राष्ट्रीय पवन ऊर्जा संस्थान
(नवीन और नवीकरणीय ऊर्जा मंत्रालय के अधीनस्वायत्त अनुसंधान एवं विकास संस्थान, भारत सरकार(
NATIONAL INSTITUTE OF WIND ENERGY
(An Autonomous R&D Institution under the Ministry of New and Renewable Energy, Government of India)
(पूर्वमें "पवन ऊर्जा प्रौद्योगिकी केंद्र" Formerly "Centre for Wind Energy Technology")
वेलचेरी ताम्बरम प्रमुखमार्ग,पल्लिकरणई,चेन्नै100 600 -,तमिलनाडु, भारत
Velachery – Tambaram Main Road, Pallikaranai, Chennai - 600 100, Tamil Nadu, INDIA
Tel No. 044-22463982/83/84, 29001162 / 67 / 95 , Fax No. +91-44-2246 3980,
E-mail : purchase.niwe@nic.in **website:** www.niwe.res.in

NIT NO: **NIWE/PUR/3/391/19** **DATE: 13.01.2022**

E-Tender for Design, Engineering Supply, Construction, Erection, Testing, Commissioning, Grid synchronization of Hybrid **Roof-Top** 100 kW(AC) Mono crystalline (PERC) Solar PV Power Plant at NIWE, Chennai, Tamil Nadu.

1.0	**Description & Brief Scope of the work**	Design, Engineering, Supply, Construction, Erection , Testing , Commissioning, Grid synchronization of Hybrid **Roof-Top** 100 kW(AC) Mono crystalline (PERC) Solar PV Power Plant at NIWE, Chennai, Tamil Nadu with 5 years of Comprehensive O&M, Warranty, Insurance and O&M from the date of commissioning	
2.0	**Content of Tender Documents**	NIWE invites Open E-tender from Indian Suppliers/ Manufacturers/ Authorized Indian Agents if any for the aforesaid as per general guidelines mentioned at Forms and Annexure. **General Purchase Conditions (GPC)** **Special Purchase Conditions (SPC)** **Technical Specifications** **Bid Price Schedule (BPS)**	
3.0	**Important Details**	Tender Mode	**E-Procurement**
		Tender Issue date	**13/01/2022**
		Pre-bid Meeting Date & Time	**20/01/2022 11:00 AM (Through Video-Conferencing for which, link shall be provided later)**
		Tender Closing Date and Time	**04/02/2022 03:30 PM**
		Tender Opening Date and Time	**05/02/2022 03:30 PM**
4.0	**Earnest Money Deposit**	Bidders are required to submit Bid securing declaration as per Annexure 4. The scanned copy of Bid securing declaration shall be uploaded along with the bid document. By signing the bid security declaration, bidders are accepting that if they withdraw or modify their bids during the bid validity period, they will be suspended for a period of one year as specified in Annexure 4. For unsuccessful bidders, the bid securing declaration shall cease to be valid upon receipt of the notification of the successful bidder in the CPP-Portal or thirty days after the expiration of validity of this bid, whichever is earlier.	

5.0	**Important Information To Bidder**	
	5.1	Issuance of bidding documents to any bidder shall not be construed that such bidder is considered to be qualified.
	5.2	Responses submitted by Bidders who do not meet the qualifying requirements in the General Purchase Conditions or incomplete bids will be rejected.
	5.3	NIWE reserves the right to verify any claims made by Bidders and to carry out a capability assessment. The decision of NIWE shall be final in this regard.
	5.4	NIWE also reserves the right to accept any proposal or to reject all proposals at any time prior to any short-listing, award or contract without incurring any liability or without any obligation to inform the affected party of the grounds for such decision.
	5.5	The proposals will be opened on the Date &Time mentioned in the documents.

6.0	**ADDRESS FOR COMMUNICATION**
	Division Head(F&A), National Institute of Wind Energy, Velachery – Tambaram Main Road, Pallikaranai, Chennai 600100. Phone: EPABX: 91-44-22463982 / 83 / 84 /29001162 / 67 / 95. Fax: 91-44-2246-3980, Email: directorfa.niwe@gov.in, purchase.niwe@nic.in

Any amendment to the Tender will be published only in the CPP Portal and NIWE Website: http://niwe.res.in.

It is the bidders' responsibility to visit the CPP Portal and NIWE website frequently to know about the latest updates / amendments / corrigendum / addendum / clarifications if any.

Division Head (F&A)

BID PREPARATION AND TENDER SUBMISSION PROCEDURE

A. Bidders should do the registration in the Central Public Procurement Portal (CPP-Portal) **http://eprocure.gov.in/eprocure/app** using the option available (online bidder enrolment). The portal enrolment is free of cost. Bidders are advised to go through the instructions/information provided at **Help for Contractors, Information about DSC, FAQ, and Bidders Manual Kit** on Portal's homepage. The Digital Signature registration has to be done with the e-token, after logging into the site.

B. For any technical related queries regarding online registration please call the Helpdesk. The 24 x 7 Help Desk Number **0120-4200462, 0120-4001002** Mobile : **+91 8826246593** and E-Mail : **support-eproc@nic.in****Note**- Bidders are requested to kindly mention the URL of the Portal and Tender Id in the subject while emailing any issue along with the Contact details.

C. For any policy related matter / clarifications kindly contact **cppp-doe@nic.in** managed by Department of Expenditure, Ministry of Finance.

D. For any issues / clarifications relating to the tender(s) published kindly contact the respective Tender Inviting Authority (NIWE).

E. The Tender Inviting Authority (TIA) will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the bidders.

F. Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender schedule and they should be in **.pdf /.xls /.jpeg /.rar** formats only.

G. After the bid submission, (the bid token number) given by the e-tendering system should be printed by the bidder and kept as a record of evidence for online submission of bid for the particular tender.

H. Bidders should ensure that prices should not be indicated anywhere in the unpriced part. The prices should be indicated only in the price bid and nowhere else.

I. The prospective Bidders should register themselves in the CPPP Portal and submit the Bids electronically through the CPPP portal. The paper based physical Tender submission is not permitted. Bids submitted/received through any other mode other than NIC-CPP portal shall summarily be rejected.

J. Bidders are requested to register for future tenders in Government e-Market Place (GeM), a dedicated digital e-commerce platform. Therefore, it is urged that bidders who are not part of GeM shall kindly be registered in GeM for all Goods and Services which they are providing to have any further business with this Organization. Suppliers can register in GeM as a Seller by accessing the portal www.gem.gov.in

I. GENERAL PURCHASE CONDITIONS (GPC)

1. INTRODUCTION

National Institute of Wind Energy (NIWE), an autonomous R&D institution of MNRE, Govt. of India intends for Supply, Installation, Commissioning and trial run of 100kWp Micro-grid solar photovoltaic power plant (on roof-top) at the premises of NIWE, Chennai " with 5 years of warranty, Comprehensive O&M , Insurance from the date of commissioning

2. GENERAL INFORMATION

The Indian Manufacturers / Their Authorized Agents if any / Indian Agents of Foreign Manufacturers if any / are invited to submit a "Technical Proposal" and "Price proposal". Methodology for submission of proposal has been detailed hereunder in this document.

3. DEFINITIONS

Unless the context otherwise requires, the following terms whenever used in this Contract have the following meanings:

1. OWNERS / BUYER / EMPLOYER shall mean NIWE.
2. Supplier/Contractor wherever mentioned in the tender document shall mean the
3. Successful Bidder.
4. "Similar Supply/Works/Installation" wherever mentioned shall mean Supply, Installation, Commissioning, Testing and Trial run of 100 kWp Micro-grid Solar Photovoltaic Power Plant (on roof-top of NIWE building)
5. "Applicable Law" - This Contract including all matters connected with this Contract shall be governed and construed in accordance with the Indian Law both substantive and procedural and shall be subject to the exclusive jurisdiction of Indian courts at Chennai (India).
6. "Contract" means the Contract signed by the parties, to which these General Purchase Conditions (GPC) are attached together with all the documents listed in such signed Contract.
7. "Contract Price" means the price to be paid for the performance of the Services, in accordance with the payment terms, subject to such additions and adjustments thereto or deductions there from, as may be made pursuant to the Contract.
8. "Government" means the Government of India.
9. "Local Currency" means the currency of the Government of India.
10. "Party" means the Owner or the Bidder, as the case may be, and "Parties" means both of them. "Personnel" means persons hired by the Bidder as employees and assigned to the performance of the Services or any part thereof.
11. "Services" means the work to be performed by the Bidder pursuant to this Contract, as described in the detailed Terms of Reference; and Law Governing the Contract
12. This Contract, its meaning and interpretation, and the relation between the Parties shall be governed by the Applicable Law.
13. Language: English shall be the binding and controlling language for all matters relating to the meaning or interpretation of this Contract.
14. Bill of Quantity (BOQ): means price bid / Financial Bid / Price bid with proposal.

4. BIDDING DOCUMENTS

I. General Purchase Conditions(GPC)

II. Special Purchase Conditions (SPC)

III. Project Description and Technical Specifications

Annexure 1 Technical specifications of 100 kWp Micro-grid solar photovoltaic power plant

Bid Form/ Annexure - 1 Technical and commercial bid submission form

Annexure 2 Manufacturer's Authorization

Annexure 3 Bid Securing Declaration form

Annexure 4 Proforma of Bank Guarantee for Contract Performance

Annexure 5 Bidder details

Annexure 6 Eligibility Criteria

Annexure 7 Price Bid/BOQ

Annexure 8 Documents to be uploaded

Annexure 9 Technical Compliance sheet

Annexure 10 Declaration

5. AMENDMENT OF BIDDING DOCUMENT

1. At any time prior to the deadline for submission of the Bids, the Owner may amend the Bidding Document by issuing Corrigendum.
2. Any Corrigendum/addendum issued shall be part of the Bidding Document and shall be published in the NIC-CPP portal and NIWE website.
3. To give prospective Bidders reasonable time in which to consider a Corrigendum/addendum in preparing their Bids, the Owner may, at its discretion, extend the deadline for the submission of the Bids.

6. PREPARATION OF BID PROPOSALS

1. Proposals shall be complete in all respect and shall be submitted with requisite information and Annexure. It shall be free from any ambiguity, cutting or overwriting. Any such correction must be initialed by the persons who sign the proposals.
2. For preparation of Proposals, Bidders are expected to examine the bidding documents in detail. Material deficiencies in providing the information requested may result in rejection of the proposal.
3. All pages of the bid, except for un-amended printed literature, shall be initialed by the person or persons signing the bid.
4. Indian agent on behalf of the Principal OEM and Principal OEM cannot bid simultaneously for the same item/product.
5. The same agent should not submit a bid on behalf of another Principal OEM in the same tender for the same item/product.

7. COST OF BIDDING

The Bidder shall bear all costs associated with the preparation and submission of its Bid, negotiation, discussion etc. and the Owner shall not be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.

8. LANGUAGE AND CURRENCY OF BID

- The Bid, as well as all correspondence and documents relating to the Bid exchanged by the Bidder and the Owner, shall be written in English. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of all the passages in English, in which case, for purposes of interpretation of the Bid, such translation shall govern. If not the tender document shall summarily be rejected.
- The Currency of the bid shall invariably in Indian Rupees. The bid is of Indigenous in nature and hence any other currency other than INR shall not be accepted and will be rejected summarily.

9. VALIDITY OF OFFER

The proposals shall remain valid for a period of 120 **DAYS** from the date of opening of Bid. The procurement may be made in a phased manner within a period of one year from the date of Purchase Order, if the exigencies so require. In exceptional circumstances the Owner may solicit the Bidder's consent for extension of the bid validity period. When the validity period is extended by the Bidder, the same shall be done without any modification to the bid proposal by the Bidder. The rates offered should be firm and will not be increased at any time by the bidder.

10. BID SECURING DECLARATION

By signing the bid security declaration, bidders are accepting that if they withdraw or modify their bids during the bid validity period, they will be suspended for a period of one year as specified in Annexure 4. The terms and conditions in the Declaration submitted by the bidder in lieu of EMD shall be imposed/effective in the following scenarios:

1. If the Bidder withdraws or varies its Bid during the period of Bid validity specified by the Bidder in the Bid Proposal.
2. If the Bidder does not accept the correction of its Bid Price pursuant to clause 19.0 of GPC.
3. If the Bidder does not withdraw any deviation listed in prescribed Deviation Schedule of BPS at the cost of withdrawal indicated by him.
4. If the Bidder refuses to withdraw, without any cost to the Owner, any deviation not listed in prescribed Deviation Schedules of BPS but found elsewhere in the Bid.
5. In the case of a successful bidder, if the bidder fails within the specified time limit to furnish the acceptance of Letter of Award/Purchase Order.
6. In the case of successful Bidder, if the Bidder fails, within the time limit, to furnish the required Contract Performance Guarantee/Security Deposit.

11. VALIDITY OF BID SECURING DECLARATION

For unsuccessful bidders, the bid securing declaration shall cease to be valid upon receipt of the notification of the successful bidder in the CPP-Portal or thirty days after the expiration of validity of this bid, whichever is earlier.

