bidder shall give the list of tests they will carry out at site to show the performance of plant.
- f. One of the staff / workers employed by the successful bidder may be trained under Solar PV installer course conducted by ANERT/MNRE under Skill Council for Green Jobs or under Surya Mithra programme of NISE for module erection and allied electrical works.

A. General Quality requirements of Solar PV Plant

The bidder shall use SPV modules of adequate capacity, Inverters etc. to ensure generation of power as per design estimates.

- a. This is to be done by applying de-rating factors for the array mentioned and recognizing the efficiency parameters of inverters.
- b. Use of equipment and systems with proven design and performance that have a high

- c. availability record of accomplishment under similar service conditions.
- d. Selection of the equipment and adoption of a plant layout to ensure ease of maintenance.
- e. Strict compliance with the approved and proven quality assurance norms and procedures
- f. during the different phases of the plant.
- g. Proper monitoring in the synchronizations, which ensures the availability of power to the grid.
- h. Generated low voltage shall be stepped up and fed to grid voltage at the delivery point, as applicable at specified locations (Step up transformers to be installed in the plants of capacity 100 kWp and above as may be required depending on site conditions).
- i. The DC injection limit shall be as per IEEE 519, IEC 61727, CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013 and CEA (Technical Standards for connectivity to grid) Regulations, 2007 and amendments thereof. It shall not inject DC current greater than the 0.5% full rated output of the inverter at interconnection point.
- j. Ripple content should not exceed as specified in IEEE-519 2014.
- k. Limits for harmonics as per CEA technical standard on Grid connectivity are : Total Voltage harmonic Distortion, Individual Voltage harmonics Distortion and total Current harmonic Distortions are as per IEEE-519 2014
- l. The power plant has to operate in parallel with the grid system, which is an infinite
- m. electrical system. The Solar Power Plant design should be equipped with requisite protective measures/ relays / breakers to protect equipment in solar power plant against any of possible fault or other disturbances from the grid.
- n. The Solar plant shall be equipped with necessary protection systems to ensure isolation of the solar power plant from the grid at the time of any fault.
- o. The inverter shall have internal protection arrangement against any sustained fault in the feeder line and against lightning in the feeder line. MOV type surge arrestors shall be provided on AC and DC terminals for over voltage protection from lightning induced surges.

- p. Successful bidder shall provide manual disconnect four pole isolation switch beside the automatic disconnection to grid to isolate the grid connection provided by the utility, so that the utility personnel can carry out maintenance of grid. The utility personnel shall lock this switch.
- q. The alarm contact shall be provided for hardware failures, failures of internal and external auxiliary supplies etc. The alarm signals should be via system fault relay (voltage free contact)
- r. The plant shall be capable of supplying dynamically varying reactive power support as per the grid requirement to maintain power factor within the range of 0.95 lagging and 0.95 leading.
- s. The plant shall be in accordance with solar photovoltaic systems, devices and component Goods (Requirement for Compulsory Registration) order 2017 of MNRE or any amendment thereof.

The Bidder must submit an offer, based upon their own design with requirement mentioned in this bid document. The bidders should be familiar of the site condition before designing the plant and offer their bid. The bidders are also required to incorporate all the system required for realizing Grid tied solar Plants at different locations and efficient operation in parallel with KSEB Ltd supply. The successful bidder shall submit the location wise detailed design of the complete solar generating plant by using their software to optimize the string sizing considering the specific location, isolation, nature of load etc.

The equipment and materials for each location wise Grid Interactive Solar PV Power Plant with associated system (Typical) shall include but not limited to the Supply, Erection, and Testing & Commissioning of the following:

- a. Solar PV modules in array (to obtain the capacity and PR specified in each of the plants)
- b. including mounting frames, structures, array foundation and module inter connection.
- c. Array Junction boxes, distribution boxes and Fuse boxes. MCBs, Surge Arrestors etc.

- d. Inverter, common AC power evacuation panel with bus bars and circuit breakers LT Power Interfacing Panel, D C Distribution board.
- e. Metering and protection system.
- f. LT Power and Control Cables including end terminations and other required accessories for both AC & DC power
- g. Suitable and standard Isolation,
- h. Suitable Panels and enclosures as per standards and weatherproof enclosures as applicable in outdoor installations.
- i. Lightning arrestors.
- j. PVC pipes and accessories/trenches
- k. Tool kit and Earthing kit
- l. Testing, maintenance and condition monitoring of equipment.
- m. Mandatory spares for 5 years
- n. Any other equipment / material required to achieve the generation from Solar Power Plants.
- o. Receipt, unloading, storage, erection, testing and commissioning of all supplied material.
- p. Suitable termination and Isolation from Grid for Safety of Maintenance with Lock and Key as applicable.
- q. Weather stations required to be installed at each location having capacity > 50 kWp for data feed to the inverter. For small systems ≤ 50 kWp, PR will be measured at 15-minute intervals for the period from 11hrs to 15 hrs on the date of commissioning and average of these values is taken for calculating PR. Performance ratio assessment shall be evaluated using the standard calibrated equipment of SNO /KSEBL.
- r. Design of Grid Interactive Solar Power Plant and its associated electrical auxiliary systems which includes preparation of single line diagrams, installation drawings electrical lay outs, design calculations for earthing etc. design memorandum and other relevant drawings and documents to be provided under this contract are covered under Bidders scope of work.

- s. LT / HT evacuation from the Roof Top plant shall be made available at the interconnection point of the KSEB Ltd Grid and the power evacuation is under Bidders scope of work.
- t. Successful bidder shall bear cost for obtaining all statutory clearances including sanction from Electrical Inspectorate regarding operation of the Plant. SNO, shall reasonably assist to obtain the same.

38. DOCUMENT SUBMISSION FOR ISSUE COMMISSIONING/ COMPLETION CERTIFICATE AND RELEASE OF CFA:

The following documents will be deemed to form the completion documents:

- a. Project completion report from successful bidder as per ANERT format
- b. Joint Commissioning Report (JCR) as per Annexure - F.
- c. Claim Letter as per the Annexure - s
- d. Guarantee certificate on Letter Head of the Vendor and from the OEM.
- e. Stability report and hot dip coating certificate for the mounting structure
- f. Geo-coordinates and photos of the site

These document submissions are to be done online through the BuyMySun portal of ANERT, which is linked to the Solar National Rooftop portal.

39. CORRUPT OR FRAUDULENT PRACTICES

The Successful Bidders/ Contractors should follow the highest standard of ethics during the execution of contract. In pursuance of this policy, ANERT:

39.1 defines, for the purposes of this provision, the terms set forth as follows:

- a. "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the bid process or in contract execution; and
- b. "fraudulent practice" means a misrepresentation of facts in order to influence a bid process or the execution of a contract to the detriment of ANERT/Govt. scheme, and includes collusive practice among Bidders (prior to or after Bid

submission) designed to establish Bid prices at artificial non-competitive levels and to deprive ANERT of the benefits of free and open competition;

- c. will declare a firm ineligible/debarred, either indefinitely or for a specific period of time, a GOVT contract if at any time it is found that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a Government/ANERT schemes.



**AGENCY FOR NEW & RENEWABLE ENERGY
RESEARCH AND TECHNOLOGY (ANERT)**

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E-TENDER DOCUMENT

Expression of Interest for the selection of Vendors for the Design, Supply, Erection, Testing and Commissioning including 5 year's Warranty of Grid-Connected Rooftop Solar Plant of various capacities under the Phase-II of Grid Connected Rooftop Solar Scheme of MNRE for a cumulative capacity of 100 MW in the proposed Solar City area of Thiruvananthapuram Corporation, Kerala, India

Ref. No.: ANERT-TECH/ /2023-PE2(RTS)

VOL – 3: TECHNICAL SPECIFICATIONS

Date of Publishing of Bids : - 21/02/2023

Last Date of Submission of Bids : - 14/03/2023

TECHNICAL SPECIFICATIONS

The proposed projects shall be commissioned as per the technical specifications given below.

40. DEFINITION

A Grid Tied Solar Photo Voltaic (SPV) power plant consists of SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter, and Controls & Protections, interconnect cables and switches. PV Array is mounted on a suitable structure. Grid tied SPV system do not have battery backup and should be designed with necessary features to supplement the grid power during day time. Components and parts used in the SPV power plants including the PV modules, metallic structures, cables, junction box, switches, PCUs etc., should conform to the BIS or IEC or international specifications, wherever such specifications are available and applicable.

Solar PV system shall consist of following equipments/components.

- Solar PV modules consisting of required number of **Crystalline** PV modules.
- Grid interactive Power Conditioning Unit with Remote Monitoring System
- Mounting structures
- String Monitoring Units / Junction Boxes.
- Power Transformers and other Substation equipment's
- Power evacuation system
- Earthing and lightening protections.
- IR/UV protected PVC Cables, pipes and accessories
- Metering (Solar energy meter, Bidirectional meter)

The detailed list of certifications and standards to be followed are given in annexure - J

41. SOLAR PHOTOVOLTAIC MODULES:

41.1 The PV modules used should be made in India and should be from the ALMM list issued by MNRE from time to time and must have DCR content as described by MNRE.

41.2 The PV modules used must qualify to the latest edition BIS standards for Crystalline Silicon Solar Cell Modules - IS 14286. In addition, the modules must conform to IEC 61730 Part-2- requirements for construction & Part 2 – requirements for testing, for safety qualification or equivalent IS.

- i. For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701/IS 61701
- ii. Inspection of testing of PV array will be conducted by the Tendering Authority including identification of panels ready for dispatch to be confirmed with details provided in RFID tag using RFID reader at site during FAT. The RFID details of each module shall be issued to the employer during FAT.
- iii. Protective devices against surges at the PV module shall be provided. Low voltage drop bypass diodes shall be provided.
- iv. PV modules must be tested and approved by one of the BIS approved test centers.
- v. The module frame shall be made of corrosion resistant materials, preferably having anodized aluminum.
- vi. The bidder shall carefully design & accommodate requisite numbers of the modules to achieve the rated power in his bid. ANERT shall allow only minor changes at the time of execution.
- vii. Other general requirement for the PV modules and subsystems shall be the Following:
 - a. The rated output power of any supplied module shall have tolerance of $\pm 3\%$.
 - b. The peak-power point voltage and the peak-power point current of any supplied module and/or any module string (series connected modules) shall not vary by more than 2 (two) per cent from the respective arithmetic means for all modules and/or for all module strings, as the case may be.
 - c. The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of by-pass diode. The box shall have hinged, weather proof lid with captive screws and cable gland entry points or may be of sealed type and IP-65 rated.
 - d. IV curves at STC should be provided by bidder.

- 41.3 Modules deployed must use a RF identification tag. The following information must be mentioned in the RFID used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions).
- a. Name of the manufacturer of the PV module
 - b. Name of the manufacturer of Solar Cells.
 - c. Month & year of the manufacture (separate for solar cells and modules)
 - d. Country of origin (separately for solar cells and module)
 - e. I-V curve for the module Wattage, I_m , V_m and FF for the module
 - f. Unique Serial No and Model No of the module
 - g. Date and year of obtaining BIS PV module qualification certificate.
 - h. Name of the test lab issuing BIS certificate.
 - i. Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO 14001

41.4 **Warranties:**

A. Material Warranty:

- i. Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (05) years from the date of sale to the original customer ("Customer")
- ii. Defects and/or failures due to manufacturing
- iii. Defects and/or failures due to quality of materials
- iv. Non conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at the Owners sole option

B. Performance Warranty:

- i. The predicted electrical degradation of power generated not more than 10% after ten years' period and not exceeding 20% of the minimum rated power over the 25-year period and of the full rated original output.

42. PCU/ INVERTER:

The Power Conditioning Unit shall be String Inverter with power exporting facility to the Grid. Vendors are free to use any other inverter provided the approval for the same are taken separately by submitting all the relevant test certificates and reports as detailed below:

General Specifications:

- 42.1 All the Inverters should contain the following clear and indelible Marking Label & Warning Label as per IS16221 Part II, clause 5. The equipment shall, as a minimum, be permanently marked with:
- a. The name or trademark of the manufacturer or supplier.
 - b. A model number, name or other means to identify the equipment.
 - c. A serial number, code or other markings allowing identification of manufacturing location and the manufacturing batch or date within a three-month time period.
 - d. Input voltage, type of voltage (A.C. or D.C.), frequency, and maximum continuous current for each input.
 - e. Output voltage, type of voltage (A.C. or D.C.), frequency, maximum continuous current, and for A.C. outputs, either the power or power factor for each output.
 - f. The Ingress Protection (IP) rating
- 42.2 The inverter output shall be 415 VAC, 50 Hz, 3 phase or 230 VAC, 50 Hz, 1 phase.
- 42.3 IS 16169 certificate of Islanding Prevention Measures for Utility – Interconnected Photovoltaic Inverters.
- 42.4 The inverter shall include appropriate self-protective and self-diagnostic feature to protect itself and the PV array from damage in the event of inverter component failure or from parameters beyond the inverter's safe operating range due to internal or external causes.
- 42.5 PCU shall have the dynamic and efficient MPPT algorithm behaviour which finds maximum power point even in low light conditions. The PCU Company should be able to display this feature.

- 42.6 The PCU shall be supplied with in-built advanced grid feed-in feature along with dynamic feed-in control considering self-consumption. The PCU shall also include control functions for optimum feed-in of reactive power and effective power. The amount of reactive power injection and absorption can be controlled depending upon under/over excited systems.
- 42.7 The PCU shall have a provision of external shutdown via remote signal separately with an in-built floating-point contact or similar option using any minimum interface which is to ensure the emergency stop function in the inverter
- 42.8 The PCU shall have a higher degree of ingress protection of IP 65 to handle robust environment conditions from dust and water ingress under complete outdoor installations.
- 42.9 The data logger should possess the feature of extracting the data externally with open protocols like Modbus TCP/RTU. The manufacturer should provide the Modbus register mapping file to utilise this feature
- 42.10 The inverter shall have an efficient cooling concept with better power derating feature to handle higher temperatures and ensure the best efficiency. The inverter shall be able to provide full rated output power even at ambient temperatures of 50°C. The manufacturer to provide the power derating curves to demonstrate the same.**
- 42.11 The inverter shall be flexible in terms of the installation and should be capable for installation in a horizontal position facilitating easy installation for site specific requirements.
- 42.12 The inverter shall have an integrated feature of emergency stop to halt the inverter from operation considering safety scenarios
- 42.13 The PCU manufacturer should have an authorised service centre in Kerala. The details of the service centre along with the spare list must be submitted along with the bid.
- 42.14 PCU should be able to respond smoothly to the voltage fluctuations on the low-tension grid via active & reactive power control/ support. The PCU should be able to respond separately to fulfil below mentioned:**
- 42.14.1 Finding out optimisation of the system**

42.14.2 Optimal power distribution on each phase

42.14.3 Prevent PCU from unnecessary disconnections

42.15 The PCU Company should have grid connected solar plants running in the country with inverters at least 10 years from the time of bidding to showcase the service reliability and long-term presence. Also, the PCU should have local presence in the county for at least last 5 years. The PCU manufacturer may need to provide authentic details to customer if asked to prove the same.

42.16 The Technical Specification of On-Grid Inverters are summarized below:

Specifications of Inverters	
Parameters	Detailed specification
Nominal voltage	230V/415V
Voltage Band	Between 80% and 110% of V nominal
Nominal Frequency	50 Hz
Operating Frequency Range	47.5 to 50.5 Hz
Waveform	Sine wave
Harmonics	AC side total harmonic current distortion < 3%
Ripple	DC Voltage ripple content shall be not more than 1%
Efficiency	Efficiency shall be >99%
Casing protection levels	Degree of protection: Minimum IP-54 for internal units and IP-65 for outdoor units
Operating ambient Temp range	-10 to + 60 degree Celsius
Operation	Completely automatic including wakeup, synchronization (phase locking) and shut down
MPPT	MPPT range must be suitable to individual array voltages
Protections	Over voltage: both input and output Over current: both input and output Over / Under grid frequency Over temperature Short circuit Lightning Surge voltage induced at output due to external source Islanding
Ingress Protection	IP 65 for Outdoor / IP 54 for Indoor

Specifications of Inverters	
Parameters	Detailed specification
Recommended LED indications	ON Grid ON Under/ Over voltage Overload Over temperature
Recommended LCD Display on front Panel	DC input voltage DC current AC Voltage (all 3 phases) AC current (all 3 phases) Frequency Ambient Temperature Instantaneous power Cumulative output energy Cumulative hours of operation Daily DC energy produced
Communication Interface	RS485/ RS232/Wi-Fi (with or without USB)

42.17 The Technical Specification for Interconnection are summarized below:

Sl No	Parameters	Requirements	Reference
1	Overall conditions of service	Reference to regulations	Conditions for Supply of Electricity
2	Overall Grid Standards	Reference to regulations	Central Electricity Authority (Grid standards) Regulations 2010
3	Equipment	Applicable industry standards	IEC/EN standards
4	Safety and Supply	Reference to regulations, (General safety requirements	Central Electricity Authority (Measures of safety and electricity supply) Regulations, 2010 and subsequent amendments
5	Meters	Reference to regulations and additional conditions issued by the commission.	Central Electricity Authority (Installation & operation of meters) regulations 2006 and subsequent amendments

Sl No	Parameters	Requirements	Reference
6	Harmonic current	Harmonic current injections from a generating station shall not exceed the limits specified in IEEE 519	IEEE 519 relevant CEA (Technical Standards for connectivity of the distributed generation resource) Regulations 2013 and subsequent amendments
7	Synchronization	Photovoltaic system must be equipped with a grid frequency synchronization device, if the system is using synchronizer inherently built in to the inverter then no separate synchronizer is required	Relevant CEA (Technical Standards for Connectivity of the distributed generation resources) regulations 2013 and subsequent amendments.
8	Voltage	The voltage-operating window should minimize nuisance tripping and should be under operating range of 80% to 110% of the nominal connected voltage. beyond the clearing time of 2 seconds, the Photovoltaic system must isolated itself from the grid	
9	Flicker	Operation of Photovoltaic system should not cause voltage flicker in excess of the limits stated in IEC 61000 or other equivalent Indian standards if any	Relevant CEA regulations 2013 and subsequent if any, (Technical standards for connectivity of the distributed generation resource)
10	Frequency	When the distribution system frequency deviates outside the specified limits (50.5 Hz on upper side and 47.5 Hz on lower side) up to 0.2 sec, the Photovoltaic systems shall automatically	

Sl No	Parameters	Requirements	Reference
		disconnect from grid and be in island mode.	
11	DC injection	Photovoltaic system shall not inject DC current greater than 0.5% of full rated output at the interconnection point or 1% rated inverter output current into distribution system under any operating conditions.	
12	Power Factor	While the output of the inverter is greater than 50%, a lagging power factor greater than 0.9 shall be maintained.	
13	Islanding and Disconnection	The photovoltaic system in the event of voltage or frequency variations must island/disconnect itself with the time stipulated as per IEC standards	
14	Overload and Overheat	The inverter should have the facility to automatically switch off in case of overload or overheat and should restart when normal conditions are restored	

42.18 The IEC Certifications of On-Grid Inverters are summarized below:

Standard	Description
IEC 61683	Photovoltaic systems - Power conditioners - Procedure for measuring efficiency
IEC 61727	Photovoltaic (PV) systems- Characteristics of the utility interface
IEC/EN 62109-1	Safety of power converters for use in photovoltaic power systems - Part 1: General requirements
IEC/EN 62109-2	Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters

Standard	Description
IEC/EN 61000-3-3/ 3-11/ 3-5	Electromagnetic compatibility (EMC) - Part 3-11; Limits; Limitation of Voltage Change, Voltage Fluctuations and Flicker in Public Low- Voltage Supply Systems; Rated Current <16A / >16A and <75A / >75A per Phase respectively
IEC/EN 61000-3-2/ -3-12/ -3-4	Electromagnetic compatibility (EMC) - Part 3-12; Limits; Limits for Harmonic Currents produced by equipment connected to the public low voltage systems with Rated Current <16A / >16A and <75A / >75A per Phase respectively
*IEC/EN 61000-6-1 / 6-2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for residential and commercial / industrial environments
*IEC/EN 61000-6-3 / 6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for residential and commercial / industrial environments
IEC 62116	Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures
IEC 60068-2-1	Environmental testing - Part 2-1: Tests - Test A: Cold
IEC 60068-2-2	Environmental testing - Part 2-2: Tests - Test B: Dry heat
IEC 60068-2-14	Environmental testing - Part 2-14: Tests - Test N: Change of temperature
IEC 60068-2-30	Environmental testing - Part 2-30: Tests - Test Db; Damp heat, cyclic (12 h + 12 h cycle)

***Recommended but not mandatory**

43. ARRAY STRUCTURE

- a. Photovoltaic arrays must be mounted on a stable, durable structure that can support the array and withstand wind, rain, and other adverse conditions. The modules will be fixed on structures with fixed arrangement.
- b. The module mounting structures shall have adequate strength and appropriate design suitable to the locations, which can withstand the load and high wind velocities. Stationary structures shall support PV modules at a given orientation, absorb and transfer the mechanical loads to the surface properly.
- c. Wherever required, suitable number of PV panel structures shall be provided. Structures shall be of flat-plate design using minimum size of C (75 x 40 x 5mm) or

L (55 x 55 x 5mm) or I (60x 40x 4mm) sections or higher dimensions for respective sections.

- d. Each structure with fixed tilt should have a tilt angle as per the site conditions to take maximum insolation which will be approximately equal to the latitude of the location facing true South with a North - South orientation. The tilt angle can vary from 9 degree to 12 degree based on the location's latitude in Kerala
- e. The PV module mounting structure shall have a capacity to withstand a wind velocity of 150 km/hr unless specified for dedicated requirements
- f. Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed. The PV array structure design shall be appropriate with a factor of safety of min 1.5.
- g. The materials used for structures shall be Hot dip Galvanized Mild Steel conformed to IS 2062:1992 or aluminium of suitable grade minimum alloy 6063 or better. The use of Pre-Galvanised Tubes or Galvanised Pipes will not be accepted, unless the end beneficiary provides an undertaking due to requirement of customisation.
- h. The minimum thickness of galvanization for hot dip Galvanized Mild Steel should be at least 80 microns as per IS 4759. The galvanisation thickness will be checked during inspection and the vendor is to arrange the equipment needed for the same at the site.
- i. The Bolts, Nuts, fasteners, and clamps used for panel mounting shall be of Stainless-Steel SS 304.
- j. Structures shall be supplied complete with all members to be compatible for allowing easy installation at the site. Additional Structures/Frames for required for the installation of modules if any need to be provided by the bidder.
- k. The structures shall be designed to allow easy replacement of any module, repairing and cleaning of any module. No Welding is allowed on the mounting structure. Adequate spacing shall be provided between two panel frames and rows of panels to facilitate personnel protection, ease of installation, replacement, cleaning of panels and electrical maintenance
- l. Aluminium structures used shall be protected against rusting either by coating or anodization. Aluminium frames should be avoided for installations in coastal areas.

- m. The structure shall be designed to withstand operating environmental conditions for a period of minimum 25 years. And shall be free from corrosion while installation.
- n. Screw fasteners shall use existing mounting holes provided by module manufacturer. No additional holes shall be drilled on module frames
- o. The total load of the structure (when installed with PV modules) on the terrace should be less than 60 kg/m².
- p. Minimum distance between the lower level of PV Module and the ground shall be 0.6m from the ground level.
- q. The PV Panel area shall be accessible for cleaning and for any repair work.
- r. Sufficient gap needs to be provided between the rows to avoid falling of shadow of one row on the next row. Seismic factors for the site will be considered while making the design of the foundation.
- s. Adequate spacing shall be provided between any two modules secured on PV panel for improved wind resistance.
- t. Installation of structure for solar PV mounting should not tamper with the water proofing of the roofs.
- u. **RCC Elevated structure: It can be divided into further three categories:**

A. Minimum Ground clearance (300MM – 1000 MM)

- a. The structure shall be designed to allow easy replacement of any module and shall be in line with site requirement. The gap between module should be minimum 30MM.
- b. Base Plate – Base plate thickness of the Structure should be 5MM for this segment.
- c. Column – Structure Column should be minimum 2MM in Lip section / 3MM in CChannel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
- d. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in CChannel section. The minimum section should be 70MM in Web side (y-axis) and 40MM in flange side (x-axis).

- e. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 60MM in Web side and 40MM in flange side in Lip section.
- f. Front/back bracing – The section for bracing part should be minimum 2MM thickness.
- g. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.
- h. For single portrait structure the minimum ground clearance should be 500MM.

B. Medium Ground clearance (1000MM – 2000 MM)

- a. Base Plate – Base plate thickness of the Structure should be Minimum 6MM for this segment.
- b. Column – Structure Column should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.
- c. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in C Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
- d. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
- e. Front/back bracing – The section for bracing part should be minimum 2MM thickness.
- f. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

C. Maximum Ground clearance (2000MM – 3000 MM)

- a. Base Plate – Base plate thickness of the Structure should be minimum 8 MM for this segment.

- b. Column – Structure Column thickness should be minimum 2.6MM in square hollow section (minimum 50x50) or rectangular hollow section (minimum 60x40) or 3MM in C-Channel section.
- c. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.
- d. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.
- e. Front/back bracing – The section for bracing part should be minimum 3MM thickness.
- f. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

D. Super elevated structure (More than 3000 MM)

i. Base structure

- b. Base Plate – Base plate thickness of the Structure should be 10MM for this segment.
- c. Column – Structure Column minimum thickness should be minimum 2.9MM in square hollow section (minimum 60x60) or rectangular hollow section (minimum 80x40).
- d. Rafter - Structure Rafter minimum thickness should be minimum 2.9MM in square hollow section (minimum 60x60) or rectangular hollow section (minimum 80x40)
- e. Cross bracing – Bracing for the connection of rafter and column should be of minimum thickness of 4mm L-angle with the help of minimum bolt diameter of 10mm.

ii. Upper structure of super elevated structure

- a. Base Plate – Base plate thickness of the Structure should be minimum 5MM for this segment.
 - b. Column – Structure Column should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
 - c. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
 - d. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 60MM in Web side and 40MM in flange side in Lip section.
 - e. Front/back bracing – The section for bracing part should be minimum 2MM thickness.
 - f. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.
- iii. If distance between two legs in X-Direction is more than 3M than sag angle/Bar should be provide for purlin to avoid deflection failure. The sag angle should be minimum 2MM thick, and bar should be minimum 12Dia.
 - iv. Degree - The Module alignment and tilt angle shell be calculated to provide the maximum annual energy output. This shall be decided on the location of array installation
 - v. Foundation – Foundation should be as per the roof condition; two types of the foundation can be done- either penetrating the roof or without penetrating the roof.
 - a) If penetration on the roof is allowed (based on the client requirement) then minimum 12MM diameter anchor fasteners with minimum length 100MM can be used with proper chipping. The minimum RCC size should be 400x400x300 cubic mm. Material grade of foundation should be minimum M20.
 - b) If penetration on roof is not allowed, then foundation can be done with the help of ‘J Bolt’ (refer IS 5624 for foundation hardware). Proper Neto bond solution should be used to adhere the Foundation block with the RCC roof.