12. INELIGIBILITY FOR FUTURE TENDERS

Notwithstanding the provisions regarding forfeiture of Bid Security specified above, if a bidder after having been issued the Letter of Award/Purchase, either does not accept the order/Letter of award or does not sign the Contract Agreement or does not submit an acceptable Performance Security and which results in tender being annulled then such bidder shall be treated ineligible for participation in future tenders.

13. DOCUMENTS FOR QUALIFYING REQUIREMENTS

The bidder shall furnish documentary evidence in support of meeting the following Qualifying Requirements:

- The bidder should be a reputed manufacturer/ supplier /dealer with minimum 5 years of experience as on 31/12/2021.
- The average annual turnover of the bidder in the preceding three (3) financial years as on bid opening date shall not be less than 25 lakhs (Scanned Copy of Certificate to be uploaded).
- The bidder should have the completed projects related to Supply, Installation and commissioning of Micro-Grid solar photovoltaic power plant in the last five years which should meet either one of the following:

  a. Three similar completed projects / works, each costing not less than 30 lakhs

  (or)

  b. Two similar completed projects / works, each costing not less than 40 lakhs

  (or)

  c. One similar completed project / work costing not less than 60 lakhs.

- The bidders should have completed at least 5 projects in the area of Supply, Installation and commissioning of Micro-Grid solar photovoltaic power plant in the last 5 years ending in the last financial year. Any other requirements that are not specified herein, detailed in **Section III** of this tender document shall also form as a mandatory part of the qualifying requirements.
- **In pursuance to Rule 153 (iii) of GFR-2017, preference to ''Make in India'' shall be given in Procurement.** This tender document complies with the Public Procurement Policy (Make in India), 2017 as amended from time to time.
- Bidders registered with National Small Industries Corporation (NSIC) including Micro/Small/Medium Enterprises & Companies will be exempted from prior turn over requirements subject to meeting of quality & technical specifications.
- **However, Customer Feedback certificate for three (3) successful** Supply, Installation and commissioning of Micro-Grid solar photovoltaic power plant **is mandatory** for all suppliers irrespective of MSME/Suppliers registered with NSIC without which the bid shall summarily be rejected.
- Any Relaxation/Exemption on Eligibility criteria **given for NSIC/MSME shall be as per the Public Procurement Policy as entitled for MSME/NSIC by Government of India.**
- **In a tender, either the Indian agent on behalf of the Principal OEM or Principal OEM itself can bid but both cannot bid simultaneously for the same item/project in the same tender.**

- **If an agent submits bid on behalf of the Principal OEM, the same agent shall not submit a bid on behalf of another Principal OEM in the same tender for the same item/product.**

14. TECHNICAL PROPOSAL

1. To establish the conformity of the Goods and Related Services to the Bidding Document, the Bidder shall furnish as part of its Bid complete list of goods as given in the Price Bid without prices, the documentary evidence wherever applicable that the Goods and Related Services conform to the requirements specified.
2. Apart from the technical requirements as stipulated in the bid documents, data sheets etc. the documentary evidence may be in the form of literature, drawings or data, and shall consist of a detailed item-by-item description of the essential technical and performance characteristics of the Goods and Related Services, demonstrating substantial responsiveness of the Goods and Related Services to those requirements. If applicable, a statement of deviations and exceptions to the provisions of Technical specifications will be submitted by the bidder separately.

15. PRICE PROPOSAL

1. For preparation of the 'Price Proposal/ BOQ", Bidders are expected to take into account the requirements and conditions of the bidding documents. The Price Proposal shall be made in 'Bid Proposal', Annexure 8 of Bidding Documents.
2. The rate quoted by the bidder shall be inclusive of all provisions for incidental expenses necessary for proper execution and completion of the work in accordance with the terms & condition of the bidding document.
3. All prices to be quoted by the Bidders will be in Indian Rupees and/or any convertible foreign currency on firm price basis and to remain valid during the currency of the Contract.
4. Bidders shall necessarily submit the prices in the enclosed format for Bid Price Schedule only.
5. The total prices arrived at in the 'Price Bid', are to be entered in the 'BOQ'. These prices shall stand corrected as elaborated elsewhere in this document.

16. DEVIATIONS/EXCLUSIONS

Bidders should generally agree to all the terms and conditions of the bid documents. However, deviation / exception / assumption, if any should be stated separately shall be submitted along-with "Bid Proposal', failing which it would be presumed that all terms and conditions are acceptable to them. In case the bidder has taken any deviation, the bidder must indicate the cost of withdrawal of the same along with the bid.

17. EVALUATION OF BIDS

1. The Owner will determine whether the Proposals are substantially responsive to the Bidding Document and their proposal is complete. Material deficiencies in the proposal may render the proposal non-responsive and may lead to the rejection of the proposal.
2. To evaluate a Bid, NIWE shall only use all the criteria and methodologies defined in this document.
3. To evaluate a Bid, NIWE shall consider the following:

The bid price as quoted as per BOQ / Bid Price Schedule

a) Price adjustment due to discounts offered; and
b) Price adjustment due to application of the evaluation criteria.

4. The evaluation criteria specified in Special Purchase Conditions (SPC) shall over-ride all other similar related clauses appearing elsewhere in the bid documents.

18. DISCREPANCIES IN BID

In case of discrepancies in bids, the following will be adopted to correct the discrepancies for the purpose of evaluation.

1. In case of discrepancy between the original & copies of bid, the original bid will be considered as correct.
2. In case of discrepancy between unit price in figures and words, the unit price words will be considered as correct.
3. In case of discrepancy between unit price and total price, the unit price will be considered as correct.
4. In case of discrepancy between unit price and total price, which is obtained by multiplying the unit price and quantity, or between sub-totals and the total price, the unit or subtotal price shall prevail, and the total price shall be corrected accordingly.

19. CLARIFICATION OF BIDS

A prospective Bidder requiring any clarification of the Bidding Document shall seek clarifications through online. Should the Owner deem it necessary to amend the Bidding Document as a result of a clarification, it shall do so by amendment in the tender. During evaluation, the Owner may, at their discretion, ask any Bidder for a clarification of its Bid. The Owner's request for clarification and the response shall be in writing. No change in the prices or substance of the Bid shall be sought, offered or permitted. No clarification regarding Tender shall be entertained after the bid submission due date.

20. CONTACTING THE OWNER

1. Subject to GPC clause 19.0, no Bidder shall contact the Owner on any matter relating to its bid, from the time of the opening of Bids to the time the contract is awarded.
2. Any effort by a Bidder to influence the Owner in the Owner's bid evaluation, bid comparison or contract award decisions may result in rejection of the Bidder's bid.

21. OWNER'S RIGHT TO ACCEPT ANY BID, AND TO REJECT ANY OR ALL BIDS

The Owner reserves the right to accept or reject any Bid, and to annul the bidding process and reject all Bids at any time prior to Contract award, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder (s) of the grounds for the owner's action.

22. AWARD CRITERIA

The owner will award the contract to the successful Bidder whose bid has been determined to be substantially responsive and to be the lowest evaluated bid, further provided that the Bidder is determined to be qualified to perform the contract satisfactorily.

23. CONTRACT

1. The Owner shall send to the successful Bidder the Purchase Order/Letter of Award (LOA).
2. The contract shall come into effect from the date of issue of Letter of Award/Purchase Order.
3. Successful bidder on whom Contract/LOA/Purchase Order is placed shall hereafter be called Supplier.

24. SIGNING OF CONTRACT

For order value more than 10 lakhs initially a letter of Indent/PO will be sent from NIWE. Within one week, the successful bidder should send his acceptance of the LOI/PO. Upon the receipt of acceptance, a contract will be signed between NIWE and the successful bidder.

25. PROJECT COMPLETION SCHEDULE:

The Entire Project as mentioned in the Technical Specifications has to be completed within a period of **60 days** from the date of receipt of Purchase order.

Payment schedule: - As per clause 4.0 of Special Purchase Conditions.

26. CONTRACT PRICE

The Contract Price shall be as specified in the Purchase Order / LOA.

27. SCOPE OF SUPPLY

1. The Goods supplied shall be as specified in the technical specification and Price Schedule. The successful bidder shall supply all the Goods as per the Delivery Schedule that may be specified.
2. Unless otherwise stipulated in the Contract (Purchase Order / LOA), the Scope of Supply shall include all such items not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Delivery and Completion of the Goods and Related Services as if such items were expressly mentioned in the Contract.
3. The Successful bidder shall ensure that the Goods and Related Services comply with the technical specifications and other provisions of the Contract.
4. The Goods and Related Services supplied under this Contract shall conform to the standards mentioned in Technical Specifications and, when no applicable standard is mentioned, the standard shall be equivalent or superior to the official standards whose application is appropriate.

28. SECURITY DEPOSIT

Successful bidder on whom Contract/LOA/Purchase Order is placed shall hereafter be called Supplier.

1. Within thirty (30) days of the receipt of Purchase Order/Letter of Award from the Owner, the Supplier shall furnish Security Deposit in any form acceptable to the Owner for 10% value of the order including taxes and duties.

2. Failure of the supplier to submit the above-mentioned Security Deposit shall constitute sufficient grounds for the annulment of the award and forfeiture of the EMD.
3. Security Deposit may be submitted in any of the following forms:
   i) A crossed Demand Draft/ Bankers cheque drawn in favour of NIWE Payable at Chennai
   ii) An irrevocable Bank Guarantee as per the NIWE standard format from any nationalized bank / Scheduled Bank as acceptable to NIWE.
4. The validity of the Security Deposit in the form of Bank Guarantee shall be for an additional period of 3 months beyond the date of Project completion period as per clause 25.0 or actual date of delivery whichever is later.
5. The Security Deposit may be adjusted against Performance Bank Guarantee to be provided by the bidder as per Clause 4.0 of Special Purchase Conditions.

29. AUTHORISED REPRESENTATIVE

Any action required or permitted to be taken, and any document required or permitted to be executed, under the Contract by the Owner or the Bidder may be taken or executed by the officials authorized for the purpose.

30. INSURANCE

The Bidder will be responsible for taking out any appropriate insurance coverage up to the delivery location of the equipment/till successful handing over of the equipment to NIWE as mentioned in the Special Purchase Conditions at their own cost as may be required against all risks including theft/fire. The insurance coverage will be arranged by the successful bidder.

31. FREIGHT

The Bidder will be responsible for safe delivery of material to the location mentioned in the Special Purchase Conditions at their own cost. Therefore, the prices quoted must be inclusive of freight and insurance.

32. PACKING

The Bidder shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination, handling and storage. The Bidder will be responsible for any loss or damage during transportation, handling and storage due to improper packing. All packages should be marked with Contract no. and date. Each package must contain packing slip and literature, if any.

33. INSPECTION AND TESTS

- The Inspection shall be carried out by the technical experts of NIWE after the Installation and
  Commissioning of the Project as mentioned in the tender document.
- Wherever the Supply/Installation so completed is subject to testing, it shall be done as per the standards mentioned in the Technical specifications.

34. WARRANTY

a) The Supplier shall warrant that the Goods shall be free from defects arising from any act or omission of the Supplier or arising from design, materials, and workmanship, under normal use in the conditions.

b) The warranty shall remain valid for the period of **five (5) years**, from the date of commissioning, together with the requisite training to the personnel of NIWE.

c) If having been notified, the Supplier fails to remedy the defect; the Owner may proceed to take within a reasonable period such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Owner may have against the Supplier under the Contract.

d) Specific to this tender, a Defect liability clause has been provided in the Special Purchase conditions.

35. PATENTS

All royalties and fees for patents covering material/equipment or processes used in executing the work shall be to the account of the bidder. The supplier shall satisfy all demands that may be made at any time for such royalties and fees.

The Supplier shall hold harmless and indemnify the Owner from and against damage, loss and expenses arising from any claim for infringement of patent, copy right, design and other such rights in existence or to be granted on and application published prior to the completion of this engagement with respect to or arising out of the use or supply of design or any work in accordance with the specifications and plans furnished or recommended by the Contractor.

The Supplier shall promptly notify the Owner in writing if the Supplier has or has acquired knowledge of any patent under which claim or suit for infringement could reasonably be brought because of the use by the Owner of any information, recommendation or specifications, services rendered by the Contractor.

The Supplier, in such case, shall furnish at its own cost make and furnish to the owner alternative specifications or recommendations to avoid the same and without putting the owner to any additional cost.

36. INDEMNIFICATION

The Supplier shall, at its own expense, defend and indemnify the owner against all third part claims of infringement of Intellectual Property Rights, including patent, trade mark, copy right, trade secret or industrial design rules arising from use of the products or any part thereof.

The Supplier shall expeditiously extinguish any such claims and shall have full rights to defend itself there from. The Owner shall not pay any compensation to a third party resulting from such infringement and the Supplier shall be fully responsible for the same, including all expenses at the court and legal fees.

The Owner will give notice to the Supplier of any such claim without delay, shall provide reasonable assistance to the Contractor in disposing of the claim, and shall at no time admit any liability for or express any intent to settle the claim. Final payment to the Supplier by the

Owner will not be made while any such suit or claim remains unsettled.