Foundation J - bolt length should be minimum 12MM diameter and length should be minimum 300MM.

v. Material standards:

- i. Design of foundation for mounting the structure should be as per defined standards which clearly states the Load Bearing Capacity & other relevant parameters for foundation design (As per IS 6403 / 456 / 4091 / 875).
- ii. Grade of raw material to be used for mounting the structures so that it complies the defined wind loading conditions (As per IS 875 - III) should be referred as follows (IS 2062 - for angles and channels, IS 1079 - for sheet, IS 1161 & 1239 for round pipes, IS 4923 for rectangular and square hollow section)
- iii. Test reports for the raw material should be as per IS 1852 / 808 / 2062 / 1079 / 811.
- iv. In process inspection report as per approved drawing & tolerance should be as per IS 7215.
- v. For ascertaining proper welding of structure part following should be referred:
 - a. D.P. Test (Pin Hole / Crack) (IS 822)
 - b. Weld wire grade should be of grade (ER 70 S - 6)
- vi. For ascertaining hot dip galvanizing of fabricated structure following should be referred: -
 - a. Min coating required should be as per IS 4759 & EN 1461.

B. Testing of galvanized material

 - Pierce Test (IS 2633)
 - Mass of Zinc (IS 6745)
 - Adhesion Test (IS 2629)
 - CuSO4 Test (IS 2633)
 - Superior High-Grade Zinc Ingot should be of 99.999% purity (IS 209) (Preferably Hindustan Zinc Limited or Equivalent).
- vii. Foundation Hardware - If using foundation bolt in foundation then it should be as per IS 5624.

44. DC DISTRIBUTION BOARD:

- a. DC Distribution panel to receive the DC output from the array field. DC generated by the solar modules is transmitted through the appropriate cables from Array Yard to Control facility. DC bus & panel should be provided for the incoming DC supply from array yard. The panel should consist of adequate size.
- b. DC DPBs shall have sheet from enclosure of dust & vermin proof conform to IP 65 protection. The bus bars are made of copper of desired size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors.

45. AC DISTRIBUTION PANEL BOARD:

- a. AC Distribution Panel Board (DPB) shall control the AC power from PCU/ inverter, and should have necessary surge arrestors. Output from the inverter shall be fed to the ACDB through 4 pole MCCB of suitable current rating and multifunction export solar meter.
- b. All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS60947 part I, II and III.
- c. The changeover switches, cabling work should be undertaken by the bidder as part of the project.
- d. All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air - insulated, cubical type suitable for operation on three phase / single phase, 415 or 230 volts, 50 Hz
- e. The panels shall be designed for minimum expected ambient temperature of 45 degrees Celsius, 80 percent humidity and dusty weather.
- f. All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better.
- g. Should conform to Indian Electricity Act and rules (till last amendment).
- h. All the 415 AC or 230 volts' devices / equipment like bus support insulators, circuit breakers, SPDs, VTs etc., mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions

Variation in supply voltage +/- 10 %

Variation in supply frequency +/- 3 Hz

46. STANDARDS AND REGULATIONS TO BE COMPLIED

The connectivity should be as per

- a. Technical Standards for connectivity of the Distributed generation resources, Regulation, 2013.
- b. KSERC (Renewable Energy and Net Metering) Regulations, 2020.
- c. KSERC (Grid interactive Distributed Solar Energy Systems) Regulations, 2014.
- d. CEA Regulation 2010 has to be followed safety and Electricity supply.
- e. Metering should be as per CEA regulation 2006.
- f. Any amendments thereof will also be applicable.

47. INTEGRATION OF PV POWER WITH GRID:

The output power from SPV would be fed to the inverters which converts DC produced by SPV array to AC and feeds it into the main electricity grid after synchronization. In case of grid failure, or low or high voltage, solar PV system shall be out of synchronization and shall be disconnected from the grid.

48. PROTECTIONS

The system should be provided with all necessary protections like earthing, Lightning, and grid islanding as follows:

48.1 LIGHTNING PROTECTION

The SPV power plants shall be provided with lightning & overvoltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors. Lightning protection should be provided as per IS/IEC 62305 standard. The protection against induced high-voltages shall be provided by the use of metal oxide

varistors (MOVs) and suitable earthing such that induced transients find an alternate route to earth.

48.2 SURGE PROTECTION

Internal surge protection shall consist of three MOV type surge-arrestors connected from +ve and -ve terminals to earth (via Y arrangement)

48.3 EARTHING PROTECTION

- i. Each array structure of the PV yard should be grounded/ earthed properly as per IS:3043-1987. In addition, the lightning arrester/masts should also be earthed inside the array field. Earth Resistance shall be tested in presence of the representative of ANERT as and when required after earthing by calibrated earth tester. PCU, ACDB and DCDB should also be earthed properly.
- ii. Earth resistance shall not be more than 5 ohms. It shall be ensured that all the earthing points are bonded together to make them at the same potential.
- iii. Earthing System shall connect all non-current carrying metal receptacles, electrical boxes, appliance frames, chassis and PV module mounting structures in one long run. The earth strips should not be bolted. Earthing GI strips shall be interconnected by proper welding.
- iv. Masonry enclosure with the earth pit of size not less than 400mm X 400mm (width) complete with cemented brick work (1:6) of minimum 500 mm depth duly plastered with cement mortar (inside), shall be provided. Hinged inspection covers of size not less than 300mm X 300mm with locking arrangement shall be provided. Suitable handle shall be provided on the cover by means of welding a rod on top of the cover for future maintenance.
- v. Earthing system must be interconnected through GI strip to arrive equipotential bonding. The size of the GI earth strip must be minimum 25mm X 6mm.
- vi. The complete earthing system shall be mechanically and electrically connected to provide independent return to earth. All three-phase equipment shall have two distinct earth connections. An earth bus shall be provided inside the control facility. For each earth pit, necessary test point shall have to be provided.

48.4 GRID ISLANDING:

- i. In the event of a power failure on the electric grid, it is required that any independent power-producing inverters attached to the grid turn off in a short period of time. This prevents the DC-to-AC inverters from continuing to feed power into small sections of the grid, known as “islands.” Powered islands present a risk to workers who may expect the area to be unpowered, and they may also damage grid-tied equipment. The PV system shall be equipped with islanding protection. In addition to disconnection from the grid (due to islanding protection) disconnection due to under and over voltage conditions shall also be provided.
- ii. A manual disconnect 4pole isolation switch beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility personnel to carry out any maintenance. This switch shall be locked by the utility personnel

49. CABLES

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

- i. Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards
- ii. Temp. Range: -10°C to $+80^{\circ}\text{C}$.
- iii. Voltage rating 660/1000V
- iv. Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- v. Flexible
- vi. Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop (power loss) of the entire solar system to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use.
- vii. Cable Routing/ Marking: All cable/wires are to be routed in a GI cable tray / UV protected UV conduits and suitably tagged and marked with proper manner by good quality ferrule or by other means so that the cable easily identified.
- viii. The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e. 25years.

- ix. The ratings given are approximate. Bidder to indicate size and length as per system design requirement. All the cables required for the plant provided by the bidder. Any change in cabling sizes if desired by the bidder/approved after citing appropriate reasons. All cable schedules/layout drawings approved prior to installation.
- x. Multi Strand, annealed high conductivity copper conductor PVC type 'A' pressure extruded insulation or XLPE insulation. Overall PVC/XLPE insulation for UV protection Armored cable for underground laying. All cable trays including covers to be provided. All cables conform to latest edition of IEC/ equivalent BIS Standards as specified below: BoS item / component Standard Description Standard Number Cables General Test and Measuring Methods, PVC/XLPE insulated cables for working Voltage up to and including 1100 V, UV resistant for outdoor installation IS /IEC 69947.
- xi. For the DC cabling, XLPE or XLPO insulated and sheathed, UV stabilized single core flexible copper cables shall be used; For the AC cabling, PVC or XLPE insulated and PVC sheathed single or, multi-core flexible Aluminium cables shall be used, Outdoor AC cables shall have a UV -stabilized outer sheath.
- xii. The size of each type of DC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 1%.
- xiii. The size of each type of AC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 2 %.
- xiv. The minimum DC cables size shall be 4.0mm² copper; The minimum AC cable size shall be 4.0mm² copper. In three phase systems, the size of the neutral wire shall be equal to the size of the phase wires.
- xv. Cable length of 15M per string on DC side and cable size of 25M on AC side should be considered in the pricing.
- xvi. The following colour code shall be used for cable wires and shall confirm to IEC 69947
- DC positive: red (the outer PVC sheath can be black with a red line marking)
 - DC negative: black
 - AC single phase: Phase: Red; Neutral: Black

- AC three phase: phases: Red, Yellow, Blue; Neutral: Black
- Earth wires: Green

50. CONNECTIVITY

The maximum capacity for interconnection with the grid at a specific voltage level as per standard. The Bidder must obtain the feasibility and connectivity certificate from KSEBL for the project and the costs in this regard re to be borne by the bidder.

51. OPERATION & MAINTENANCE OF THE PLANT

The contractor shall be responsible for Comprehensive Operation and maintenance of the Solar Power Plants of for a period of five (5) years from the date of commissioning of this solar project. The EPC contractor will operate the solar Plant and shall provide for, at a minimum, the following services:

Performing routine and non-routine maintenance on the solar Plant for a period of five years from the date of commissioning of solar project;

- i. Operating the solar Plant;
- ii. Providing all materials and services necessary for solar Plant maintenance;
- iii. Performing all duties for the safe and efficient operation and maintenance as per the standards;
- iv. Complying with all regulatory obligations;
 - a. Replacement of damaged modules if any, during the period of 5(five) years.
 - b. Replacement of Inverter and any other equipments in solar plant time to time if required, during the period of 5(five) years.
 - c. Maintaining and replacement of Lightning Arrestors.

The contractor shall carry out the periodical/plant maintenance as given in the manufacturer's service manual and perform at least minimum requirement. Preventive/Routine Maintenance shall be done by the Contractor at least once in a every three months and shall include activities such as checking the health of the SPV system, tightening of all electrical connections, mounting structure, Inverter operations and any other activity that may be required for proper functioning of the SPV system as a whole.

Regular periodic checks of the Modules, Inverters, shall be carried out as a part of routine 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.

At the end of the warranty period of 5 years, the Contractor shall hand over the complete system to Beneficiary in the best working condition. Any component found defective/inefficient/worn out shall be rectified/ replaced/ made good at contractor's cost before handing over the system to the beneficiary. In order to ensure longevity & safety of the core equipment and optimum performance of the system the Contractor should use only genuine spares of high-quality standards.

52. CIVIL WORKS

While installing solar power plants on rooftops, the physical condition of the rooftop, chances of shading, chances water level rise in the rooftop during raining due improper drainage in the roof-top should be taken in to consideration.

- a. PV array shall be installed in the terrace space free from any obstruction and/or shadow and to minimize effects of shadows due to adjacent PV panel rows.
- b. PV array shall be oriented in the south direction in order to maximize annual energy yield of the plant.
- c. The solar PV array must be installed on the rooftop in such a way that there is sufficient space on the rooftop for maintenance etc.
- d. There should not be any damage what so ever to the rooftop due to setting up of the solar power plant so that on a later day there is leakage of rainwater, etc. from the rooftop.
- e. Some civil works are inevitable for erecting the footings for the module mounting structure as discussed in Module Mounting Structure section. The roof top may be given a suitable grading plaster with suitable leak proof compound so as to render the roof entirely leak proof.
- f. Ample clearance shall be provided in the layout of the inverter and DC/AC distribution boxes for adequate cooling and ease of maintenance.
- g. While cabling the array, care must be taken such that no loose cables lie on the

rooftops.

- h. The roof top should look clean and tidy after installation of the array.
- i. Neatness, tidiness and aesthetics must be observed while installing the systems.
- j. 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 IS standards. Reinforcement shall be high strength TMT Fe 415 or Fe 500 conforming to IS: 1786-1985.
- k. Brick Works (If any) - All brick works shall be using 1st class bricks of approved quality as per IS 3102.
- l. Plastering - Plastering in cement mortar 1:5, 1:6 and 1:3 shall be applied to all.
- m. Display of mandatory items- Single Line Diagram and layout diagram of modules and interconnection at installation site shall be provided near the inverter.
- n. For painting on concrete, masonry and plastered surface IS:2395 shall be followed. For distempering IS 427 shall be followed referred. For synthetic enamel painting IS 428 shall be followed. For cement painting IS 5410 shall be followed.
- o. All Civil works required for the installation of the PV Plant and other civil and electrical work in evacuation infrastructure, wherever necessary, shall be within the scope of the bidder
- p. The layout of Inverter accommodation shall be designed to enable adequate heat dissipation and availability. Mount within the existing infrastructure available in consultation with the Site in charge. String Inverters may be installed with Canopy type structure over it to protect it from frequent monsoon and weather changes.