37. REMOVAL OF REJECTED GOODS AND REPLACEMENT

1. If any delivery, whether inspected and approved earlier or otherwise, the material/equipment is not in conformity with the specifications, the same shall be rejected by the Owner or his duly authorized representative and notification to this effect will be issued to the Supplier normally within 30 days from the date of receipt of the material at site.
2. The supplier shall arrange for removal of the rejected/failure of item(s) during testing within 15 days from the date of notification. In the event, the supplier fails to lift the materials within the said 15 days, the Owner shall be at liberty to dispose of such rejected item(s) in any manner as he may think fit. All expenses shall be recoverable from the supplier or any sum due that may become payable to him.

38. MODIFICATION OF CONTRACT

Modification of the terms and conditions of the Contract, including any modification of the Scope of the Services or of the Contract price may only be made by written agreement between the Parties.

39. LIQUIDATED DAMAGES

The timely Completion of the Project work at the mentioned location in SPC including Commissioning and its related services is the essence of the contract. In the event of supplier's failure to complete the Work within the stipulated period of 60 days, the liquidated damages are payable by the Bidder @ 0.5% (one half of one percent) per week of delay or part thereof, of the Purchase order value. However, the total liability of the Bidder under this clause shall not exceed 5% of the Contract value as awarded.

40. FORCE MAJEURE

1. "Force Majeure" shall mean any event beyond the reasonable control of the Owner or the Supplier, as the case may be, and which is unavoidable notwithstanding the reasonable care of the party affected.
2. If either party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances there of within fourteen (14) days after the occurrence of such event.
3. The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered or delayed. The Time for Completion shall be extended by a reasonable time.
4. The party or parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect there of upon its or their performance of the Contract and to fulfil its or their obligations under the Contract, but without prejudice to either parties' right to terminate the contract.

5. No delay or non-performance by either party hereto caused by the occurrence of any event of Force Majeure shall
   i. Constitutes a default or breach of the Contract.
   ii. Give rise to any claim for damages or additional cost or expense occasioned there by if and to the extent that such delay or non-performance is caused by the occurrence of an event of Force Majeure.
6. If the performance of the Contract is substantially prevented, hindered or delayed for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of one or more events of Force Majeure during the currency of the Contract, the parties will attempt to develop a mutually satisfactory solution, failing which the dispute shall be resolved in accordance with Clause 44 of GPC.

7. Notwithstanding clause above, Force Majeure shall not apply to any obligation of the Owner to make payments to the Supplier herein.
8. NIWE will not entertain/allow/pay any mobilization or demobilization claims from the contractor in the event of force majeure/clearance & protocol issues.

41. NO BREACH OF CONTRACT

The failure of a party to fulfil any of its obligations under the Contract shall not be considered to be a breach or default under the Contract in so far as such inability arises from an event of Force Majeure, provided that the Party affected by such an event has taken all reasonable precautions, due care and reasonable alternative measures in order to carry out the terms and conditions of this Contract and has informed the other Party as soon as possible about the occurrence of such an event.

42. OBLIGATIONS OF THE BIDDER

The Bidder shall perform the Services and carry out their obligations with all due diligence, efficiency, and economy, in accordance with generally accepted professional techniques and practices, and shall observe sound management practices, and employ appropriate advance technology and safe methods. The Bidder shall always act, in respect of any matter relating to this Contract or to the Services, as faithful advisers to the Owner and shall at all times support and safeguard the Owner's legitimate interests in any dealings with Sub-bidder or third parties.

43. RISK PROCUREMENT

In the event of Suppliers failure to render service of acceptable quality in scheduled delivery period, NIWE reserves the right to procure services from any other source at the Suppliers risk and cost and the difference in cost shall be borne by the Supplier. Further, NIWE shall retain the right of forfeiture of Contract Performance Guarantee (CPG) and or any other action as deemed fit.

44. SETTLEMENT OF DISPUTES

If any dispute(s)or difference(s) of any kind whatsoever arise between the Parties hereto in connection with or arising out of this Contract, the Parties hereto shall negotiate with a view to its amicable resolution and settlement. In the event no amicable resolution or settlement is reached within a period of thirty (30) days from the date on which the dispute(s) or difference(s) arose, such dispute(s) or differences shall be referred to and settled by sole arbitration of the Secretary, Ministry of New and Renewable Energy, New Delhi or his nominee whose decision shall be final and binding for both the parties, under the provisions of The Arbitration and Conciliation Act, 1996 and its amendments enacted by the Government from time to time. The existence of any dispute(s) or difference(s) or the initiation or continuance of the arbitration proceedings shall not permit the Parties to postpone or delay the performance by the parties of their respective obligations pursuant to this Contract. The venue of the arbitration shall be Chennai, India.

45. NOTICES

Any notice, request, or consent sought pursuant to the tender shall be in writing and shall be deemed to have been made when delivered in person to an authorized representative of the Party to whom the communication is addressed, or when sent by speed post, fax, or facsimile to such Party i.e. Owner or Bidder.

46. TERMINATION

The Owner may terminate the Contract, by not less than thirty (30) days' written notice of termination to the Supplier to be given after the occurrence of any of the events specified in paragraphs (1) to (4) of this Clause and sixty (60) days' in the case of the event referred to in (5) below:

1. If the Supplier does not remedy a failure within thirty (30) days.
2. If the Supplier becomes insolvent or bankrupt;
3. If as a result of Force Majeure, the Supplier is unable to perform a material portion of the Services delayed for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of one or more events or;
4. If the Supplier, in the judgement of the Owner has engaged in corrupt or fraudulent practices in competing or in executing the Contract. For the purpose of this clause: "Corrupt Practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the selection process or in contract execution. "Fraudulent Practice" means a misrepresentation of facts in order to influence a selection process or the execution of a contract to the detriment of the Owner.
5. If the Owner, at its sole discretion, decides to terminate this Contract.

47. TAXES & DUTIES

1. The prices shall be inclusive of all Statutory levies & duties excluding Goods and Service taxes. GST will not be considered for evaluation.
2. However, GST at prevailing rates shall be paid during the currency of the contract.
3. In the case of High Sea Sales, Agreement has to be executed between Contractor and NIWE before the delivery of goods/items.
4. If any rates of tax are increased or decreased, a new tax is introduced, an existing tax is abolished, or any change in interpretation or application of any tax occurs in the course of the performance of contract, which was or will be accessed on the bidder in connection with performance of the contract, an equitable adjustment of the contract price shall be made to fully take into account any such change by addition to the contract price or deduction there from as the case may be.

48. TAX DEDUCTION AT SOURCE (TDS)

TDS will be deducted as applicable. Valid Permanent Account Number (PAN) is Mandatory.

49. PAYMENTS TO THE BIDDERS

Payment will be made to the account of the bidder and according to the payment terms stated in SPC Clause 6.0 based on the certification by the officer i/c NIWE.. The payments shall be made after the conditions listed for such payment have been met, and the Bidder has submitted an invoice to the Owner specifying the amount due. Payment shall be released within 30 days of receipt of invoice complete in all respect as per Payment terms mentioned in SPC.

50. JURISDICTION

Notwithstanding any other court or courts having jurisdiction to decide the question(s) forming the subject matter of the reference if the same had been the subject matter of a suit, any and all actions and proceeding arising out of or relative to the contract (including any arbitration in terms thereof) shall lie only in the Court of Competent Civil jurisdiction in this behalf at Chennai and only the said Court(s) shall have jurisdiction to entertain and try any such action(s) and/or proceeding(s) to the exclusion of all other Courts.

51. LIMITATION OF LIABILITY

Except in cases of criminal negligence or willful misconduct,

1. The Contractor shall not be liable to the Employer, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Contractor to pay liquidated damages to the Employer and
2. The aggregate liability of the Contractor to the Employer, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to any obligation of the Contractor to indemnify the Employer with respect to patent infringement. In the event of summons from Government organizations like GST authorities, NIWE shall recover such sums as directed by the authorities and remit the same to them under intimation to the suppliers.

52. ACCIDENT OR INJURY TO WORKMEN:

NIWE shall not be liable for any damage or compensation payable at law in respect or in consequence of any accident or injury to any workmen or other men in the employment of the contractor or sub-contractor. The contractor shall indemnify and keep indemnify NIWE against all such damages and compensation, and against all claims, proceedings costs, charges and expenses whatsoever in respect thereof of in relation there to. The insurance shall be within the contract price. It is the responsibility of contractor to ensure prompt settlement of such claims as admissible in law without waiting for settlement of insurance claims.

53. OWNERSHIP:

All data and accompanying documents & records, both working and fair, acquired or created in the contract shall become the property and copyright of NIWE or of whosoever transferred upon by NIWE. Copyright and intellectual property rights will belong to NIWE.

54. OPTION CLAUSE:

NIWE reserves the right to increase/decrease the ordered quantity by up to 25 (twenty-five) percent at any time, till final delivery date (or the extended delivery date of the contract), by giving reasonable notice even though the quantity ordered initially has been supplied in full before the date of the delivery period (or the extended delivery period).

55. CORRUPT/FRAUDULENT PRACTICES:

It is expected that the bidders who wish to bid for this project have highest standards of ethics. NIWE will reject the bid if it determines that the bidder participating in this tender has engaged in corrupt or fraudulent practices while competing for this tender and / or submitted false statement/certificate/information. NIWE will also declare such bidder ineligible for participating in NIWE tenders, either indefinitely or for a stated duration.

A declaration shall also be attached along with the bid as given at Annexure 11.

56. COMPLIANCE OF RESTRICTIONS UNDER RULE 144 (XI) OF GFR 2017:

Restrictions on procurement from a bidder of a country which shares a land border with India:

I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.
II. "Bidder" (Seller / Service Provider) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.
III. "Bidder from a country which shares a land border with India" for the purpose of this Order means: -
   a) An entity incorporated, established, or registered in such a country; or
   b) A subsidiary of an entity incorporated, established, or registered in such a country; or

c) An entity substantially controlled through entities incorporated, established, or registered in such a country; or

a. An entity whose beneficial owner is situated in such a country; or
b. An Indian (or other) agent of such an entity; or
c. A natural person who is a citizen of such a country; or
d. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above

I. The beneficial owner for the purpose of (iii) above will be as under:

1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means. Explanation—

a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company;
b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;

2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;
3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of

Or

entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;
5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

II. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

III. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority. Any false declaration and non-compliance of the above would be a ground for immediate termination of the contract and further legal action in accordance with the laws.

II SPECIAL PURCHASE CONDITIONS (SPC)

1. GENERAL:

National Institute of Wind Energy (NIWE) has been established in Chennai in the year 1998 as an autonomous R&D institution by the Ministry of New and Renewable Energy (MNRE). NIWE office complex is situated in a two-story (Ground + 1 floor) building in Chennai. It receives a good amount of solar radiation, which can be converted to a usable source of electricity by the installation of a Photovoltaic solar power plant. A hybrid Photovoltaic solar power plant of 100 kW (AC) is proposed with PV solar panels mounted over on the **Roof-Top** of the building. The Design, Engineering, Supply, Construction, Erection, Testing, Commissioning, Grid Synchronization with comprehensive AMC for a period of 5 years from the date of commissioning including warranty, Insurance and O&M the proposed Photovoltaic solar power plant of the rated capacity of 100 kW(AC) is also in the scope of this work.

2. LOCATION:

The National Institute of wind energy (NIWE) is located in Chennai, which is the capital city of Tamil Nadu. The latitude and longitude of the place 12°57'24.0 "N and 80°12'51.5 "E, respectively.

3. BIDDING TYPE:

- Two bids system (Technical and Price Bid). The offer can be submitted only in INR.
- Each Bidder should submit only one (1) bid. Any bidder who submits/ participates in more than one bid for the work shall be disqualified.

4. FINANCIAL BID EVALUATION CRITERIA:

Evaluation of the total contract shall be carried out as referred herein under.

- Evaluation shall be done on Total Solution basis.
- BID Price shall mean that the total package price of all the services listed in the PRICE BID for its complete Scope of Work including O&M Charges.
- The prices quoted must be inclusive of freight and insurance.
- Bid price shall include a warranty of 5 years also.
- As the work is of an EPC nature, GST shall be PAID for the prices quoted at prevailing rates as per rules. Hence prices may be quoted excluding GST. No representation for enhancement of price accepted will be considered.
- Any supplemental, incidental & ancillary expenses/costs in this regard is deemed to be included in the price quoted.
- Total Cost arrived after arithmetical corrections, including concessional import Duties, freight & insurance as indicated by the contractors, will be considered for the purpose of evaluation.
- The overall evaluated cost arrived at in this manner shall be taken for cost comparison and final evaluation.
- The evaluation criteria over-rides all other similar related clauses appearing anywhere in the bid documents, and such clauses are deemed to have been modified to the extent stipulated above.
- The Goods and service tax will not be considered for bid evaluation.
- After scrutiny of Technical offers by a competent team, the price bids of the technically qualified tenderers will be opened.

Note: The selection of the L1 Bidder will be based on the total EPC and O&M Cost for 5 years. L1 criteria will be based on the 100 kW (AC) plant with fixed-tilt only.

5. SCOPE OF WORK /SUPPLY:

a) Design, Engineering, Supply, Construction, Erection, Testing, Commissioning, Grid Synchronization with comprehensive AMC for a period of 5 years from the date of commissioning including warranty, Insurance and O&M of a 100 kW (AC) Solar m-Si (monocrystalline solar module technology- MONOPERC) PV Power Plant at National Institute of Wind Energy, Chennai, Tamil Nadu from the Date of Commissioning (i.e., Power evacuation to the existing LT Panel at NIWE substation) for a period of 5 years.
b) The New machineries /equipment's/ components/materials to be supplied for the establishment of the 100 kW (AC) SPV plant shall be in good working condition.
c) The contractor shall give warranty that the Goods shall be free from defects arising from any act or omission of the Contractor or arising from design, materials, and workmanship, under normal use in the conditions. The warranty is for a period of 5 years from the date of commissioning and grid synchronization of the 100 kW (AC) SPV plant at the specified location.
d) The contractor has to make necessary arrangements for the continuous supply of deionized water to the required level of 75ppm for the cleaning of the solar modules after commissioning of the 100 kW (AC) SPV plant. The permanent arrangement for the supply of the required quality water is part of the Scope of Work.
e) The latest available only licensed software version must be provided/used for any type of work or with the system supplied, and version must be made available along with the equipment.
f) The contractor has to provide training/demonstration to designated NIWE officials during the entire contract period at the location.
g) Contractor should provide the proposed detailed work plan, methodology, and time schedule to complete the Scope of Work in the stipulated time.
h) The contractor has to obtain all necessary approvals and permits from the respective authorities to procure, transport, install grid integration, commissioning etc. in order to complete the work in a timely manner. In this, the Owner may facilitate the Contractor in a possible manner only. Thus the quote should cover the expenses in taking necessary approvals and permits from the respective authorities.
i) Contractor shall submit complete literature regarding Equipment/Machinery. **Solar panel shall be 100% Indian Make**, and 40% of the other equipment shall be of Indian Make.
j) The Models enlisted in ALMM list issued by MNRE are only eligible to participate in this tender.
k) The Contractor will be responsible for the safe delivery of all materials required for the installation and commissioning of the 100 kW (AC) SPV plant at the location at their own cost. Therefore, the price quoted must be inclusive of freight and insurance.

l) The Contractor shall provide a list of Tools/Tackles for installation, operation, and maintenance of the plant. The list shall be submitted along with the bid. The list shall be verified and certified mutually at the site of delivery.

m) The Contractor shall provide a list of critical spares and deliver them along with equipment. The list shall be submitted along with the bid.

n) The Scope of Work/Supply over-rides all other similar related clauses appearing anywhere in the bid documents, and such clauses are deemed to have been modified to the extent stipulated above.

o) The installation, commissioning, and handing over of the 100 kW(AC) SPV plant at the location is to be completed within the stipulated period of **2 months** from the date of the Purchase Order with the technical specifications as mentioned in the Annexure (Technical Compliance sheet)

p) The rates ordered should be firm and would not be increased at any time by the Contractor

q) Conditions in the technical document, technical specifications, and special conditions of this tender document would override the general conditions, wherever applicable.

r) Bidder must visit the site at NIWE, Chennai (Monday to Friday 09.00 AM to 5.30 PM) where the work is proposed. Certificate to the effect that the vendor of the bidding firm has visited the site shall be obtained from the concerned NIWE, Chennai Official. (National Institute of Wind Energy, Velachery – Tambaram Main Road, Pallikaranai, Chennai 600100.)

s) Contractor should dismantle the existing structures, concrete construction and panels at their own cost. After dismantling NIWE will provide the area for storage of dismantled materials.

t) Contractor shall have to make his own arrangements for supply of water to his labor camps and for installation & commissioning works. All pumping installations, pipe network and distribution system will have to be carried out by the contractor at his own

risk and cost. The Owner does not guarantee the supply of water and this does not relieve the contractor of his responsibility in making his own arrangement and for the timely completion of the various works as stipulated.

u) Contractor has to make arrangements for power supply for construction & commissioning of the project successfully.

v) Contractor must provide Walkway and construction of passage for cleaning of SPV power plant.

w) The contractor can submit a maximum of two PV Syst simulation reports using Atlas data for the project site (NIWE Chennai) along with Technical offer. The contractor can submit more than one PVSyst report based on different combination of PV modules and inverters to obtain a minimum Performance Ratio (PR) of 78% or above etc.)

x) The contractor shall provide the necessary technical support for re-location of the solar power plant within or outside NIWE if any such request made by NIWE within 5 years for which a declaration shall be given by the contractor.

y) Supply , installation , calibration, testing and commissioning of Energy meter (3 phase 4 wire 415 AC) shall be provided at NIWE substation / near by the inverter

(Energy meter and other required instruments shall be borne by the contractor) for calculating the total Energy in kWh.

z) Energy meter should be compatible to transmit the data digitally to SCADA and as per NIWE requirement.

6. PAYMENT:

6.1. No advance payment will be given. All part payments will be released against bank guarantee (valid up to five years from the date of commissioning) and according to the inspection reports at each of the following stages from the concerned officer of Owner in charge of the project at the location.

6.2. The terms of EPC amount payment shall be:

I. 30% of the EPC amount shall be paid after receiving of the complete PV Modules, Module mounting structure, and balance of materials at the site.

II. 25% of the EPC amount shall be paid after the completion of PV Module with module mounting structures (MMS) and receipt of inverters, energy meter and AC & DC Combiner box and balance of materials at the site.

III. 20% of the EPC amount shall be paid after DC side wiring, including the installation of String Combiner Boxes (SCB)/ Array Junction Boxes (AJB), DC & AC Cabling and Inverter Installation.

IV. 15% of the EPC amount shall be paid on successful commissioning of the PV Power Plant.

V. The remaining 10% shall be paid after submission of bank guarantee as to performance security and shall be released at the end of the five-year period from the date of commissioning.

VI. The Performance Ratio (PR) of the PV Power Plant will be calculated by comparing the one year's production data and corresponding actual Solar Radiation Data (PoA) measurements taken at the site. The PV Power Plant should be designed and simulated with the offered quality components by the Bidder (PV Modules, Inverters, transformers, etc.) so as to obtain a minimum Performance Ratio (PR) of 78% or above.

VII. If the PR calculated every year (during the first five years) of the PV Plant is less than 78%, a penalty of 1% of the EPC amount for every 1% reduction in PR will be imposed from the 10% of the EPC amount available with NIWE.

VIII. The payment shall be made within 30 days on receipt, inspection, testing, and certification of all the necessary materials by the Project Manager (In-charge) of NIWE. The following documents shall be produced for making the payment by the Contractor:

1. Invoice
2. Delivery Challan
3. Acceptance letter from NIWE.
4. Reports at each stage from the concerned officer of the Owner in charge of the project at the location.

7. OPERATION & MAINTENANCE (O & M)

The terms of O & M amount payment shall be:

I. O&M amount shall be paid after the satisfactory completion of every one year from the date of commissioning for 5 years.
II. The O&M procedures and the payment as given above will be validated by an O&M agreement executed between the Owner and the successful Bidder.
III. Any loss of data measurements affecting PR calculations for more than 50 solar hours (sunrise to sunset) in a year, the penalty will be levied as per the following loss of hours.

50-100 Hours -1% of O&M amount for that year
100-150 hours- 3% of O&M amount for that year
>150 hours- 5% of O&M amount for that year

8. COMPLETION OF PROJECT AND PENALITY:

8.1. Design engineering supply, Construction, Erection , Testing , commissioning, Grid synchronization, of Hybrid **Roof-Top** 100 kW(AC) Mono crystalline (PERC) Solar PV Power Plant at NIWE, Chennai, Tamil Nadu with 5 years of comprehensive AMC, Warranty, insurance and O&M from the date of commissioning.

100 kW(AC) Solar m-Si (monocrystalline solar module technology- MONOPERC) PV Power Plant at National Institute of Wind Energy, Chennai, Tamil Nadu, has to be completed in all respects on or before **31.03.2022.**

8.2. Penalty for delay in the supply installation and commissioning of the PV power plant beyond 60 days of the project period, 1% of the total EPC cost for 90 days will be levied up to a maximum of 5% beyond 120 days from the date of issuance of the work order.

8.3. If the successful Bidder is not completing the first 30 days' scheduled work, NIWE has the right to cancel the contract and take recourse to other action as deemed appropriate.

8.4. Performance ratio (PR) Minimum 78%

The Contractor shall maintain a minimum of PR, 78% Non-adherence to the maintenance of minimum specified PR, the Contractor will attract imposition of penalty as per the details given below:

The contractor shall maintain a minimum PR of 78% for the entire duration of O&M activities 5 years from the date of completion. For every 1% shortfall of PR below 78%, a penalty of 0.1% of the total contract value, i.e., total sum of all the supply contract, service contract and absolute value of O&M contract performance security submitted by the Contractor will be forfeited the PR shall be calculated as per the formula given below

$$PR. = \frac{(\text{Energy Generated (kWh)} x\ Reference\ inplane\ irradiance\ (W/M2)}{(\text{Installed capacity of the plane (kWp) x Total inplane irradiance (kWh/M2)}}$$

The "Reference in- plane irradiance" is considered 1000 W/m^2 and "Total in-plane irradiance" is the measured value from the weather monitoring station (WMS) at NIWE site. In case if this data is not available, the "Total in- plane irradiance" value will be from the nearest SRRA stations.

- PR are calculated after the completion of 12 months from the Date of completion (DoC) of the SPV Power Plant. The penalties will be levied after calculating the PR at the end of every 12 th month from the Date of Completion during the O & M activities of 5 years
- All the penalties to be imposed will be recovered from any due payments to the Contractor or from the performance guarantee.
- **Performance Ratio (PR)-Minimum 78% (for the entire AC capacity installed for 100 kW AC export of energy during the operation)**
- In addition, the Contractor will have to pay the penalty for non-achievement of minimum specified PR during the O&M period (5 years) as compensation calculated at a discounted factor of 9.08% (prevailing practices) as per the given formula under Clause 8.5.
- **In case if the contractor fails to pay the penalty within the stipulated time levied by NIWE, NIWE has the rights to invoke the Bank Guarantee and the customer has to accept the same.**

8.5. Performance guarantee based compensation for the life time of the plant after the O&M period

The bidder will pay performance guarantee based compensation for non-adherence to the minimum PR and CUF, for the remaining of the project life equal to the net present value (NPV) of the average penalty imposed per year during the O&M period, calculated at a discounted factor of 9.08% (as per the prevailing practices) as per the given formula.

$$\text{COM}=\sum_{n=1(6)}^{20(25)} \left[\frac{\sum penalty\ amount\ of\ O\&M\ duration}{O\&M\ duration\ (years)} * \frac{1}{(1+\text{Discount factor}\%)^{n}}\right]$$

8.6. OPERATION & MAINTENANCE (O & M)

Any loss of data measurements affecting PR calculations for more than 50 solar hours (sunrise to sunset) in a year, the penalty will be levied as per the following loss of hours.

50-100 Hours -1% of O&M amount for that year
100-150 hours- 3% of O&M amount for that year
>150 hours- 5% of O&M amount for that year

9. PROJECT IMPLEMENTATION SCHEDULE:

The proposed schedule for the major activities after issuing the work order shall be as following this is an indicative schedule for project management. Penalty will be imposed only as per clause 8.1 above.

1) Preparation of Proposal, system design, obtaining necessary approvals & permits, executing agreement has to be executed within 15 working days after the work order.
2) The inverter & supply of module mounting structure (MMS), the foundation for MMS structure, ducts for AC/DC cabling, etc., shall be completed within 30 days.
3) The supply of complete PV Modules/ inverters/ cables/ conductors/ circuit breakers etc., at the site, shall be completed within 40 days.
4) AC/DC Cabling (Cable Routing/ Marking: All cable/wires are to be routed in a GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable easily identified) and Inverter Erection shall be completed within 50 days.
5) SCADA system installation and, finally, grid integration and commissioning of the power plant within 60 days.

(III) TECHNICAL SPECIFICATIONS

Annexure I

PREAMBLE

The scope of present work is to design engineering supply, Construction, Erection, Testing , commissioning, Grid synchronization, of Hybrid **Roof-Top** 100 kW(AC) Mono crystalline (PERC) Solar PV Power Plant at NIWE, Chennai, Tamil Nadu with 5 years of comprehensive AMC, Warranty, insurance and O&M from the date of commissioning.

The Bidder is mandated to source the solar modules manufactured 100 percent in India as per MNRE, Government of India Office Memorandum F No. 146/57/2018-P&C dated 11.12.2018. The other components, such as inverters, need to be manufactured 40 percent in India. The bidders are advised to visit the site before submitting technical and financial bids to meet the functional requirements, execution, planning for supply, erection, testing & commissioning, and all other allied works. The bidders should complete the project within stipulated time from the date of order/ Letter of Intent/ Notice. The main objective of the design philosophy is to construct the plant with in-built quality and appropriate redundancy to achieve high availability and reliability with minimum maintenance efforts. In order to achieve this, Contractor shall design the plant to sustain 25 years of life with minimum maintenance efforts.

The Contractor will be responsible for 5 years of Operation and Maintenance after commissioning of the project along with comprehensive warrantee of the power plant, including repairs and replacement of any faulty equipment.

Successful Contractor needs to take prior approvals wherever necessary from NIWE for designs and calculations as mentioned in the clauses mentioned in the tender document.