53. NET METERING AND UTILITY INTERCONNECTION

- a. Net metering equipment (an Import-Export Energy Meter) approved and tested by the electrical utility based on the accuracy class required for the proposed capacity of the system must be provided with the necessary data cables if required.
- b. Net Metering and Utility Interconnection should be accomplished according the Kerala State Electricity Regulatory Commission (Grid Interactive Distributed Solar Energy Systems) Regulations 2014 Clauses (8) & (9) (Notification No. 2096/KSERC/CT/2014 dt. 10th June 2014)

54. INTER CONNECTION OF INVERTER OUTPUT WITH UTILITY GRID

- a. The interconnection of load with inverter output should be done after obtaining permission from Electrical Inspectorate and Electrical Utility.
- b. The plan scheme and drawing related to interconnection details should be submitted to Electrical Inspectorate through a licensed Electrical contractor with the guidance appropriate Engineering Authority.
- c. Licenced contractor has to be engaged for preparation of plan scheme to be submitted to the Kerala State Electricity Licensing Board and necessary fee should be remitted for energisation of Solar Power Plant.
- d. The panel board and distribution board required for AC interconnection should be done as per specification/ instruction given appropriate Engineering Authority.
- e. All the electrical works required for the interconnection of load with inverter output should be done by the successful bidder as a part of the Solar Power Plant installation.
- f. Bidder should visit the actual site and ensure the exact place for providing Solar Modules and Inverter etc. in presence of technical representative from the ANERT.
- g. Net Metering Equipment shall be installed and maintained in accordance with the provisions of The Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 as amended from time to time. The Contractor shall maintain the Metering System as per metering code and CEA guidelines. The defective meter shall be immediately tested and calibrated.
- h. The accuracy class of the Net Metering Equipment will be selected so that all levels of energy produced or taken by the Solar Power Plant will be measured accurately, and this equipment has applicable accuracy class.
- i. Net Metering Equipment shall be microprocessor-based conforming to the relevant IEC standards with Advanced Metering Infrastructure (AMI) with RS232 cable facility.
- j. Net Metering Equipment shall measure active energy (both import and export) and reactive energy (import) by 3 ph, 4 wire principle suitable for balanced / un-balanced 3 phase load (With KVA_r, KWh, KVA measuring registers). Tri-vector based energy meter shall have an accuracy class of energy measurement of at least

Class 0.2 for active energy and at least 0.5 Class for reactive energy according to IEC 60687.

- k. Display parameters: LCD test, KWH import, KWH export, MD in KW export, MD in KW import, Date & Time, AC current and voltages and power factor (Cumulative KWH will be indicated continuously by default)

55. PERMISSION FROM KSEBL BY BIDDER

- a. The procedures for Grid Connectivity of the PV Plants for capacities from 1kWp to 1MWp are governed by the KSEBL Circular No. CE(REES)/Escot/AEE6/Solar-General/16-17/766(1) Dt. 09-09-2016 and its Amendments.
- b. The beneficiary/ANERT will obtain a feasibility certificate by submitting an application form along with the documents and a fee of Rs 1000/- as per the Annexure-I form of KSEBL.
- c. After submitting all the documents and clarification required by KSEBL, the vendors will pay a Registration fee of Rs 1000/- per kW to KSEBL (Eg: If the plant size is 3.65kW then it will be considered as 4kW and the applicant has to pay a sum of Rs 4000/-) to acquire a SPIN (Solar Plant Identification Number). For example, 5501-00001 where 5501 is the section office code for the locality and 00001 is the solar plant number.
- d. Request for the cancellation of Registration by the applicant will be verified by the Assistant Engineer, KSEBL and a decision will be taken on this by division Executive Engineer, KSEBL and 80% of the amount shall be reimbursed based upon the recommendation of Assistant Engineer.
- e. The application for testing of the installed PV power plant has to be submitted at the Electrical Section office by the contractor. For plant capacities above 10kWp the application must be submitted along with Energization Certificate from Electrical Inspectorate and for the plant capacities below 10kWp the application must be submitted along with a Completion Report of a Certified Electrical Contractor. The minimum qualification for carrying out the installation work of a PV Plant shall be a B-Class contractor licensee and depending upon the capacity of

installation, eligible contractors can carry out the work. (Circular no. B2-13958/2017/CEI Dtd 24.07.2018.)

- f. The officials from Electrical Inspectorate and KSEBL will visit the site with prior notice to the beneficiary.
- g. Tests shall be conducted as per system capacity norms issued by KSEBL/Electrical Inspectorate
- h. Test Certificate for Solar Plant Installation as per annexure 9 of KSEBL order will be issued by the Assistant Engineer, once the PV plants is successfully performing as per the standards
- i. Agreement for Connecting Solar Energy System as per Annexure 10 of KSEBL order shall be signed between KSEBL and the applicant as per the Annexure 11 (KSEBL Order) in which the capacity of the net meter should be mentioned. The contractor is required to undertake all the liaison work required for the same.
- j. The import and export will be calculated based upon the Net meter installed at the site of the consumer for which the reading will be taken on every month from the Net meter and Solar meter.

56. DATE OF COMMISSIONING

After the Inspection and approval of the Electrical Inspectorate, date of Energisation to the Grid will be considered as the official Date of Commissioning (CoD) of the project. To ensure PR, the bidder will be allowed to improve the quality of the plant by replacement of any components with all suitable modification requirements on balance of systems at his own cost to achieve the performance ratio.

57. SAFETY MEASURES

The bidder shall take entire responsibility for electrical safety of the installation(s) including connectivity with the grid and follow all the safety rules & regulations applicable as per Electricity Act, 2003 and CEA guidelines etc. Bidder should ensure workers are following standards electrical and work at height safety procedures and PPEs at site and do not work under dangerous conditions.



**AGENCY FOR NEW & RENEWABLE ENERGY
RESEARCH AND TECHNOLOGY (ANERT)**

Department of Power, Government of Kerala
Thiruvananthapuram, Kerala – 695 033;
www.ANERT.gov.in , projects@ANERT.in

E-TENDER DOCUMENT

Expression of Interest for the selection of Vendors for the Design, Supply, Erection, Testing and Commissioning including 5 year's Warranty of Grid-Connected Rooftop Solar Plant of various capacities under the Phase-II of Grid Connected Rooftop Solar Scheme of MNRE for a cumulative capacity of 100 MW in the proposed Solar City area of Thiruvananthapuram Corporation, Kerala, India

Ref. No.: ANERT-TECH/184/2022-CTM

VOL – 4: ANNEXURES

Date of Publishing of Bids : - 21/02/2023

Last Date of Submission of Bids : - 14/03/2023

FORMAT 1 - COVERING LETTER

(This letter to be submitted on the official letter head of the tenderer, signed by the authorised signatory.)

Ref. No. _____

Date:

(Insert name and address of Bidding Company)

Tel.#: Fax#:

E-mail address#

Sub: RFP for the empanelment of vendors for “Design, supply, erection, testing and commissioning including warranty, Comprehensive maintenance of grid connected rooftop solar power plant of various capacities in the Proposed Solar City of Thiruvananthapuram for Part-A/ Part-B/ Part C/ Part- D/Part- E).

Dear Sir,

1. We, the undersigned.....[Name of the ‘Bidder’] having read, examined and understood in detail the RFP Document for Implementation of Grid connected Roof Top Solar System hereby submit our Bid comprising of Price Bid and Techno Commercial Bid. We confirm that neither we nor any of our Parent Company / Affiliate/Ultimate Parent Company has submitted Bid other than this Bid directly or indirectly in response to the aforesaid EoI.
2. We give our unconditional acceptance to the EoI, dated..... and EoI Documents attached thereto, issued by ANERT, as amended. As a token of our acceptance to the EoI documents, the same have been initiated by us and enclosed with the bid. We shall ensure that we execute such EoI as per the provisions of the EoI and provisions of such EoI Documents shall be binding on us.

Bid Capacity: We have bid for the capacity of kWp for Part-A/ Part-B/ Part C/ Part-D/Part- E separately as per RFP terms and conditions.

Bid Bond: We have enclosed a Bid Bond of Rs (Insert Amount), in the form of Bank Guarantee no (Insert number of the bank guarantee) dated[Insert date of bank guarantee] as per Format from (Insert name of bank providing Bid Bond) and valid up to in terms of Clause of this RFP. The offered quantum of power

by us is (Insert total capacity offered) kWp in (Part-A/ Part-B/ Part C/ Part-D/Part- E).

3. We have submitted our Price Bid strictly as per conditions mentioned in the EoI, without any deviations, conditions and without mentioning any assumptions or notes for the Price Bid in the said format(s).
4. In case we are an Empanelled Vendor, we shall furnish a declaration at the time of commissioning of the project to the effect that neither we have availed nor we shall avail in future any CFA other than received from ANERT for implementation of the project.
5. Acceptance: We hereby unconditionally and irrevocably agree and accept that the decision made by ANERT in respect of any matter regarding or arising out of the RFP shall be binding on us. We hereby expressly waive any and all claims in respect of Bid process. We confirm that there are no litigations or disputes against us, which materially affect our ability to fulfil our obligations with regards to execution of projects of capacity offered by us.
6. Familiarity with Relevant Indian Laws & Regulations: - We confirm that we have studied the provisions of the relevant Indian laws and regulations as required to enable us to submit this Bid and execute the RFP Documents, in the event of our selection as successful bidder. We further undertake and agree that all such factors as mentioned in RFP have been fully examined and considered while submitting the Bid.
7. Contact Person

Details of the contact person are furnished as under:

Name:

Address:

Phone Nos.:

Fax No.:

E-Mail:

8. We are enclosing herewith the Envelope-I (Covering letter, Processing fee and Bid Bonds etc as per the EoI) (through Offline) and Techno-Commercial documents (through online) and Price Bids (through online) containing duly

signed formats, each one duly sealed separately, in one original as desired by you in the EoI for your consideration in the EoI.

It is confirmed that our Bid is consistent with all the requirements of submission as stated in the EoI and subsequent communications from ANERT. The information submitted in our Bid is complete, strictly as per the requirements stipulated in the EoI and is correct to the best of our knowledge and understanding. We would be solely responsible for any errors or omissions in our Bid. We confirm that all the terms and conditions of our Bid are valid for acceptance for a period of 6 month from the Bid deadline. We confirm that we have not taken any deviation so as to be deemed non-responsive.

Dated the day of 2023

Yours faithfully,

Signature:

Name:

Designation with Seal

Name, Designation and Signature of Authorized Person in whose name Power of Attorney/Board Resolution/Declaration (Format 3).

FORMAT 2 – GENERAL PARTICULARS

(This letter to be submitted on the official letter head of the tenderer, signed by the authorised signatory.)

Name of the Agency	
Registered Office	
Nature of Agency (Ltd. Co., Partnership etc.) Attach Copy of partnership Deed/ Certification of Incorporation	
Year of Establishment	
Registration of Number	
Address for Communication	
Telephone number of Contact person(Mobile if any)	
Name of CEOs/ Proprietor/Partners(with address and Telephone No)	
GST Registration Number (Copy to be Attached)	
PAN Number	
TAN Number	
Whether the bidder wishes to form a project company for execution of work	
Whether any Civil Suit / Litigation arisen in the contract executed during the last five years/being executed. If yes, please furnish the name of the Contract, employer nature of work, contract value,	

work order and date and brief details of litigation.	
Details of Total Experience in general since inception(Details of similar systems installed till the date of bid)	
Details of Turnover for last Two years. (Copy Audited Statements has to be submitted for last two financial years)	
Details of offices in Kerala, India and abroad- address and contact details	

Documentary evidence for the bid qualification requirements are submitted along with this document and the details furnished above are true and correct.

Signature
of authorised signatory

Name

Designation

Date:

(office seal)

FORMAT 3 - POWER OF ATTORNEY

(To be on non-judicial Kerala stamp paper of appropriate value as per Stamp Act relevant to place of execution)

Power of Attorney to be provided by the Bidding Company in favour of its representative as evidence of authorized signatory's authority.

Know all men by these presents, We (name and address of the registered office of the Bidding Company as applicable) do hereby constitute, appoint and authorize Mr./Ms. (name & residential address) who is presently employed with us and holding the position of as our true and lawful attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to submission of our Bid for Implementation of grid connected Roof top solar in response to the EoI No. dated issued by ANERT, including signing and submission of the Bid and all other documents related to the Bid, including but not limited to undertakings, letters, certificates, acceptances, clarifications, guarantees or any other document which the Insert the name of State Implementing Agency may require us to submit. The aforesaid attorney is further authorized for making representations to the Insert the name of State Implementing Agency, and providing information / responses to Insert the name of State Implementing Agency, representing us in all matters before Insert the name of State Implementing Agency and generally dealing with ANERT in all matters in connection with Bid till the completion of the bidding process as per the terms of the above mentioned EoI.

We hereby agree to ratify all acts, deeds and things done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall be binding on us and shall always be deemed to have been done by us.

All the terms used herein but not defined shall have the meaning ascribed to such terms under the EoI.

Signed by the within named

..... **(Insert the name of the executant company)**

through the hand of Mr.
duly authorized by the Board (vide Board Resolution No____) to issue such Power
of Attorney

Dated this day of

Accepted

.....

Signature of Attorney

(Name, designation and address of the Attorney)

Attested

.....

(Signature of the executant)

(Name, designation and address of the executant)

.....

Signature and stamp of Notary of the place of execution

Common seal of has been affixed in my/our presence pursuant to
Board of CEO's Resolution dated.....(Board of CEO's Resolution is also
enclosed)

WITNESS

1.

(Signature)

Name.....

Designation

2.