The specifications provided in this document are functional ones and are meant as guidelines.

OVERVIEW OF PROJECT

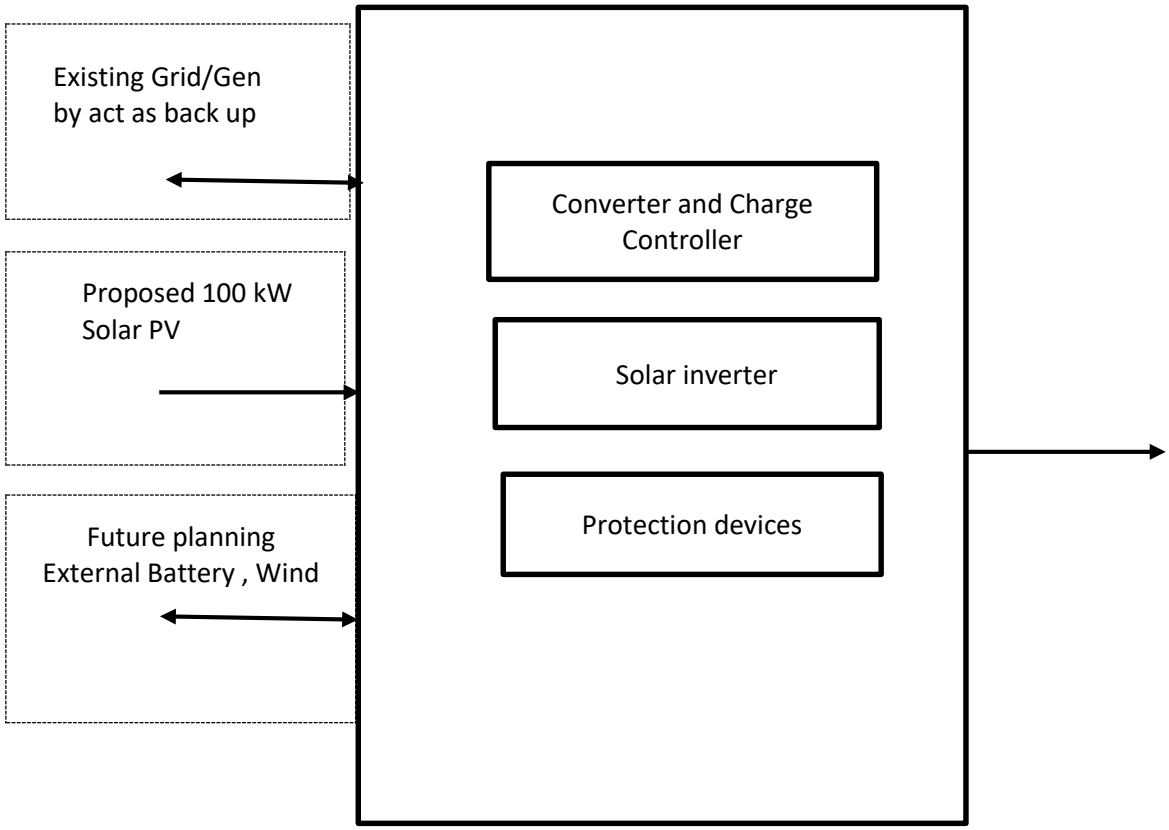
Micro Grid is a localized group of electricity sources and loads that normally operates connected to and synchronous with the traditional centralized electrical grid (macro grid), but can also disconnect to "island mode" and function autonomously as physical and/or economic conditions dictate.

Presently, NIWE proposing an addition of 100kW AC Solar installations. Upon successful installation of 100kW AC Solar power plant at NIWE campus, the same may be integration with the smart RE-Micro Grid along with Generator, Battery storage system, wind turbine and Load management system in the phase manner. Hence, the contractor shall provide the necessary arrangements in the proposed solar power plant for integration of RE microgrid system in later stage.

The Focus is to upgrade the following in the system-

- Increase the capacity of SPV module.
- Battery Energy Storage System (BESS) (provision for future)
- Microgrid Management system or Controller

Sample Layout of Grid tied Micro Grid at NIWE:

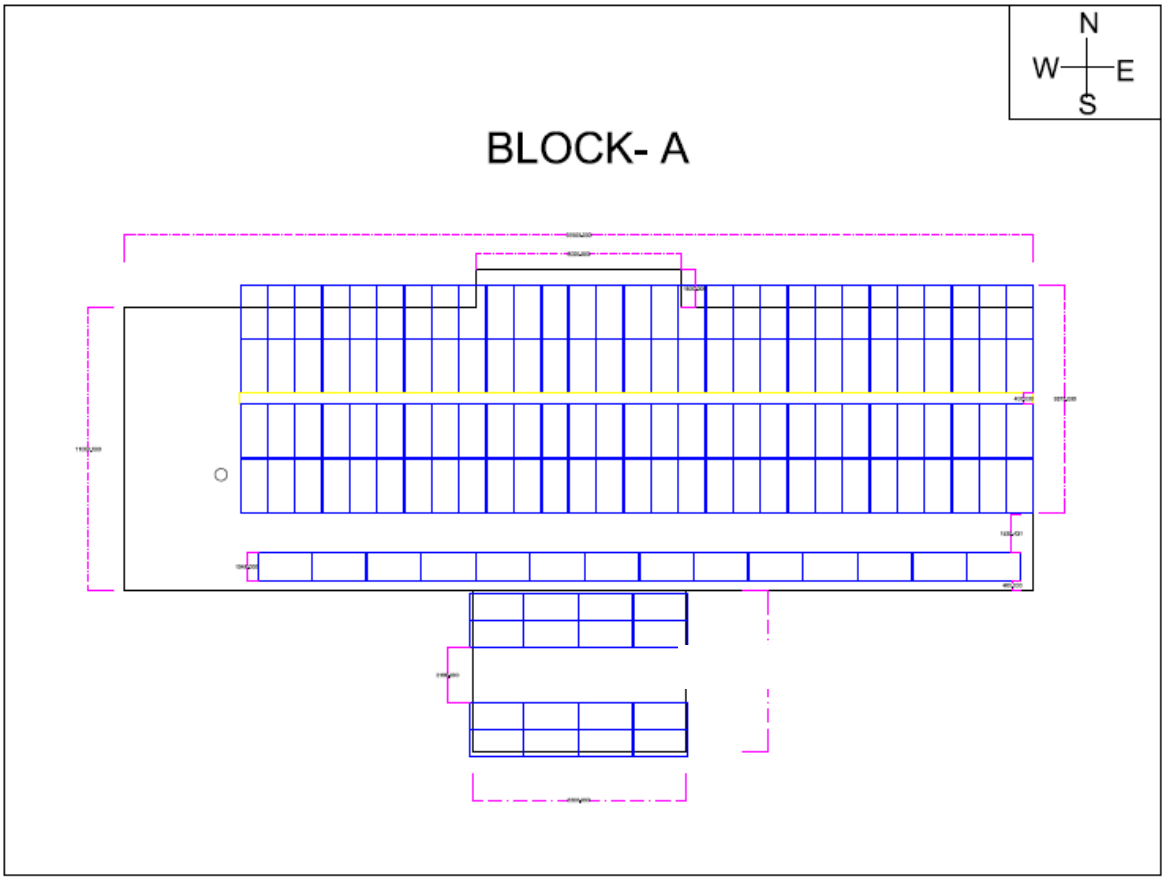


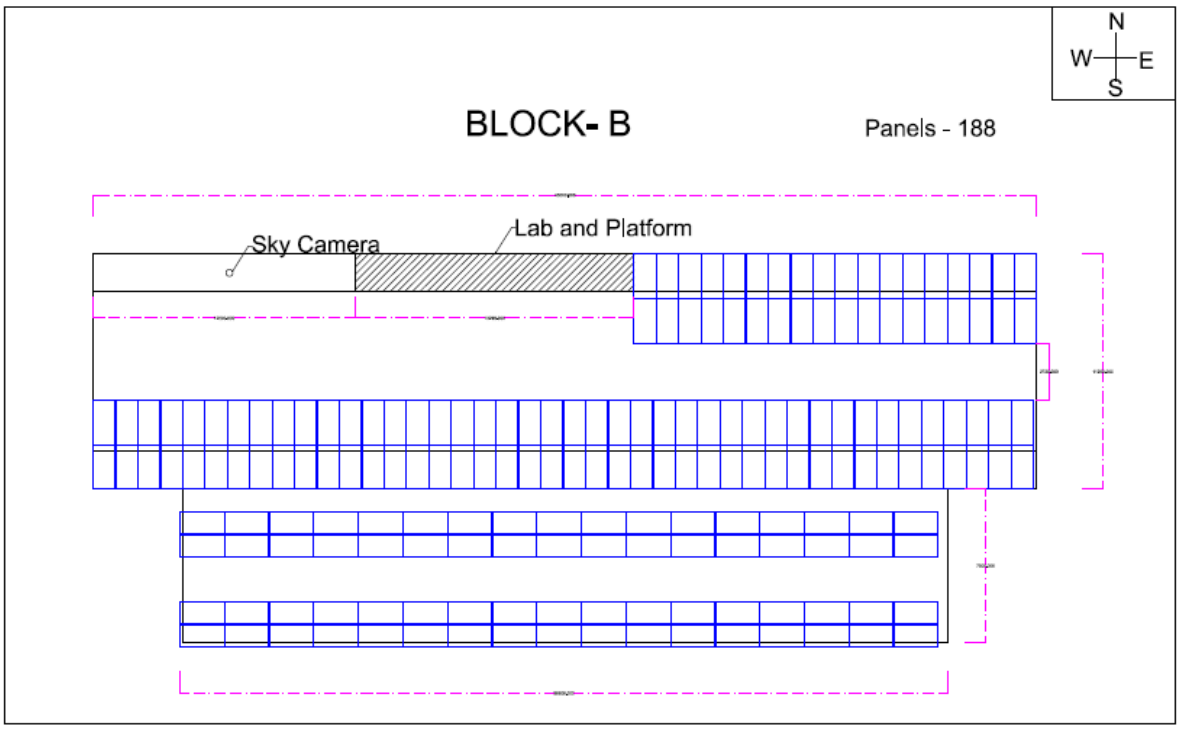
SITE CONDITION ANALYSIS

Site Conditions

S. No.	Parameters	Specifications
1.	Average GHI	4.92 kWh/m^2/day
2.	Average Wind Speed	3.5 m/s (6m)
3.	Temperature	29° C

Design Layout for NIWE Rooftop





1 SOLAR PHOTOVOLTAIC (SPV) MODULES

1.1 Technical Requirements

The Contractor should supply all PV modules which are **enlisted in ALMM list issued by MNRE are only eligible to participate in this tender,** and in addition shall meet following requirements:

Parameters	**Specifications**
Cell type	Crystalline Silicon- Mono PERC
Rated power at STC(standard test condition)	Minimum 380 Wp
Module efficiency	Minimum 19%
Maximum temperature coefficient on power	-0.45%/°C
PV cell	Minimum 4 Bus bar

General Specifications

1. The PV modules must be PID(Potential Induced Degradation) compliant, salt mist & ammonia resistant, and should withstand weather conditions at Chennai, Tamil Nadu, for the project life cycle.
2. All the PV Modules must be having a power optimizer.
3. High transmittance tempered/arc glass for PV modules, durable layered structure for the back sheet of the PV modules with moisture barrier properties, elongation retention, and UV resistance.
4. The encapsulate used for the PV modules should be UV resistant in nature. No yellowing of the encapsulate with prolonged exposure shall occur. The sealant used

for edge sealing of PV modules shall have excellent moisture ingress Protection with good electrical insulation and with good adhesion strength. **Edge tapes for sealing are not allowed.**

5. Anodized Aluminum module frames of sufficient thickness shall be used, which are electrically & chemically compatible with the structural material used for mounting the modules having provision for earthing.
6. UV resistant junction boxes with a minimum of three numbers of bypass diodes and two numbers of MC4 connectors with appropriate length with 4 sq.mm Cu cable shall be provided.
7. Minimum of 3 nos. of randomly selected Solar PV modules from the site will be sent to MNRE (Ministry of New and Renewable Energy) approved testing laboratories. The complete cost of testing, transportation will be borne by Contractor. The Contractor shall not use the tested panels in the plant.
8. Each PV Module shall be provided with Radio Frequency Identification (RFID) Tag inside the module lamination, containing the following:

    i. Name of the manufacturer of PV Module
    ii. Name of the Manufacturer of Solar cells
    iii. Type of cell: Monocrystalline
    iv. Month and year of the manufacture (separately for solar cells and module)
    v. Country of origin (separately for solar cells and module)
    vi. I-V curve for the module
    vii. Peak Wattage, Im, Vm and FF for the module.
    viii. Unique Serial No. and Model No. of the module.
    ix. Date and year of obtaining IEC PV module qualification certificate
    x. Name of the test lab issuing IEC certificate
    xi. Other relevant information on traceability of solar cells and modules as per ISO 9000 series.

    The RFID should be readable during the entire life of the PV Module. Necessary documentary support should also be submitted for all the information contained in the RFID tag.
9. PV modules must be warranted for a minimum of 10 years against all material, Manufacturing defects, and workmanship. PV modules must be warranted for linear degradation rate of power output except for first-year and shall guarantee 90% of the initial rated power output at the end of 10 years and 80 % by the end of 25 years.
10. Transportation, handling, storage, and installation of modules shall be in accordance with the manufacturer manual so as not to breach warranty conditions. The Standard Operating Procedure (SOP) for the same shall be shared prior to dispatch.

    If the Contractor scheduled/ planned to mount the modules immediately after the receipt at the site, then the module shall be kept in a common storage area with proper arrangement. The stacked modules, in any case, shall be stacked as per the manufacturer's recommendation only and shall be covered properly.

1.2. Standards and Certifications

Photovoltaic Modules shall comply with the specified edition of the following standards and codes.

Standard	Description
IS 14286	Crystalline silicon terrestrial photovoltaic (PV) modules — design qualification and type approval
IEC 61215 Ed.2	Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval
IEC 61730-1 Ed.1.2	Photovoltaic Module safety qualification- Part 1: Requirements for construction
IEC 61730-2 Ed.1.1	Photovoltaic Module safety qualification- Part 2: Requirements for testing
IEC 61701 Ed.2	Salt mist corrosion testing of photovoltaic modules

2. (A) STRING COMBINER BOX (SCB)

2.1. Technical requirements

Parameter	Specification
Maximum VDC	As per the design requirement of Solar Array and Strings
String inputs	As per the design requirement of Solar Array and Strings
SPD PROTECTION	SPD TYPE II

2.2. General Specifications

1. Enclosure with at least IP67 shall be made of UV resistant, fire retardant, thermoplastic material with mechanical impact resistance at least IK07.
2. Not more than two strings can be connected in parallel to a single input of SCB. It is suggested that a minimum one spare input terminal along with a connector shall be provided for each SCB.
3. Every SCB input shall be provided with fuses on both the positive and negative sides. The rating of the fuses shall be selected such that it protects the modules from reverse current overload. It should also have a reverse blocking diode at either of the incomers.
4. DC disconnector switch of suitable rating shall be provided at SCB output to disconnect both positive and negative sides simultaneously.
5. SCB shall be provided with terminals connected to the copper bus-bar arrangement

of proper sizing. The junction boxes shall have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and outgoing cables. Suitable markings shall be provided on the bus bars for easy identification, and cable ferrules will be fitted at the cable termination points for identification.

2.3. Standards and Certifications

Following are the suggestive standards for the SCBs:

Standards/Code	**Description**
IEC 60529	Enclosure ingress protection
IEC 62262	Enclosure ingress protection
Standards/code	**Description**
IEC 60269-1 IEC 60269-6	Fuse
IEC 61643-12	Surge protection device
IEC 62852	Solar cable connector

(B) STRING MONITORING UNIT (SMU)

The SCB must be supplied with a suitable communication interface to communicate the data to SCADA. The following parameters shall be measured/ monitored and made available at SCADA:

- String current,
- Bus voltage,
- Output current,
- Cabinet temperature
- DC disconnector switch ON/OFF status,
- SPD operating status

Resistance Temperature Detector (RTD) type or semiconductor type temperature sensor shall be provided to monitor the cabinet temperature

3. DC CABLES:

3.1. Technical requirements

All DC cables shall comply with the latest/relevant IS/IEC standards. The following technical requirements general specifications standards and codes are given as general guidelines to follow:

Cable	**Insulation & Conductor**	**Voltage Rating**
DC Cable	XLPE cable with copper conductor	1.1 kV DC

3.2. General specifications

3.2.1. The outer sheath covering solar cable shall be flame retardant, UV resistant, and black in color, with positive polarity having red line marking on the black outer sheath. DC cables shall be single-core, armored, Flame Retardant Low Smoke (FRLS), PVC outer sheath conforming to IS 7098-I. DC cable with positive polarity should have marking of the red line on the black outer sheath. In addition to the manufacturer's identification on cables as per relevant standard, following marking shall also be provided over the outer sheath.

i. Cable size and voltage grade.
ii. Word' FRNC/ FRLS' (as applicable) at every meter.
iii. Sequential marking of length of the cable in meters at every meter.

3.2.2. Cables shall be sized based on the following considerations:

i. Rated and short circuit current of modules and array.
ii. The average voltage drop in the cables (Modules to Inverter) shall be limited to 1.5 % of the rated voltage. Contractor shall provide voltage drop calculations in excel sheet.
iii. Short circuit withstands capability.
iv. De-rating factors according to laying pattern.

3.2.3. Cables shall be installed considering the following:

I. Cable installation shall be as per IS 1255.
II. DC cables shall be provided with punched/ embossed aluminum tags. The marking shall be done with good quality letters and numbers of proper size so that the cables can be identified easily.
III. Cable terminations shall be made with properly crimped lugs and passed through cable glands at the entry & exit point of the cubicles. Bimetallic lugs shall be used for connecting Cu bus bar and Al cables or vice-versa.
IV. Solar cables, wherever exposed to direct sunlight, shall be laid through Double Wall Corrugated (DWC) HDPE conduits with GI Cable tray .
V. Solar cables shall be aesthetically tied to Module Mounting Structure using UV resistant cable-ties suitable for outdoor application.

3.3. Standards and certifications

Cable	Applicable Standard
DC Cable	IS 7098 Part I

4. Power Conditioning Unit / Proposed Inverter System

There are various types of inverters used in photovoltaic systems. Inverters are distinguished accordingly to the inverter operation, voltage, and current control scheme. Inverter must-have feature to operate standalone with battery. Solar photovoltaic panels convert solar energy into electrical energy as DC power. This DC power is fed to an inverter which converts dc power to ac power and delivers energy to the NIWE substation; in this project, we have proposed a string inverter. The inverters will be designed with innovative

cutting–edge technology. optimized efficiency factor, higher availability, the latest control procedure are key features. some salient features of inverter

- Microprocessor-Based Design
- MPPT Charge Controller
- Inbuilt LCD Display
- Sophisticated Local & Remote Monitoring System (Optional)
- Built-in output isolation transformer with isolation on high frequency side.

4.1 Technical requirements

The Bidder shall comply with the technical requirements.

Parameters	**Specifications**
Inverter Type	Hybrid (capable of both off-grid and On-grid mode)
Proposed inverter AC power rating	120 KVA
Maximum input voltage	1000 V DC
Output voltage range	3 phase 4 wire (415 AC)
Rated frequency	50Hz
Operating frequency range	As per CEA guidelines
Power factor control range	0.9 lag to 0.9 lead
Inverter efficiency	Minimum 97%
Total Harmonic Distortion	Less than 3% at 100 % load
Degree of Protection	IP 54 for Indoor , IP 66 for outdoor
CEA Technical standards for connectivity to the grid regulations 2007 with 2013 Amendment & 2019 Amendment must be followed.	

4.2. General Specifications

4.2.1. The rated / nameplate AC Capacity of the PCU shall be the AC power output of the PCU at 50°C

4.2.2. Maximum Power Point Tracker (MPPT) technology shall be integrated with the PCU to maximize energy drawn from the solar PV array. The MPPT voltage window shall be sufficient enough to accommodate the output voltage of the PV array at extreme temperatures prevailing at site.

4.2.3 The PCU output shall always follow the grid in terms of voltage and frequency. The operating voltage and frequency range of the PCU shall be sufficient enough to accommodate the allowable grid voltage and frequency variations as per the CEA Guidelines.

4.2.4 Power conditioning of PCU shall consist of an electronic three-phase inverter along with associated control, protection, filtering, measurement, and data logging devices.

4.2.5 Every DC input terminal of PCU shall be provided with the fuse of appropriate rating. The combined DC feeder shall have suitably rated isolators for safe start-up and shut down of the system.

4.2.6 In case of an external auxiliary power supply is required, standalone ups along with a minimum backup storage capacity of 2 hours shall be used to meet the auxiliary power requirement of PCU.

4.2.7 Circuit breakers of appropriate voltage and current rating shall be provided at the output to isolate the PCU from the grid in case of faults.

4.2.8 The PCU shall be tropicalized, and the design shall be compatible with conditions prevailing at the site. Suitable number of exhaust fan with proper ducting shall be provided for cooling, keeping in mind the extreme climatic condition of the site as per the recommendations of OEM to achieve desired performance and life expectancy. The PCU shall have a provision of mobility either by crane or fork lifting.

4.2.9 All the conducting parts of the PCU that are not intended to carry current shall be bonded together and connected to dedicated earth pits through the protective conductor of appropriate size.

4.2.10 Dedicated communication interface shall be provided to monitor the PCU from SCADA.

4.2.11 PCU front panel shall be provided with LCD/LED to display all the relevant parameters related to PCU operation and fault conditions. it shall include, but not be limited to, the following parameters.

a) DC Input Power
b) DC Input Voltage
c) DC Input Current
d) AC Output Power
e) AC Output Voltage (All The 3 Phases And Line)
f) AC Output Current (All The 3 Phases And Line)
g) Frequency
h) Power Factor

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

a) DC/AC Over Current
b) DC/AC Over Voltage
c) DC Reverse Polarity
d) DC Earth Fault
e) AC Under Voltage
f) AC Under Frequency/Over Frequency
g) Islanding
h) Over Temperature
i) Lightning Surges
j) Cooling Fan Failure
k) Auxiliary Supply Failure

4.2.13 The PCU must be able to provide grid support functions, including active power regulation, reactive power control, and voltage ride through(VRT), as per the CEA guidelines

4.3 Standards and Certifications

The Bidder shall comply with the following standards and codes Power Conditioning Units (PCU)

Standard	Description
IEC 61683 Ed.1	Photovoltaic Systems – Power Conditioners – Procedure for Measuring Efficiency
IEC 61727	Photovoltaic (PV) Systems Characteristics of the Utility Interface
IEC 62109-1 Ed.1	Safety of power converters for use in Photovoltaic Power Systems- Part 1: General Requirements
IEC 62109-2 Ed.1	Safety of power converters for use in Photovoltaic Power Systems- Part 2: Particular Requirements For Inverter
IEC 61000-6-2 Ed.2	Electromagnetic Compatibility (EMC)- Part 6-2: Generic Standard – Immunity Standard For Industrial Environments
IEC 61000-6-4 Ed.2.1	Electromagnetic Compatibility (EMC)- Part 6-4: Generic Standard – Emission Standard For Industrial Environments
IEC 60068-2-1:2007	Environmental testing - Part 2-1: Tests - Test A: Cold
IEC 60068-2-2:2007	Environmental testing - Part 2-2: Tests - Test B: Dry heat
IEC 60068-2 14:2009	Environmental testing - Part 2-14: Tests - Test N: Change of temperature
IEC 60068-2-30:2005	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)
IS 16221 (Part 1): 2016	Safety of Power Converters for use in Photovoltaic Power Systems Part 1- General Requirements
IS 16221 (Part 2):2015	Safety of Power Converters for Use in Photovoltaic Power Systems Part 2- Particular Requirements for Inverters
IS 16169: 2014	Test Procedure of Islanding Prevention Measures for Utility-Interconnected Photovoltaic Inverters

5. AC CABLES

All AC cables shall comply with the latest/relevant IS/IEC standards. The following technical requirements, general specifications, standards and codes are given as general guidelines to follow:

5.1 Technical requirements

AC Cables shall be of the following material types:

LT CABLES (from the inverter to LT NIWE Substation)	XLPE insulated PVC sheathed cables

5.2 General Specifications

5.2.1. All AC cables shall be flame retardant low smoke (FRLS) type, designed to withstand all mechanical, electrical, and thermal stresses developed under steady-state and transient operating conditions.

5.2.2. Only terminal cable joints shall be accepted. No other cable joint to join two cable ends shall be accepted. However, cable joints may be allowed if the route length is more than the maximum available drum length, subject to NIWE approval.

5.2.3. In addition to the manufacturer's identification of cables as per relevant standards, the following marking shall also be provided over the outer sheath.

I. Cable size and voltage grade
II. Word 'FRLS' at every meter
III. Sequential marking of the length of the cable in meters at every meter

5.2.4. Cables shall be sized based on the following considerations:

I. Rated current of the equipment
II. Maximum voltage drop in LT cable (from the inverter to LT NIWE Substation) shall be limited to 0.5% of the rated voltage. Successful Bidder shall provide voltage drop calculations in an excel sheet.
III. Short circuit withstands capability as per design for Is.
IV. De-rating factors according to laying pattern.

5.2.5. Cable installation shall be as per IS 1255.

5.2.6. **LT cable (from the inverter to LT NIWE Substation) shall be laid through the GI Tray with supports. The output of invertor LT cables should be connected to NIWE substation LT panel with required MCCB and Automatic change over switch and other necessary equipment (panels, controls, indication lamps and measurement instruments etc.,)**

5.2.7. Cable terminations shall be made with properly crimped lugs and passed through cable glands at the entry & exit point of the cubicles. Bimetallic lugs shall be used for connecting Cu bus bar and Al cables or vice-versa.

5.2.8. All AC cables shall be provided with punched/embossed aluminum tags. The marking shall be done with good quality letters and numbers of proper size so that the cables can be identified easily.