(Signature)

Name.....

Designation

Notes:

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 the same should be under common seal of the executant affixed in
accordance with the applicable procedure. Further, the person whose signatures are to be
provided on the power of attorney shall be duly authorized by the executant(s) in this
regard.

The person authorized under this Power of Attorney, in the case of the Bidding Company / Lead Member being a public company, or a private company which is a subsidiary of a public company, in terms of the Companies Act, 1956, with a paid up share capital of more than Rupees Five crores, should be the Managing CEO / whole time CEO/manager appointed under section 269 of the Companies Act, 1956. In all other cases the person authorized should be a CEO duly authorized by a board resolution duly passed by the Company. Also, wherever required, the executant(s) should submit for verification the extract of the chartered documents and documents such as a Board resolution / power of attorney, in favour of the person executing this power of attorney for delegation of power hereunder on behalf of the executant(s).

FORMAT 4 - PERFORMANCE SECURITY GUARANTEE

(To be on non-judicial Kerala stamp paper of appropriate value as per Stamp Act relevant to place of execution)

BG No. :

Amount :

Date :

Valid up to :

In consideration of the Agency for New & Renewable Energy Research and Technology, therein after called "ANERT") have allotted work to M/s..... (hereinafter called the said Contractor) under the terms and conditions of Supply Order No..... issued by ANERT and the agreement dated made between (name of contractor) and ANERT for covering (hereinafter called the said agreement) of Security Deposit for the due fulfilment by the said contractor of the terms and conditions.

Contained in the said agreement, on production of the Bank Guarantee for Rs..... (Rupees..... only) we,Bank having our Head Office at (herein after referred to as "the Bank") at the request of M/s.(name of contractor) do hereby undertake to pay to the ANERT an amount not exceeding Rs..... (Rupees only), against any loss or damage caused to or suffered or would be caused to or suffered by the ANERT by reason of any breach by the said contractor of any of the terms and conditions contained in the said agreement

We,Bank, do hereby undertake to pay the amount due and payable under this Guarantee without any demur, merely on a demand from the ANERT stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the ANERT by reasons of breach by the said contractor of any of the terms or conditions contained in the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. (Rupees only).

This guarantee will not be discharged due to change in the constitution of the bank or the contractor/supplier.

Notwithstanding anything contained hereinbefore:

- 1) Our liability under this Bank Guarantee shall not exceed Rs.....(Rupees only)
- 2) This Bank Guarantee shall be valid upto
- 3) We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee amount only and only if you serve us a written claim or demand on or before.....

Dated at this day of 2023

FORMAT 5 – FINANCIAL CRITERIA

(certified by Authorized Signatory and the Statutory Auditor / Practising Chartered Accountant of the Bidding Company)

Financial Qualification Certificate

(Rupees in Crores)

S/N	Financial parameters	FY 17-18	FY 18-19	FY 19-20	FY 20-21	FY 21-22
1.	Net Worth					
a)	Paid up Capital					
b)	Free Reserves and Surplus*					
c)	Misc expenses to the extent not written off					
	Net Worth (a+b-c)					
2.	Annual Turnover **					

* Free Reserve and Surplus shall be Exclusive of Revaluation Reserve, written back of Depreciation Provision and Amalgamation.

** Annual total Income/ turnover as incorporated in the Profit and Loss Account excluding non-recurring income, i.e., sale of fixed asset etc.

It is certified that all the figures are based on audited accounts read with auditors report and Notes to Accounts etc.

(Signature & Seal of Authorized Signatory

Name of Authorized Signatory:

Certifying Chartered Accountant:

Designation:

Name of Firm:

Date:

UDIN No:

Place:

Date:

Place:

Note:

1. In addition to above certificate from Chartered Accountant, Bidder is required to submit Firm's Annual Audit Report, Balance sheet, Profit & Loss and Income Tax Returns / CA certificate for last Five years i.e., F.Y: 2017-18, 2018-19, 2019-20, 2020-21 & 2021-22.

FORMAT 6 – CONSORTIUM AGREEMENT

(TO BE ON NON-JUDICIAL STAMP PAPER OF APPROPRIATE VALUE AS PER STAMP ACT RELEVANT TO PLACE OF EXECUTION)

THIS Consortium Agreement (“Agreement”) executed on this day of 2023 between M/s [insert name of Lead Member] a Firm / Company incorporated under the laws of and having its Registered Office at (hereinafter called the “Lead Member”, which expression shall include its successors, executors and permitted assigns) and M/s, a Firm / Company incorporated under the laws of and having its Registered Office at (hereinafter called the “Technical Member”, which expression shall include its successors, executors and permitted assigns), which expression shall include its successors, executors and permitted assigns) WHEREAS, each Member individually shall be referred to as the “Member” and both the Members shall be collectively referred to as the “Members” in this Agreement.

WHEREAS ANERT (hereinafter called Insert the name of State Implementing Agency), has invited response to EoI No. [Insert the RFP Number] and dated for design, manufacture, supply, erection, testing and commissioning including warranty, operation & maintenance of Roof Top Solar system in the proposed Solar City of Thiruvananthapuram, Kerala,

WHEREAS the EoI documents stipulates that the Lead Member may enter into a Technical Consortium Agreement with another Company / Corporate entity to fulfil the Technical Eligibility Criteria as stipulated in the EoI document, The Members of the Bidding Consortium will have to submit a legally enforceable Consortium Agreement in a format enclosed with the EoI document,

NOW THEREFORE, THIS AGREEMENT WITNESSTH AS UNDER:

In consideration of the above premises and agreements all the Members in this Consortium do hereby mutually agree as follows:

1. We, the Members of the Consortium and Members to the Agreement do hereby unequivocally agree that (M/s), shall act as the Lead Member as defined in the RFP for self and agent for and on behalf of Technical Member ,

2. The Lead Member is hereby authorized by the Technical Member of the Consortium to bind the Consortium and receive instructions for and on their behalf,
3. The Lead Member shall be liable and responsible for ensuring the individual and collective commitment of each of the Members of the Consortium in discharging all of their respective obligations, Each Member further undertakes to be individually liable for the performance of its part of the obligations without in any way limiting the scope of collective liability envisaged in this Agreement,
4. Subject to the terms of this Agreement, the technical member shall be responsible for providing technical knowledge for Implementation of Grid connected Roof Top Solar Systems.
5. In case of any breach of any commitment by any of the Consortium Members, the Lead Member shall be liable for the consequences thereof.
6. This Agreement shall be construed and interpreted in accordance with the Laws of India and courts at Thiruvananthapuram, Kerala alone shall have the exclusive jurisdiction in all matters relating thereto and arising there under.
7. It is hereby further agreed that in case of being shortlisted, the Members do hereby agree that they shall abide by the terms & conditions of the EoI document.
8. It is further expressly agreed that this Agreement shall be irrevocable and shall form an integral part of the EoI submitted to Insert the name of State Implementing Agency and shall remain valid till completion of the job assigned to the Contractor.
9. The Lead Member is authorized and shall be fully responsible for the accuracy and veracity of the representations and information submitted by the Members respectively from time to time in the response to EoI.
10. It is hereby expressly understood between the Members that no Member at any given point of time, may assign or delegate its rights, duties or obligations under this agreement without the explicit permission of Insert the name of State Implementing Agency.
11. This Agreement:
 - a. Has been duly executed and delivered on behalf of each Member hereto and constitutes the legal, valid, binding and enforceable obligation of each such Member;

- b. Sets forth the entire understanding of the Members hereto with respect to the subject matter hereof; and
- c. May not be amended or modified except in writing signed by each of the Members and with prior written consent of Insert the name of State Implementing Agency.

IN WITNESS WHEREOF, the Members have, through their authorized representatives, executed these presents on the Day, Month and Year first mentioned above.

For M/s [Lead Member]

(Signature, Name & Designation of the person authorized vide Board Resolution Dated)

Witnesses:

1) Signature, Name: Address:

2) Signature, Name: Address:

For M/s [Technical Member]

(Signature, Name & Designation of the person authorized vide Board Resolution

Dated

Witnesses:

1) Signature, Name: Address:

2) Signature, Name: Address:

ANNEXURE A – BIDDERS TECHNICAL INFORMATION

TECHNICAL PARTICULAR DATA

Solar PV Module

Sl. No	Particulars	Required	Offered
1	PV Module Manufacture name & Country of origin	Manufacture name to be specified	
2	PV Module type	Poly/Mono Crystalline, Mono PERC	
3	No. of PV cells per Module		
4	Total number of PV modules		
5	Max. Power, P_{mp} @STC	330 Wp or above	
6	Max. Power tolerance (%)	Not more than 3%	
7	Max. Power voltage (V_{mp}) @STC	To be specified	
8	Max. Power current (I_{mp}) @STC	To be specified	
9	Open circuit voltage, V_{oc} @ STC	To be specified	
10	Short circuit current, I_{sc} @STC	To be specified	
11	Nominal voltage	To be specified	
12	Nominal Wattage	To be specified	
13	Fill Factor	Not less than 0.7	
14	Temp. coefficient of V_{oc} (%/C)		
15	Temp. coefficient of P_{mp} (%/C)		
16	Temperature Co-efficient of I_{sc} (%/°C)		
17	Normal Operating Cell Temperature (NOCT) (°C)		
18	Operating Temperature (°C)		
19	Module efficiency	$\geq 17\%$	
20	No. of By-pass Diodes		
21	Mounting arrangement for Solar Module	Fixed Arrangement	
22	Solar Module frame material	Anodized Aluminium	

Sl. No	Particulars	Required	Offered
23	Module dimensions' cm (L x W x H)	To be specified	
24	PV panel Weight (kg)	To be specified	
25	Output Cables	Polarized, UV protected & Weather Proof DC rated multi-contact connector	
26	Output Terminal	PV Connectors	
27	Junction Box	Weather resistant HDPE (IP65)	
28	Copies of test certificates	IS 14286 and IEC 61215,61730 part 1&2, IEC 61701	

INVERTER

Sl. No.	Particulars	Required	Offered
1	Manufacturer		
2	Model name/No.		
3	Number of units		
4	Nominal AC power		
5	Nominal AC voltage		
6	Nominal AC Current		
7	AC grid Frequency range	50Hz \pm 0.5%	
8	AC grid voltage range		
9	Power Factor (+ and -)		
10	Total Harmonic Distortion	As per IEEE-519 2014	

Sl. No.	Particulars	Required	Offered
11	AC over / under voltage over / under frequency protection		
12	Max PV input power		
13	Maximum DC voltage	Less than 1000 V	
14	MPPT voltage range		
15	Maximum DC current		
16	No. of DC input ports		
17	Maximum Efficiency	as per IEC61683	
18	DC voltage ripple		
19	Ambient temperature range		
20	Humidity (non-condensing)	95%, non-condensing	
21	Protective functions - AC over/under voltage, AC over/under frequency, over temperature, AC and DC overcurrent, DC over-voltage, against Islanding		
22	Communication Interface	RS485, MPI Profi-Bus/Telephone Modem/WiFi	
22	User-display standard	LCD panel with membrane keypad	
23	Enclosure environment rating		
24	Safety and EMC	IS 16221	
25	Anti-islanding feature	IEC62116 and IS -16169	

ANNEXURE B – PROJECT REPORT FORMAT

Format for Summary Project Report for Grid Connected Rooftop Solar Plants

1. Name of Bidder:
2. EoI no.
3. Project details (Site location & Address):
4. Brief about the Rooftop Solar Power Generation System:
5. Details of the beneficiary:
6. Specifications of the Components and Bill of Material/ Quantities:

S. No.	Component	Specifications	Quantity	Make
A	Solar PV module			
A.1	Aggregate Solar PV capacity (kWp)			
B	Grid Tie inverter (Type and Capacity)			
B.1	Aggregate Inverter capacity (kVA)			
C	Module mounting structure			
E	AC Distribution Board			
F	Cable (All type)			
G	Earthing Kit			
H	Meters			
I	Online monitoring system			
J	Any other component			

7. Unit cost of solar power generation:
8. Expected output/annum:
9. Respective drawings for layout, electrical wiring connections, earthing, etc.
10. Connectivity details with grid and metering arrangement (with sketch diagram)
11. Copy of electricity bill of the beneficiary and consumer number
12. Any other information.
13. Documentary proof regarding beneficiary type as per of the RFP document.

ANNEXURE C - PROJECT COMPLETION REPORT

Financial year *:			
Approval No. *:			
Proposal Title:			
Installed by agency:			
Title of the Project*:		SPV Capacity (kWp)*:	
Category of the organization/ beneficiary*:		Name of the contact person*	
Address of contact person*:			
State*:		District/City*:	
Mobile*:		Email*:	
Aadhaar Card Number (For Residential) Copy to be attached.		Latitude:	
		Longitude:	
Other info			
Electricity Distribution Company Name:		Sanction Load	
Electricity consumer account no. as per electricity bill:			

Technology Description & System Design /Specification

(Compliance to BIS/ IEC Standards is mandatory - Attach Copies)

1. Solar PV Module:

Power of each PV Module / Nos. (Wp)* / Make			
Cumulative Capacity of Modules(kWp):			
Solar cell technology:		Tilt Angle of Modules:	
Module efficiency (in Percentage):		Azimuth	
Indigenous or imported		RFID passed inside or outside:	

2. Inverters:

Type of inverter:			
Power of each PCU/ Nos. of inverters (kVA)* / Make			
Capacity/Power of PCU/inverters (kVA):		Type of Charge Controller / MPPT	
Inverter efficiency (Full load): (In percentage)			
Grid connectivity level phase	Single Phase/ Three Phase	Grid connectivity level Voltage	230V/415 V
3. Mounting Structures			
Type		Surface Finish	
Material		Wind Speed Tolerance	
4. Cables:			
DC Cable Make & Size		Length:	
AC Cable Make & Size (Inverter to ACDB)		Length:	
AC Cable Make & Size (ACDB to Electric Panel)		Length:	
Conductor	Multi strand high conductivity Copper	Insulation/sheath	PVC /XLPE Insulated
5. JUNCTION BOX & DISTRIBUTION BOARDS			
Type	weatherpro of, dust & vermin proof	Nos.:	
Make			
6. EARTHING & LIGHTNING PROTECTION			
EQUIPMENT EARTHING			
AC (Nos.)		Earth Resistance	
DC (Nos.)		Earth Resistance	

LIGHTNING ARRESTORS (LA)			
Type			
LA (Nos.)		Earth Resistance	

**(Signature of Vendor)
With Stamp**

Commissioning Test Report - ____ kW

Inverter Testing (DC) Side: Nos. of Inverter: Nos.

Inverter S. No.	Capacity	String 1: Voc	String 2: Voc	Remark

Inverter Testing (AC) Side - Single / Three Phase

Inverter S. No.	Capacity	R - Y/ P-N	Y - B	B - R	R - N	Y - N	B - N	Remark

ACDB & Meter Panel Testing - Single / Three Phase

	R - Y/ P-N	Y - B	B - R	R - N	Y - N	B - N	Remark
ACDB I/C (V)							
ACDB O/G (V)							
Meter Panel I/C							
Meter Panel O/G							

Earthing Pit Details: Nos. of Earth Pit: Nos.

	Earthing AC	Earthing DC	Earthing LA	Remark
Earth Test Value (Ohm)				

**(Signature of Engineer)
With Stamp**

ANNEXURE D – DECLARATION OF RELATIONSHIP WITH ANERT EMPLOYEE

(to be signed and submitted by the bidder along with the bid)

Tender Notification No.:

Expression of Interest for the selection of Vendors for the Design, Supply, Erection, Testing and Commissioning including 5 year's Warranty of Grid-Connected Rooftop Solar Plant of various capacities under the Phase-II of Grid Connected Rooftop Solar Scheme of MNRE for a cumulative capacity of 100 MW in the proposed Solar City area of Thiruvananthapuram Corporation, Kerala, India

To

The CEO
ANERT

Name of the ANERT employee with Designation:

Name of the bidder related to the employee:

This is to put on record that Shri/Smt
currently working as in ANERT is related
to, who is the bidder in the bid. We are aware of
the Anti-corruption policy of ANERT and will observe the highest standards during the
procurement and the execution of contract and shall refrain from corrupt, fraudulent,
collusive or coercive practices on competing for the contract.

Signature

Name

Date

ANNEXURE F – JOINT INSPECTION REPORT

This is to certify that a Grid Connected Solar PV Power Plant has been installed with following details:

1. Name of the beneficiary:
2. Address of installation with pin code:
3. Electricity consumer number:
4. Solar PV module capacity (DC): kWp
5. Inverter capacity (AC) (Nominal output power): kW
6. Date of installation:
7. Date of commissioning (after installation of net-meter):
8. Date of Joint inspection:
9. Metering arrangement: (Net meter/Gross meter/Net billing)

The above system is as per BIS/MNRE specifications and has been checked for its performance on and it is working satisfactorily.

	CONSUMER	EMPANELLED AGENCY	ANERT
Name			
Designation	NA		
Date			
Sign			
Seal	NA		

It is to certify that the above system has been purchased with following details:

1. Total project cost - _____
2. CFA amount - _____
3. Amount paid by beneficiary - _____

	CONSUMER	EMPANELLED AGENCY
Name		
Date		
Sign		
Seal	NA	

ANNEXURE G – DECLARATION REG ALMM LIST

*Reference Bidders' Declaration Format associated with Implementation of ALMM Order
(on the letter head of the bidder)*

Declaration

TO WHOMSOEVER THIS MAY CONCERN

Reference: (RFP no. and description)

1. We hereby declare that we are fully aware of the binding provisions of the ALMM order and the Lists thereunder, while quoting the rate in the tender no. [*tender number*] floated by [name if tendering authority]
2. We understand that the List - I (Solar PV Modules) of ALMM Order, Annexure - I of the OM, issued by MNRE on 10th March 2021 will be updated by MNRE from time to time. We also understand that the Modules to be procured for this project, shall be from the List - I of the ALMM order applicable on the date of invoicing of such modules.
3. We further understand and accept that we shall be liable for penal action, including but not limited to blacklisting and invocation of Performance Bank Guarantee, if we are found not complying with the provisions of ALMM Order, including those mentioned above.

Name:

Designation:

Organization:

Date:

(Signature and Stamp)

ANNEXURE H – DECLARATION REGARDING DCR

Undertaking/Self- Declaration for domestic content requirement fulfilment

(On a plain Paper)

This is to certify that M/S.....[Company Name] has installedKW [Capacity] Grid Connected Rooftop Solar PV Power Plant for..... [Consumer Name] at [Address] under sanction numberdated[sanction date] issued byANERT.

It is hereby undertaken that the PV modules installed for the above-mentioned project are domestically manufactured using domestic manufactured solar cells. The details of installed PV Modules are follows:

1. PV Module Capacity:
2. Number of PV Modules:
3. Sr No of PV Module
4. PV Module Make:
5. Purchase Order Number:
6. Purchase Order Date:
7. Cell manufacturer's name
8. Cell GST invoice No

The above undertaking is based on the certificate issued by PV Module manufacturer/supplier while supplying the above-mentioned order.

I,on behalf of M/S.....
[Company Name] further declare that the information given above is true and correct and

nothing has been concealed therein. If anything is found incorrect at any stage then the due Central Financial Assistance (CFA) that I have not charged from the consumer can be withheld and appropriate criminal action may be taken against me and my company, as per law, for wrong declaration. Supporting documents and proof of the above information will be provided as and when requested by MNRE/state implementing agency.

(Signature With official Seal)

For M/S

Name

Designation.....

Phone.....

Email.....

ANNEXURE I – AGREEMENT B/W VENDOR AND BENEFICIARY

Agreement between Vendor and beneficiary for additional cost

This agreement is signed between two parties i.e., M/s (Name of Vendor) registered at address, who is an empanelled vendors in the tender floated by ANERT for implementation of Grid Connected Rooftop Solar (GCRTS) PV projects in the Solar City of Thiruvananthapuram, hereby referred to in as the 'Vendor' or 'first party' AND (Name of Consumer, residing at.....), hereby referred to in as the 'customer' or 'second party'.

Both the parties mentioned above, by mutual consent, are entering into an agreement for installation of grid connected rooftop solar project under Phase-II of grid connected rooftop solar programme of MNRE, being implemented by ANERT in the Solar City of Thiruvananthapuram in Kerala. The second party has satisfied itself that the first party is an empanelled vendor in the tender floated by ANERT and rooftop solar project of kW capacity will be installed by first party at the residence of second party, under the tender floated by ANERT.

Both the parties referred above, do hereby declare that they are aware of the fact that the L1 price discovered in the tender floated by ANERT is Rs./kW. However, the second party has agreed to pay additional cost to the first party for desired customization in the project which is in the form of (mention the customizations). Due to these customizations, the per KW cost of the rooftop project comes out to be (Rs.).

The first party hereby declares that the invoice raised to the second party for amount mentioned above, is on actual basis after taking into account the cost of any customization and no other extra/hidden charges are being charged to the second party. The second party hereby declares that they are aware of the provisions of the scheme and do hereby consent to pay the additional cost of customization to the first party for the desired customizations. MNRE and the implementing agency shall not be, in any case, be held responsible for any dispute arising out of these agreement/financial transactions.

This agreement is entered into day of the month of in year 2023

FOR FIRST PARTY (NAME OF COMPANY)

FOR SECOND PARTY (NAME OF CONSUMER)

ANNEXURE J – CERTIFICATIONS & STANDARDS

QUALITY CERTIFICATION, STANDARDS AND TESTING FOR GRID-CONNECTED SOLAR PV POWER PLANTS

Solar PV Modules/Panels	
IEC 61215	<i>Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules</i>
IS 14286	<i>Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules</i>
IEC 61646	<i>Design Qualification and Type Approval for Thin-Film Terrestrial Photovoltaic (PV) Modules</i>
IS 16077	<i>Design Qualification and Type Approval for Thin-Film Terrestrial Photovoltaic (PV) Modules</i>
IEC 62108	<i>Design Qualification and Type Approval for Concentrator Photovoltaic (CPV) Modules and Assemblies</i>
IEC 61701	<i>Salt Mist Corrosion Testing of Photovoltaic (PV) Modules</i>
IEC 61725	<i>Analytical expression for Daily Solar Profiles</i>
IEC 61853-1	<i>Photovoltaic (PV) Module performance testing and energy rating Part-1: Irradiance and temperature performance measurements, and power rating</i>
IS 16170: Part 1	<i>Photovoltaic (PV) Module performance testing and energy rating Part-1: Irradiance and temperature performance measurements, and energy rating</i>
IEC 62716	<i>Photovoltaic (PV) Modules - Ammonia (NH₃) Corrosion Testing</i>
IEC 60721-2-1	<i>Classification of environmental conditions - Part 2-1 : Environmental conditions appearing in nature - Temperature and humidity</i>
IEC 61730-1	<i>Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements for Construction</i>
IEC 61730-2	<i>Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements for Testing</i>
IEC 60904-2	<i>Photovoltaic devices - Part 2: Requirements for photovoltaic reference devices (STC Performance, 1-V)</i>
IEC 60891	<i>Photovoltaic devices - Procedures for temperature and irradiance corrections to measured I-V characteristics (STC Performance)</i>
IEC TS 62548	<i>Photovoltaic (PV) Arrays - Design requirements</i>
IEC 61829	<i>Crystalline silicon photovoltaic (PV) array- on-site measurement of I-V characteristics</i>

Solar PV String Inverters/INVERTERS

IEC 62109-1, IEC 62109-2	<i>Safety of power converters for use in photovoltaic power systems- Part 1: General requirements, and Safety of power converters for use in photovoltaic power systems - part 2 : Particular requirements for inverters. Safety compliance (Protection degree IP 65 for outdoor mounting, IP 54 for indoor mounting)</i>
IEC/IS 61683	<i>Photovoltaic systems - Power conditioners: Procedure for measuring Efficiency (10%, 25%, 50%, 75% & 90-100% loading conditions)</i>
IEC 62093	<i>Balance-of-system components for photovoltaic systems – Design qualification natural environments for solar inverters (grid-connected)</i>
IEC 62116	<i>Utility-interconnected photovoltaic inverters- Test procedure of Islanding prevention measures Standard for Inverters, Converters, Controllers and</i>
UL1741	<i>interconnection system Equipment for use with Distributed Energy Resources</i>
IEEE 1547	<i>Standard for interconnecting Distributed Resources with Electric Power Systems</i>
IEEE 1547.1	<i>Standard for Conformance Test procedures for</i>
	<i>Equipment interconnecting Distributed Resources with Electric Power Systems</i>
IEC 60255-27	<i>Measuring relays and protection equipment - Part 27 : Product safety requirements</i>
IEC 60068-2 (1,2,14,27,30 & 64)	<i>Environmental Testing of PV System – Power Conditioners and Inverters IEC 60068 -2-1: Environmental testing - part 2-1: Tests - Test A: Cold IEC 60068 -2-2: Environmental testing - part 2-2: Tests - Test B: Dry heat IEC 60068 -2-14: Environmental testing - part 2-14: Tests - Test N: Change of temperature IEC 60068 -2-27: Environmental testing - part 2-27: Tests - Test Ea and guidance: shock IEC 60068 -2-30: Environmental testing - part 2-30: Tests - Test Db: Damp heat, cyclic (12h+12h cycle) IEC 60068 -2-64: Environmental testing - part 2-64: Tests - Test Fh : Vibration, broadband random and guidance</i>
IEC 61727	<i>Photovoltaic (PV) systems - characteristics of the utility interface (Parallel operation)</i>
CEA Guidelines / Regulations	<i>Technical standards for connectivity of the distributed Generation Resources at Voltage - level of below 33kV</i>
IEC 62103	<i>Electronic equipment for use in power installations</i>
BS EN 50438	<i>Requirements for micro-generating plants to be connected in parallel with public low-voltage distribution networks</i>