5.3 Standard And Certifications:

Relevant standards and codes:

Is 7098-1	Cross-Linked Polyethylene Insulated PVC sheathed cables, Part 1: for working voltage up to and including 1100 V

6 Distribution Switchgear

Technical Specifications of distribution switchgear shall comply with the latest/relevant IS/IEC Standards. The following technical requirements, general specifications, standards, and codes are given as general guidelines to follow:

6.1 Technical Requirements

System Details	
Rated System Voltage	415V, 3 Phase, 50Hz 4 Wire, Neutral Solidly Earthed (As Per CEA Standards)
Digital Multifunctional Meter(MFM)	
Accuracy Class	0.2 Class For Main Distribution Board At Main Control Room And 0.2 Class For DB
Communication With SCADA	RS485 Communication With Modbus RTU
Current Transformer (CT) As Per Standards	
Voltage Transformer(VT) As Per Standards	
Moulded Case Circuit Breaker (MCCB)	
Rated Voltage	415V
Release	Thermal-Magnetic/Microprocessor
Rated Current	As Per System Requirement
Poles	4 Poles
Rated Insulation Level	690V
Rated Ultimate And Service Short Circuit Breaking Capacity	As Per System Requirement
Rated Making Capacity (As Per System Requirement)	2.1 X Short Circuit Breaking Capacity
Utilization Category	A

6.2 General Specifications

6.2.1. The panel shall be metal-enclosed, free-standing, floor-mounted, and modular type with Compartmentalized construction having the degree of protection of IP 54 as per IS 2147 or better & all outdoor protection of IP 65 or better. All Doors and covers shall be provided with neoprene gaskets to prevent the entry of vermin and dust.

6.2.2. All switches, pushbuttons, etc., shall be operated front and shall be flush/semi-flush Mounted.

6.2.3. The panel shall be fabricated from 2 mm CRCA sheet steel for frame & load-bearing Surfaces. Partitions may be fabricated from 1.6 mm CRCA if no components are mounted on them.

6.2.4. Cable entries shall be from the bottom. The opening of the cable entry shall be covered by 3mm thick gland plates with proper sealing to avoid water and rodent entry.

6.2.5. Earthing bus bar of a suitable cross-section shall be provided throughout the length of the panel.

6.2.6. The panel shall be duly wired with a suitable size of l.l kV, PVC insulated cable, and terminals shall be brought out for cable connections.

6.2.7. 10% spare terminals subjected to a minimum of one of each rating shall be provided on each distribution switchgear. All wires shall have ferrules as per the wiring diagram.

6.2.8. The panel shall be painted with 2 coats of primer after pre-treatment and 2 coats of Polyurethane/epoxy paint.

6.2.9. The panel shall be of dead front construction suitable for front operated and back

maintained functioning.

6.2.10. 240 V, 15 A, 3 pins industrial socket-outlet with ON/OFF switch shall be provided in each panel.

6.2.11. Each panel shall be provided with an LED lamp rated for 240 V, 50 Hz, single- phase AC supply for interior illumination controlled by a door switch.

6.2.12. Suitable lifting hooks shall be provided for each panel.

6.3 Standards and Certification

All equipment provided under distribution switchgear shall comply with the latest revision and amendments of the relevant IEC standard and IS codes. Relevant standards and codes are given below:

Standard/code	Description
IEC 61439-1	Low-voltage switchgear and control gear assemblies- part 1: general rules
IEC 61439-2	Low–voltage switchgear and control gear assemblies- part 2: power switchgear assemblies
IEC 60947-1	Low voltage switchgear and control gear – part1: general rules
IEC 60947-2	low- voltage switchgear and control gear: circuit breakers
IEC 60947-3	Low-voltage switchgear and control gear – part-3 switches, disconnectors, switch, disconnectors, and fuse combination units
IEC 60947-4-1	Low-voltage switchgear and control gear- part 4-1: contactors and motor starters- electromechanical contactors and motor- starters
IEC 60947-5-1	Low-voltage switchgear and control gear – part 5-1: control circuit devices and switching elements electromechanical control circuit devices
IEC 60947-11	Electricity metering equipment(ac)- general requirements, tests, and test conditions-Part 11: Metering Equipment
IS 694	Polyvinyl chloride insulated unsheathed- and sheathed cables/cords with rigid and –flexible conductor for rated voltages—up to and including 450/750V
IEC 61869	Instrument Transformers
IS 3043	Code of practice for Earthing
IEC 60255	Measuring relays and protection equipment-Part 1: Common Requirements

7 UNINTERRUPTED POWER SUPPLY (UPS)

7.1. General Specifications

7.1.1. The uninterrupted Power Supply (UPS) system shall be designed to supply power to the following loads (but not limited to)

i. Data logger/SCADA
ii. HMI of SCADA
iii. Emergency Lighting
iv. Inverter's Auxiliary supply (if applicable)

7.1.2. UPS should have a battery backup system for minimum 2 hours

7.1.3. Contractor shall provide the Operation & Maintenance Manual and Mandatory spare parts list along with the equipment

7.1.4. On completion of installation and commissioning of the equipment on site tests shall be carried out with the max. available load, which does not exceed the rated continuous load. An on-site test procedure shall be submitted by Contractor include a check of controls and indicators after installation of the equipment.

8. EARTHING

8.1. STANDARDS AND CODES

Earthing system shall comply with the latest revisions and amendments of the relevant IEC standards and IS codes. In particular, the earthing system shall comply with the following standards and codes.

Standard/code	Description
IS 3043	Code of practice for earthing
IEEE 80	IEEE Guide for Safety in AC Substation Grounding
IEEE 142	IEEE Recommended Practice for Grounding of Industrial and Commercial power systems
As per CEA	

8.2. General Requirements

8.2.1 Earthing system shall be designed based on system fault current and soil resistivity value obtained from the geo-technical investigation report. Earth grid shall be formed consisting of a number of earth electrodes sufficient enough to dissipate the system fault current interconnected by earthing conductors

8.2.2 The earth electrode shall be made of a high tensile low carbon steel rod with high conductivity copper on the outer surface with coating thickness not less than 250 microns as per relevant standards. Suitable earth-enhancing material shall be filled around the electrode to lower the resistance to earth. Inspection chamber and lid shall be provided as per IS 3043.

8.2.3 Earth conductors shall be made of copper bonded steel or galvanized steel of sufficient cross-section to carry the fault current and withstand corrosion.

8.2.4 Earth conductors buried in the ground shall be laid a minimum of 600 mm below ground level unless otherwise indicated in the drawing. Backfilling material to be placed over buried conductors shall be free from stones and harmful mixtures. Earthing conductor shall be buried at least 2000 mm outside the fence of electrical installations.

8.2.5 Earth electrodes shall not be situated within 1.5m from any building whose installation system is being earthed. Minimum distance between earth electrodes shall

be driven from the depth of the electrode.

8.2.6 Every alternate post of the transformer yard and switchyard fence shall be connected to the earth grid by one GS flat and gates by flexible lead to the earthed post.

8.2.7 All welded connections shall be made by electric arc welding. For rust protection, the welds should be treated with a red lead compound and afterward thickly coated with bitumen compound.

8.3 EARTHING OF PV ARRAY FIELD

8.3.1 All PV Modules, module mounting structures, and string monitoring unit structures in the PV array field shall be bonded to the earthing system by two distinct connections.

8.3.2 Each PV module frame shall be earthed using copper wire of sufficient cross-section. The copper wire shall be connected to the earth hole provided in the module frame using suitable arrangement in line with the manufacturer's recommendation. The earthing arrangement shall use stainless washers to prevent galvanic corrosion between the aluminum frame and copper wire. In order to achieve effective earthing, serrated washers shall be employed to penetrate the anodization layer of the module frame.

8.3.3 Continuous copper earthing wire shall be run to connect a group of modules, and both ends of the loop shall be bolted to the DC earth grid using bimetallic lugs and a stainless-steel fastener. The copper earthing wire shall be routed in such a way to avoid physical contact with the module aluminum frame.

8.3.4 The connection between MMS and DC earth grid shall be bolted or welded. The portion of the MMS which undergoes welding at the site shall be coated with two coats of cold galvanizing and anti-corrosion paint afterward.

8.3.5 Earth electrodes of the DC earth grid shall be uniformly distributed throughout the PV array field so that optimum earth resistance is offered to leakage current flowing from any module frame or MMS.

8.3.6 SMU equipment earthing point shall be connected to the DC earth grid using a flexible copper cable of sufficient cross-section as recommended by the manufacturer. The connection with the DC earth grid shall be made using suitable bimetallic lugs and stainless steel fasteners.

8.4 PCU EARTHING

DC negative bus bar of the PCU shall be earthed to avoid potential induced degradation. DC negative bus bar and PCU equipment earth shall be bonded to the PCU earth bus and connected to earth electrodes through the flexible copper cable of sufficient cross-section as mentioned by the manufacturer. The interconnection of PCU earth electrodes with DC earth shall be as per PCU manufacturer recommendation.

8.5 TESTS

On completion of installation, continuity of earth conductors and efficiency of all bonds and joints shall be checked. Earth resistance at earth terminations shall be measured and recorded.

9.0 LIGHTNING PROTECTION SYSTEM

9.1 Lightning protection system for the entire plant against direct lightning strokes shall be provided with early streamer emission air terminal as per NFC 17- 102:2011.

9.2 Protection level for the entire plant shall be level – 1

9.3 Each ESE air terminal shall be provided with the following accessories.

I. Highly insulated poly plastic adaptor to fix the ESE air terminal with the FRP mast.
II. Fiberglass reinforced plastic mast.
III. Coupler to connect FRP mast with GI mast
IV. Galvanized iron mast with base plate and guy wire kit.
V. Down- conductor: PVC insulated flexible copper cable of suitable size complying with EN 50164-2 or equivalent standard. It shall be routed along the mast with suitable fixings and connectors.
VI. Test joint with each down conductor
VII. Lighting event counter complying with EN 50164-6 or equivalent standard. It shall be fixed at a suitable height in series with the down conductor.
VIII. Earth termination system in accordance with NFC 17-102. Earth electrodes shall comply with the EN 50164-2 or equivalent standard. Earth enhancing compounds complying with EN 50164-7 or equivalent standard may be used where soil resistivity is higher and making it impossible to achieve system resistance within the specified limit.

9.4 Accessories listed above are indicative only, and any other fitting or accessories that are usual or necessary for satisfactory operation of the lightning protection shall be provided by the Contractor without extra charges.

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

9.6 The product shall be warranted for a minimum of 5 years against all material/ manufacturing defects and workmanship.

9.7 Type test reports as per NFC 17-102:2011 shall be submitted during detailed engineering for approval.

10. SCADA

10.1 GENERAL REQUIRMENTS

10.1.1. The SCADA shall perform the following operations, which include the measurement and continuous recording at an interval of 1 minute

I. DC bus output of SCB
II. Inverter output power, energy, voltage, current, and pf.
III. AC and DC side power of the inverter.
IV. Energy delivered to the grid in kW
V. System frequency
VI. Current and voltage of each sub-array/string
VII. Any other parameters considered necessary by supplier based on current prudent practice.

10.1.2 SCADA System shall have the provision to perform the following functions.

i. Real time acquisition and display of data, status, alarms and trends
II. Display and storage of measured values
III. Display and storage of derived/ calculated/ integrated values
IV. Generate, store and retrieve user-configurable sequence of event reports

10.1.3 SCADA shall provide 1 minute and 10-minute interval daily, monthly and annual reports of following parameters

i. Exported energy
ii. Energy of the inverter

10.1.4 SCADA should be compatible with transmitting the data to the NIWE server or any other institution as directed by NIWE as per their requirement.

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

10.1.6 The Contractor shall provide all the components including, but not limited to hardware, software, SCADA panels, power supply, HMI, associated cables etc., needed for the completeness.

10.1.7 It shall be possible to remove/replace redundant controller or various modules from its slot for maintenance purposes without switching off the power supply to the corresponding rack without releasing any spurious signal to the controller and causing disturbance or loss of controller functions for another controller.

10.1.8 PLC Processor

The processor unit shall be capable of executing the following functions.

I. Receiving binary and analog signals from the field to server
II. Implementing all logic functions for protection and annunciation of the equipment and systems.
III. Providing supervisory information for alarm, various types of displays, status information, trending, historical storage of data, etc.

10.2 HUMAN MACHINE INTERFACE SYSTEM (HMIS)

10.2.1 Graphical interface unit/ Operator work station shall perform monitoring and operation of all devices interacting with PLC-based system.

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

10.2.3 Contractor has to provide suitable hardware and software-based firewall for network security to restrict unauthorized access to HMI/Solar SCADA pcs and systems.

10.3 PROGRAMMING FUNCTIONALITIES

Programming of the PLC processor/ controller as well as programming of HMIS shall be user-friendly with the graphical user interface. All programming functionalities shall be password protected to avoid unauthorized modification.

10.4 SOFTWARE REQUIREMENTS

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

10.4.2 Industry standard operating systems like WINDOWS etc., to ensure openness and connectivity with other systems in the industry shall be provided. SCADA system shall support the following standard protocols to communicate with different subsystem/devices:

I. MODBUS (TCP/IP, RTU, ASCII)
II. IEC 60870- 5 – 101/104
III. Any other protocol on which the offered equipment will communicate with SCADA

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

10.4.4 System Spare Capacity

Over and above the equipment and accessories required to meet the fully implemented system as per specification requirement, control system shall have spare capacity of 10% along with the necessary hardware/ equipment/ accessories to meet the future expansion requirement.