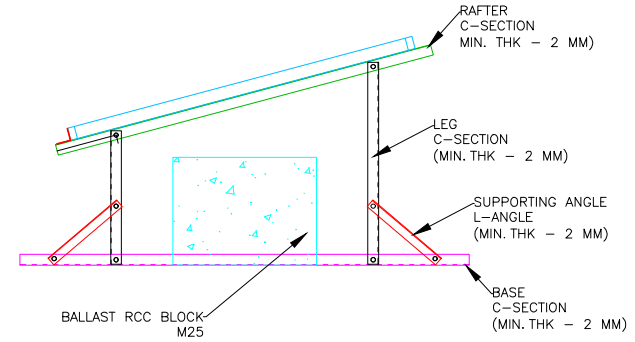
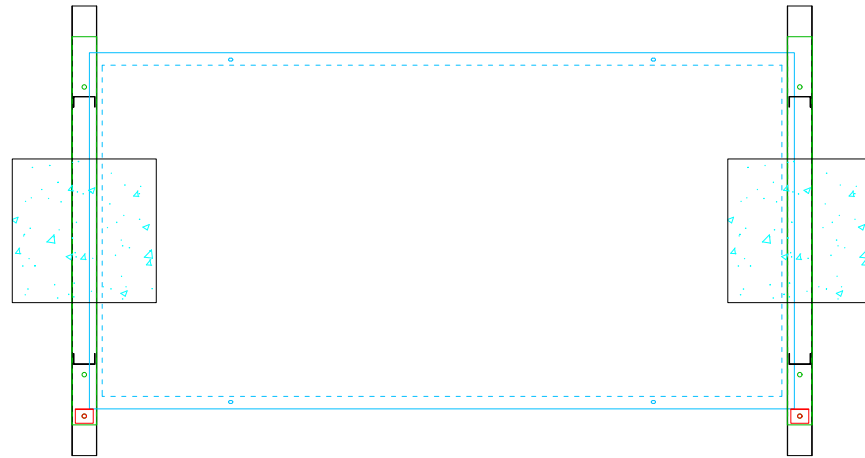
IEC 61000 Series	<i>Electromagnetic Interference (EMI), and Electromagnetic Compatibility (EMC) testing of PV inverters</i>
IEC61850	<i>Inverters with Reactive Power Control</i>
IEC 62124	<i>Photovoltaic (PV) Stand -alone systems- Design verification</i>
Fuses	
IS/IEC 60947 (Part 1,2 &3) EN 50521	<i>General safety requirements for connectors, switches, circuit breakers (AC/DC) Low-voltage switchgear and Control-gear, Part-1: General rules Low-voltage switchgear and Control-gear, Part-2: Circuit Breakers Low-voltage switchgear and Control-gear, Part-3: Switches, disconnectors, switch-disconnectors and fuse- combination units EN. 50521: Connectors for photovoltaic systems - Safety requirement</i>
Surge Arrestors	
IEC 60364-5-53	<i>DC surge protection device (SPD), class 2</i>
IEC 60364-5-53	<i>AC surge protection device (SPD), class 2</i>
IEC 60364-5-53	<i>Electrical installations of buildings-Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control</i>
IEC 61643-11:2011	<i>Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods</i>
IS 15086-5	<i>Surge Arresters, Part 5: Selection and Application Recommendations</i>
IEC 62305-4	<i>Lightening Protection Standard</i>
Cables	
IEC 60227/IS 694, IEC 60502/IS 1554 (Part 1 & 2)	<i>General test and measuring method for PVC (Polyvinyl chloride) insulated cables (for working voltage up to and including 1100V, and UV resistant for outdoor installation)</i>
BS EN 50618	<i>Electric cables for photovoltaic systems (BT(DE/NOT)258), mainly for DC Cables</i>
Earthing and Lightning	
IS 3043-1986	<i>Earthing shall be done in accordance with iS-3043-1986, provided that earthing conductors shall have a minimum size of 6.0 mm² copper, 10 mm² aluminum or 70mm² hot dip galvanized steel</i>
IEC 60364-5-53	<i>The SPDs earthing terminal shall be connected to earth through the above-mentioned dedicated earthing system; The SPDs shall be of type 2 as per IEC 60364-5-53</i>

IS 3043	<i>Code of practice for earthing (ETD 20: Electrical Installation)</i>
IEC 62561 Series	<i>IEC 62561-1 - Lightning protection system components (LPSC)- Part 1: Requirements for connection components IEC 62561-2 - Lightning protection system components (LPSC)- Part 2: Requirements for conductors and earth electrodes IEC 62561-7 - Lightning protection system components (LPSC)- Part 2: Requirements for earthing enhancing compounds</i>
Junction Boxes	
IEC 60529	<i>Junction boxes and solar panel terminal boxes shall be of the thermo plastic type with IP 65 protection for outdoor use, and IP 54 protection for indoor use</i>
IE 62208, IP 54 as per IEC 529	<i>General requirements for junction boxes, charge controllers</i>
CEA Regulations	<i>Energy Meter Installation and operation of Energy Meters Regulations 2006, and as amended in 2010 & 2014</i>
IS 13779	<i>AC Static watt-hour Meters Class 1 and 2 - specification</i>
IS 14697	<i>AC Static Transformer Operated Watt-hour and Var- hour Meters, Class 0.2 S and 0.5 S - specification</i>
IS 15884	<i>Alternating Current Direct connected static Prepayment Meters for Active Energy (Class 1 and 2) - Specification</i>
IS 15959	<i>Data exchange for electricity meter reading, tariff and load control-companion specification</i>
IS 16444	<i>AC Static direct connected watt-hour Smart Meter Class 1 and 2 specifications (with Import & Export/Net energy measurements)</i>
System Performance Monitoring	
IS/IEC 61724	<i>Guidelines for PV System Performance Monitoring- measurement, Data Exchange, and Analysis</i>
Rooftop PV System/Power Plant inspection	
IEC 62446	<i>Grid connected Solar PV Systems-Minimum requirements for system Documentation, Commissioning Tests, and Inspection</i>
IEC 61557-1	<i>Electrical Safety in low voltage distribution systems up to 1000 V AC. and 1500 V DC - Equipment for testing, measuring or monitoring of protective measures – Part 1: General requirements</i>
IEC 60364-6	<i>Low-voltage electrical installations - part 6: Verification</i>
IEC 61829	<i>Crystalline silicon photovoltaic (PV) array- on-site measurement of I-V characteristics</i>

Solar PV Roof Mounting Structure	
IS 2062/IS 4759	Material for the structure mounting

ANNEXURE K – MODULE STRUCTURE TYPES

BALLAST TYPE STRUCTURE



BALLAST STRUCTURE

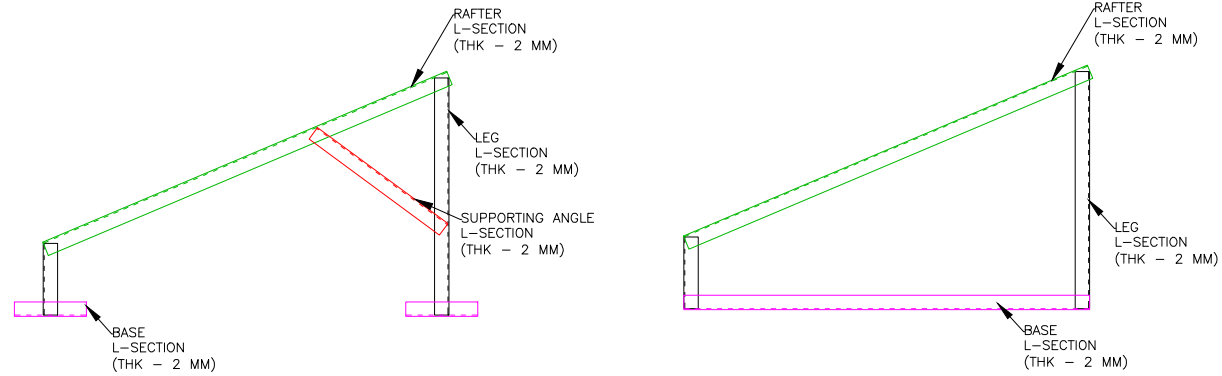
PART NAME	SECTION	DESCRIPTION
BASE	C-SECTION	MIN. THK - 2 MM
FRONT LEG	C-SECTION	MIN. THK - 2 MM
BACK LEG	C-SECTION	MIN. THK - 2 MM
RAFTER	C-SECTION	MIN. THK - 2 MM
SUPPORTING ANGLE	-	MIN. THK - 2 MM

IDENTIFICATION MARKING






PART NAME	SECTION VIEW	SECTION SPECS.
BASE		MIN. THK - 2 MM
LEG		MIN. THK - 2 MM
RAFTER		MIN. THK - 2 MM
SUPPORTING ANGLE		MIN. THK - 2 MM
BALLAST RCC BLOCK		M25
MODULE		AS PER SUPPLIER

Note:-All dimensions are in mm.

TINSHED TYPE STRUCTURE

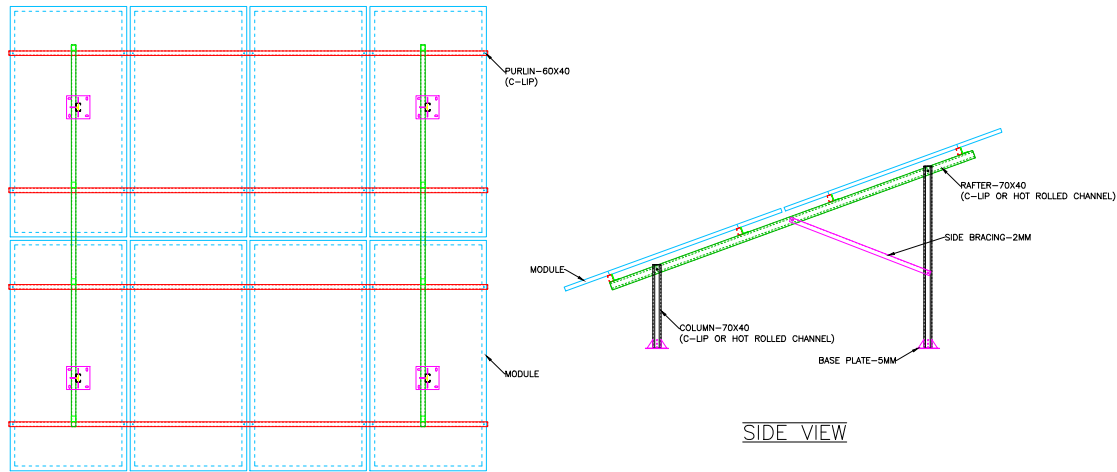


TINSHED STRUCTURE		
PART NAME	SECTION	DESCRIPTION
BASE	L-SECTION	MIN. THK - 2 MM
FRONT LEG	L-SECTION	MIN. THK - 2 MM
BACK LEG	L-SECTION	MIN. THK - 2 MM
RAFTER	L-SECTION	MIN. THK - 2 MM
SUPPORTING ANGLE	L-SECTION	MIN. THK - 2 MM

IDENTIFICATION MARKING		
PART NAME	SECTION VIEW	SECTION SPECS.
BASE		MIN. THK - 2 MM
LEG		MIN. THK - 2 MM
RAFTER		MIN. THK - 2 MM
SUPPORTING ANGLE		MIN. THK - 2 MM
MODULE		AS PER SUPPLIER

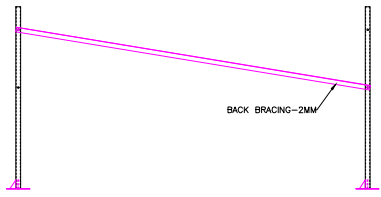
Note:-All dimensions are in mm.

SOLAR ROOFTOP STRUCTURE
MINIMUM GROUND CLEARANCE
(300 – 1000 MM)

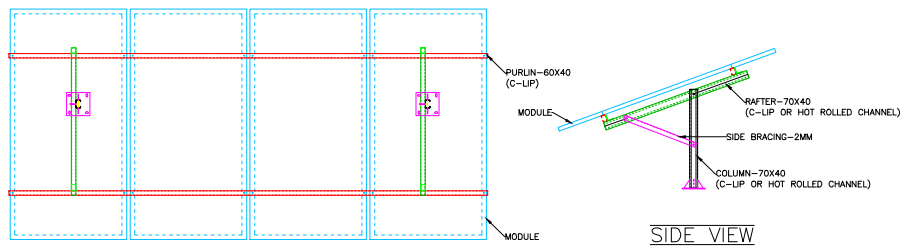


SIDE VIEW

TOP VIEW



BACK VIEW



SIDE VIEW

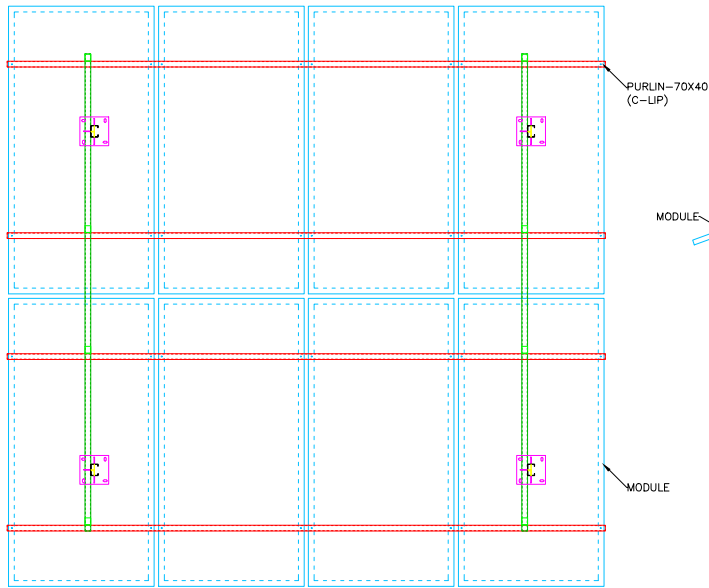
TOP VIEW

MINIMUM GROUND CLEARANCE (300-1000 MM)		
PART NAME	SECTION	DESCRIPTION
BASE PLATE	-	MIN. THK - 5 MM
COLUMN	70x40 (MIN. THK - 2 MM)	C-LIP OR HOT ROLLED CHANNEL
RAFTER	70x40 (MIN. THK - 2 MM)	C-LIP OR HOT ROLLED CHANNEL
SIDE/BACK BRACING	-	MIN. THK - 2 MM
PURLIN	60x40 (MIN. THK - 2 MM)	C-LIP

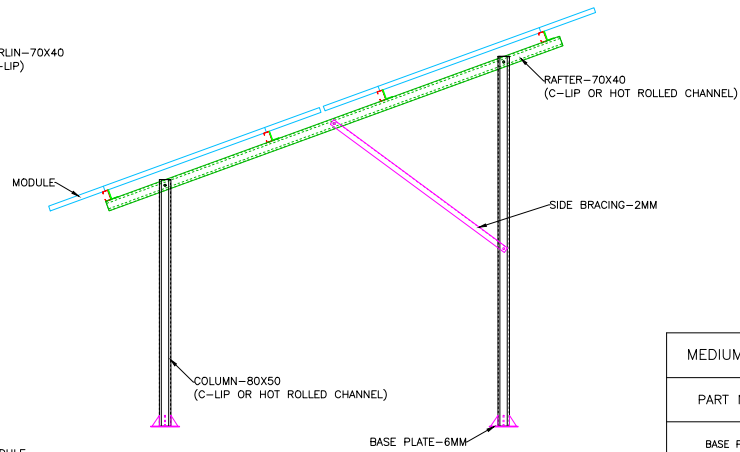
IDENTIFICATION MARKING		
PART NAME	SECTION VIEW	SECTION SPECS.
BASE PLATE		MIN. THK - 5 MM
COLUMN		C-LIP OR HOT ROLLED CHANNEL
RAFTER		C-LIP OR HOT ROLLED CHANNEL
SIDE/BACK BRACING		MIN. THK - 2 MM
PURLIN		C-LIP
MODULE		AS PER SUPPLIER

Note:-All dimensions are in mm.

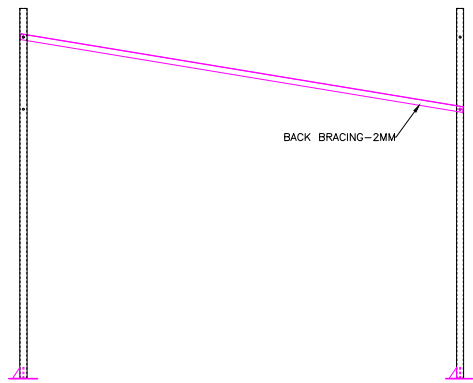
SOLAR ROOFTOP STRUCTURE
 MEDIUM GROUND CLEARANCE
 (1000 – 2000 MM)



TOP VIEW



SIDE VIEW



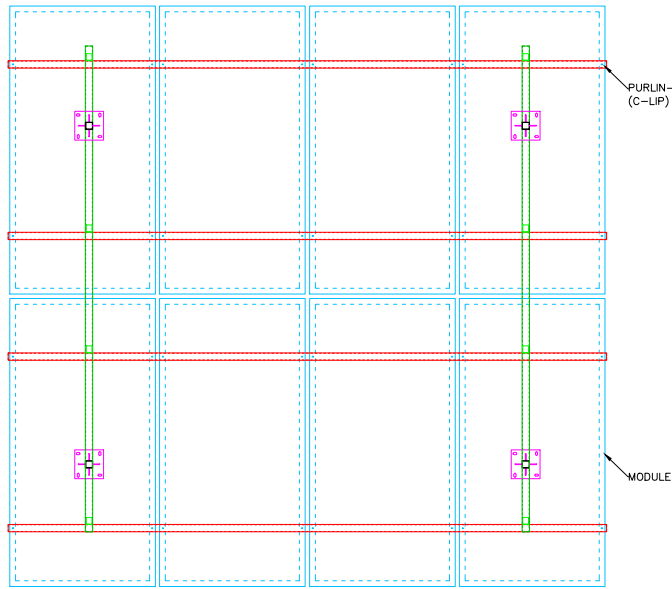
BACK VIEW

MEDIUM GROUND CLEARANCE (1000-2000 MM)		
PART NAME	SECTION	DESCRIPTION
BASE PLATE	-	MIN. THK - 6 MM
COLUMN	80X50 (MIN. THK - 2 MM)	C-LIP OR HOT ROLLED CHANNEL
RAFTER	70X40 (MIN. THK - 2 MM)	C-LIP OR HOT ROLLED CHANNEL
SIDE/BACK BRACING	-	MIN. THK - 2 MM
PURLIN	70X40 (MIN. THK - 2 MM)	C-LIP

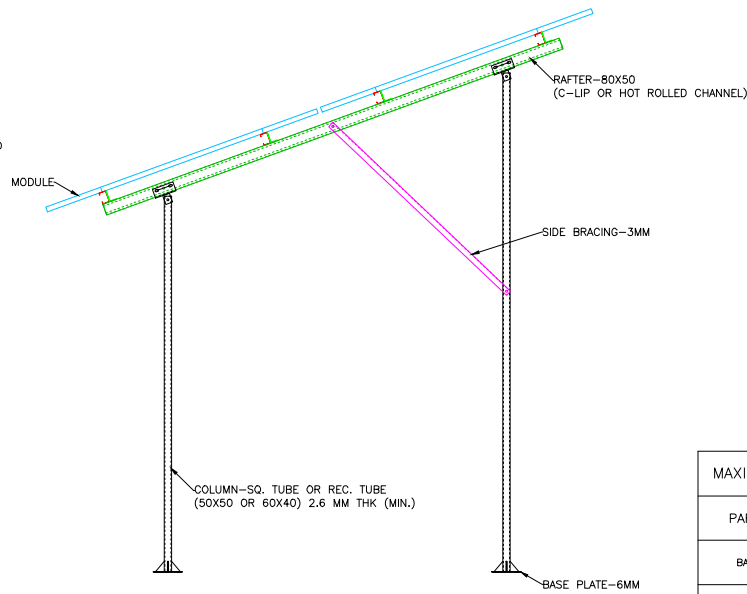
IDENTIFICATION MARKING		
PART NAME	SECTION VIEW	SECTION SPECS.
BASE PLATE		MIN. THK - 6 MM
COLUMN		C-LIP OR HOT ROLLED CHANNEL
RAFTER		C-LIP OR HOT ROLLED CHANNEL
SIDE/BACK BRACING		MIN. THK - 2 MM
PURLIN		C-LIP
MODULE		AS PER SUPPLIER

Note:-All dimensions are in mm.

SOLAR ROOFTOP STRUCTURE
MAXIMUM GROUND CLEARANCE
(2000 – 3000 MM)

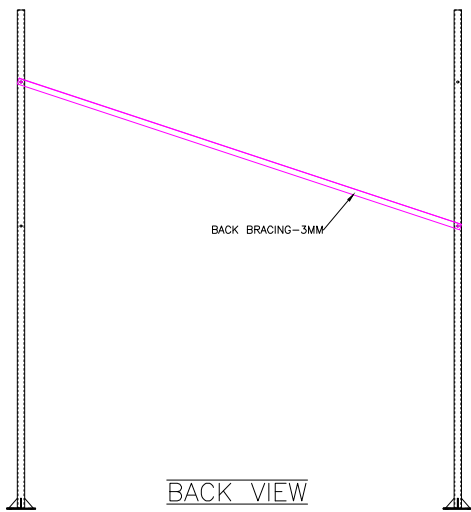


TOP VIEW



SIDE VIEW

MAXIMUM GROUND CLEARANCE (2000-3000 MM)		
PART NAME	SECTION	DESCRIPTION
BASE PLATE	-	MIN. THK - 6 MM
COLUMN	50X50 OR 60X40 (MIN. THK - 2.6 MM)	SQ. OR REC. TUBE
RAFTER	80X50 (MIN. THK - 2 MM)	C-LIP OR HOT ROLLED CHANNEL
SIDE/BACK BRACING	-	MIN. THK - 3 MM
PURLIN	80X50 (MIN. THK - 2 MM)	C-LIP

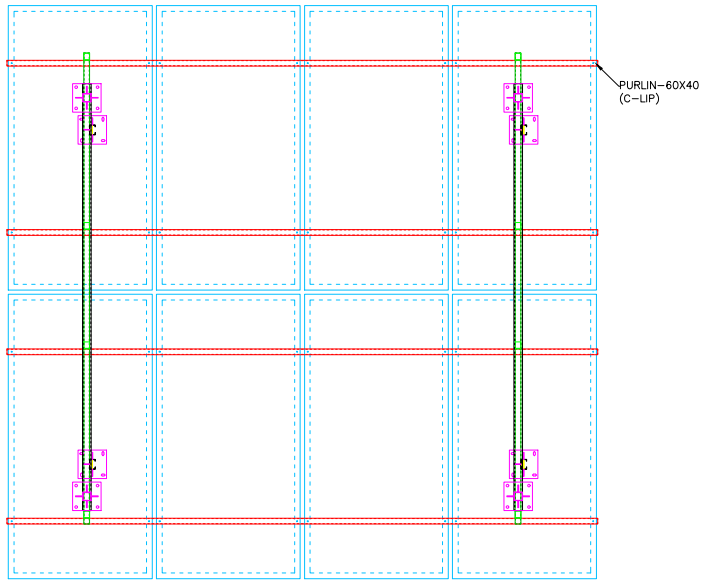


BACK VIEW

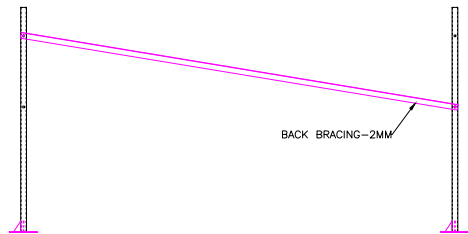
IDENTIFICATION MARKING		
PART NAME	SECTION VIEW	SECTION SPECS.
BASE PLATE		MIN. THK - 6 MM
COLUMN		SQ. OR REC. TUBE
RAFTER		C-LIP OR HOT ROLLED CHANNEL
SIDE/BACK BRACING		MIN. THK - 3 MM
PURLIN		C-LIP
MODULE		AS PER SUPPLIER

Note:-All dimensions are in mm.

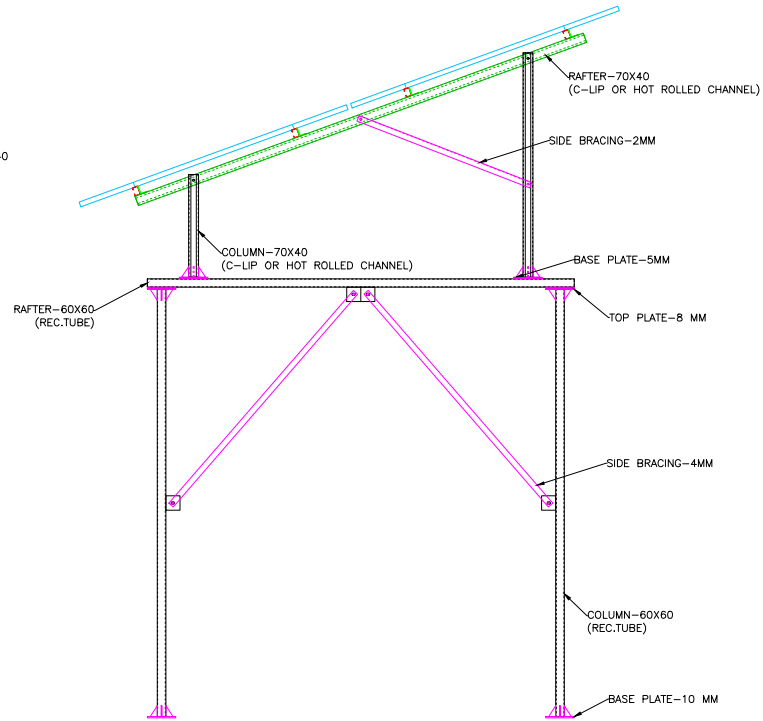
SOLAR ROOFTOP STRUCTURE
SUPER STRUCTURE
(MORE THAN 3000 MM)



TOP VIEW



BACK VIEW



SIDE VIEW

SUPER STRUCTURE (MORE THAN 3000 MM)		
PART NAME	SECTION	DESCRIPTION
BASE PLATE	-	MIN. THK - 10 MM
BASE COLUMN	60X60 OR 80X40 (MIN. THK - 2.9 MM)	SQ. TUBE OR REC. TUBE
BASE RAFTER	60X60 OR 80X40 (MIN. THK - 2.9 MM)	SQ. TUBE OR REC. TUBE
CROSS BRACING	-	MIN. THK - 4 MM
UPPER COLUMN	70X40 (MIN. THK - 2 MM)	C-LIP OR HOT ROLLED CHANNEL
UPPER RAFTER	70X40 (MIN. THK - 2 MM)	C-LIP OR HOT ROLLED CHANNEL
SIDE/BACK BRACING	-	MIN. THK - 2 MM
PURLIN	60X40 (MIN. THK - 2 MM)	C-LIP

IDENTIFICATION MARKING		
PART NAME	SECTION VIEW	SECTION SPECS.
BASE PLATE		MIN. THK - 10 MM
BASE COLUMN		SQ. OR REC. TUBE
BASE RAFTER		SQ. OR REC. TUBE
CROSS BRACING		MIN. THK - 4 MM
UPPER COLUMN		C-LIP OR HOT ROLLED CHANNEL
UPPER RAFTER		C-LIP OR HOT ROLLED CHANNEL
SIDE/BACK BRACING		MIN. THK - 2 MM
PURLIN		C-LIP
MODULE		AS PER SUPPLIER

Note:-All dimensions are in mm.