10.5 DATA COMMUNICATION SYSTEM (DCS)

The DCS shall have the following minimum features.

10.5.1 Redundant communication controllers shall be provided to handle the communication between I/O Modules and PLC and between PLC and operator work station.

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

10.5.3 Built-in diagnostics shall be provided for easy fault detection. Communication error detection and correction facilities shall be provided at all levels of communication. Failure of one bus and changeover to the standby system bus shall be automatic and completely bumpless, and the same shall be suitably alarmed.

10.5.4 Data transmitting speed shall be sufficient to meet the responses of the system in terms of displays control etc., plus 20% spare capacity shall be available for future expansion.

10.5.5 Contractor shall employ redundant fiber optic backbone for data communication between inverter rooms and main control room

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

10.6 OPERATOR INTERFACE DISPLAYS/LOGS/REPORTS

Suitable operator interface displays/logs/reports for control operation and monitoring shall be provided. The details shall be furnished and finalized during detailed engineering stage.

10.7 HISTORICAL STORAGE AND RETRIEVAL SYSTEM (HSRS)

10.7.1 The HSRS shall collect, store and process system data from the power plant to an offline storage device at the plant site, which is retrievable at any given point in time.

10.7.2 In addition, facilities shall be made to transmit the real-time data through SCADA as mentioned in clause 10.1.4. the real time online data transmission system should have a minimum storage capacity of 15 days in case of communication failure and should be able to transmit the data as per clause 10.1.4 after restoring the communication line.

10.7.3 The data to be stored in the above system shall include alarm and event list periodic plant data, selected logs/reports. The data to be stored and frequency of storage and retrieval shall be finalized during the detail engineering stage.

10.8 CONTROL AND POWER SUPPLY SCHEME

The Contractor shall provide the UPS/DC power supply of suitable rating to cater to all the load requirements of the SCADA system and its auxiliaries. The power backup for the entire system should be at least for 2 hrs.

10.9 CONTROL CABINET/ PANELS/ DESKS AT MAIN CONTROL ROOM

10.9.1 The Contractor shall ensure that the temperature rise is well within the safe limits for systems components even under the worst condition and specification requirement.

10.10 SOFTWARE LICENSES

The Contractor shall provide a software License for all software being used in Contractor systems. The software licenses shall be provided for the project and shall not be hardware/machine-specific.

10.11 HARDWARE AT MAIN CONTROL ROOM

The hardware as specified shall be based on the latest state-of-the-art workstation and server and technology suitable for industrial application.

10.12 FACTORY ACCEPTANCE TEST (FAT)

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

10.13 COMMUNICATION CABLES
Optical Fiber Cables

10.13.1. Optic Fiber cable shall be 8 core galvanized corrugated steel taped armoured, fully water blocked with the dielectric central member for outdoor/ indoor application so as to prevent any physical damage.

10.13.2. The cable shall have multiple single-mode or multimode fibers on a required basis so as to avoid the usage of any repeaters.

10.13.3. The outer sheath shall have Flame Retardant, UV resistant properties and are to be identified with the manufacturer's name, year of manufacturing, progressive automatic sequential online marking of length in meters at every meter on the outer sheath.

10.13.4. The cable core shall have suitable characteristics and strengthening for the prevention of damage during pulling.

10.13.5. All testing of the optic fiber cable being supplied shall be as per the relevant IEC, EIA, and other international standards.

10.13.6. The Contractor shall ensure that a minimum of 100% cores is kept as spare in all types of optical fiber cables.

10.13.7. Cables shall be suitable for laying in conduits, ducts, trenches, racks.

10.13.8. Spliced/ Repaired cables are not acceptable. Penetration of water resistance and impact resistance shall be as per IEC standards.

10.14. COMMUNICATION CABLE (MODBUS)

10.14.1. Data (Modbus) Cable to be used shall be shielded type with stranded copper conductor. The cable shall have minimum 2 pair each with conductor size of 0.5 Sq.mm. Cable shall be flame retardant according to IEC 60332-1-2

10.14.2. Cable shall be tested for Peak working voltage of not less than 300 V and shall be suitable for serial interfaces (RS 422 and RS 485).

11. LIST OF DELIVERABLES:

1.	**SOLAR PHOTOVOLTAIC (SPV) MODULES** I. Total number of SPV Modules II. Commercial Datasheet and Guaranteed Technical Datasheet III. Complete Test Reports and Certifications for the module. IV. RFID details along with RFID Readers. V. Proof of Class A type PV Modules as per IEC 61730 VI. Guarantee and Warranty Certificates from Original Equipment Manufacturer (OEM) VII. Delivery and Insurance Challans VIII. Insurance Certificate from OEM
2.	**(A) STRING COMBINER BOX (SCB)** **(B) STRING MONITORING UNIT (SMU)** i. The Contractor shall submit the following documents, drawings, and certificates for approval II. Guaranteed Technical Particular (GTP) Datasheet. III. General Arrangement (GA) drawing IV. Quality Assurance Plan (QAP) V. Enclosure ingress protection and impact protection test certificates
3.	**DC CABLES** The Contractor shall submit the following documents, drawings, and certificates with the necessary approval I. Guaranteed Technical Particular (GTP) Datasheet. II. DC Cable sizing calculation III. Quality Assurance Plan (QAP) IV. DC cable type test certificate as per TUV 2 PfG 1169/08.2007 /IS 7098 Part I
4.	**POWER CONDITIONING UNIT** I. Guaranteed Technical Particular (GTP) Datasheet II. General Arrangement (GA) drawing and Foundation details III. Single Line Diagram IV. Quality Assurance Plan (QAP) V. Detailed flow chart indicating the various operating modes (Standby/MPPT/sleep etc.) VI. Valid Test certificates shall be submitted from MNRE approved laboratories or laboratories like RETL/NABL/UL/TUV. VII. The inverter should qualify all the CEA REGULATIONS and Utility Regulations.

5.	**AC CABLES** The Contractor shall submit the following documents, drawings and certificates for approval: I. Guaranteed Technical Particular (GTP) Datasheet II. Cable sizing calculation III. Quality Assurance Plan (QAP) IV. Test Certificates as per standards, Routine test and acceptance tests requirements shall be as per relevant standards for all cable sizes.
6.	**DISTRIBUTION SWITCH GEAR** I. Schematic diagram and General Arrangement (GA) drawing shall be submitted for Approval from NIWE II. Routine test and acceptance tests requirements shall be as per relevant standards for all cable sizes.
7.	**UNINTERRUPTED POWER SUPPLY (UPS)** The Contractor shall submit the following documents, drawings and certificates for approval I. Design Documents/Drawings II. Technical Datasheet III. UPS sizing calculation IV. Single line diagram V. General Arrangement (GA) drawing VI. Quality Assurance Plan VII. Type test certificates as per the standards
8.	**EARTHING APPROVALS** Earthing documents/ drawings shall be approved by CEIG/Electrical Inspectorate along with the Scheme Approval. I. Technical datasheet. II. Earthing Design calculation.
9.	**LIGHTNING PROTECTION SYSTEM** Type test reports as per NFC 17-102:2011 shall be submitted during detailed engineering for approval.
10.	**SCADA** Factory Acceptance Test procedure shall be submitted by Contractor for approval.

12. GENERAL REQUIREMENT FOR CIVIL WORKS

This section of Technical Specifications describes detailed technical and functional requirements of all civil, Mechanical & Plumbing works included in the scope. Existing shade-free roof-top space shall be used to install Solar PV array While installing solar power pants 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.

I. All design and construction of civil works shall conform to relevant Indian standards such as BIS, IRC, NBC etc.
II. Contractor shall either have in-house qualified and experienced engineering team to carry out engineering or shall appoint a qualified and experienced external agency to carry out the engineering subjected to clearance of NIWE.
III. The design calculations shall be carried out after visiting the site and submitted for approval of NIWE before the commencement of construction.
IV. The design calculations shall be provided with a neat sketch showing the structure geometry, node, and member nos., lengths of various typical members, support points and type of supports, types of materials with design properties considered, type of sections used in analysis & design.
V. The report shall also include calculations for various loads considered in the design, a brief write-up on primary load cases and load combinations considered, and conclusions on design results with supporting sketches for easy reference and clarity.
VI. Where a computer program (other than STAAD Pro) is used for analysis and design, the Contractor shall also include a write-up on the computer program used along with a validation check. Input and output file shall also be given in the design report to facilitate its review and approval by the NIWE.
VII. The construction methodology for the MMS structure and its foundations shall also be submitted for prior approval of NIWE before the start of works at the site.
VIII. Contractor has to submit the design documents, drawings, layouts, investigation reports, test reports, calculations, and analysis, etc. for all works to NIWE for approval prior to the start of construction/ implementation activates at the site. The construction/implementation shall be done only as per approved drawings.
IX. The Contractor shall submit the detailed design calculations and drawings for MMS structure and their specifications/ standards to the Employer for approval before starting for fabrication work.
X. Contractor must submit the complete quality documents, i.e., test certificates for ail tests conducted starting from the raw material stage, in-process, final testing w.r.t structure.
XI. The Contractor shall submit the detailed foundation & structural design basis and the list of reference standards. The Contractor to get the design vetted by a Chartered engineer/ design proof check consultant.
XII. 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
XIII. 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
XIV. 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 Contractor

13. MODULE MOUNTING STRUCTURE (MMS)

13.1. Structure plain Roof-top suitable

I. PV module should be placed uniformly in a gridded layout. The drawing indicating the alignment of solar modules should be submitted to the approval of NIWE, and NIWE may suggest modification, if necessary.
II. The Contractor has to submit the layout of the MMS structure along with all civil/structural drawings.
III. The structure shall be designed to allow easy replacement of any module and shall be in line with the site requirements.
IV. The support structure shall be designed as per relevant Indian standard(s) against prevailing loads considering the appropriate factor of safety. The connection between foundation to structures and other marks should be designed as per Indian standards.
V. The structure should be capable of withstanding a wind load of 170 km/hr after grouting and installation.
VI. Structural material, including fasteners, shall be corrosion resistant and compatible with the materials used in the module frame.
VII. Grouting material for SPV structures shall be as per M25 (1:2:2) concrete specification. If the module arrays are installed on the rooftop, a proper PCC foundation is to be provided, and the bottom of the array should be elevated to a height of 60cm from the ground.

13.2. Galvanization

The MMS structure shall be hot-dip galvanized with a minimum thickness of 75 microns coating provided on each side.

13.3. Fasteners

All the fasteners and washers (packing & spring) for Module Mounting Structure and Module shall be adequately protected from atmosphere and weather prevailing in the area and must sustain the adverse climatic conditions to ensure the life of the structure for at least 25 years.

14. PLANT LAYOUT

The Contractor shall submit drawing showing proposed project plant layout.

15. PERFORMANCE MEASUREMENT PROCEDURE

15.1. Performance Ratio (PR)

Performance Ratio (PR) test for Operational Acceptance of the plant shall be performed based on the following formula.

$$Performance\ Ratio = \frac{(\text{Energy Generated (kWh)} x\ Reference\ inplane\ irradiance\ (W/M2)}{(\text{Installed capacity of the plane (kWp) x Total inplane irradiance (kWh/M2)}}$$

The "Reference in- plane irradiance" is considered 1000 W/m² and "Total in-plane irradiance" is the measured value from the weather monitoring station (WMS) at NIWE site. In case if this data is not available, the "Total in- plane irradiance" value will be from the nearest SRRA stations.

15.2. Performance Guarantee Based Compensation for the Life Time of the plant after the O&M Period

The Contractor will pay performance guarantee based compensation for non-adherence to the minimum PR for the remaining of the project life equal to the net present value (NPV) of the average penalty imposed per year during the O&M period, calculated at a discounted factor of 9.08% (as per the prevailing practices) as per the given formula.

$$\text{COM}=\sum_{n=1(6)}^{20(25)} \left[\frac{\sum penalty\ amount\ of\ O\&M\ duration}{O\&M\ duration\ (years)} * \frac{1}{(1+\text{Discount factor\%})^{n}}\right]$$

16. COMPLETION OF PROJECT AND PENALITY:

16.1. Design engineering supply, Construction, Erection , Testing , commissioning, Grid synchronization, of Hybrid **Roof-Top** 100 kW(AC) Mono crystalline (PERC) Solar PV Power Plant at NIWE, Chennai, Tamil Nadu with 5 years of comprehensive AMC, Warranty, insurance and O&M from the date of commissioning.

100 kW(AC) Solar m-Si (monocrystalline solar module technology- MONOPERC) PV Power Plant at National Institute of Wind Energy, Chennai, Tamil Nadu, has to be completed in all respects on or before **31.03.2022.**

16.2. Performance ratio (PR) Minimum 78%

The Contractor shall maintain a minimum of PR, 78% Non-adherence to the maintenance of minimum specified PR, the Contractor will attract imposition of penalty as per the details given below:

The contractor shall maintain a minimum PR of 78% for the entire duration of O&M activities 5 years from the date of completion. For every 1% shortfall of PR below 78%, a penalty of 0.1% of the total contract value, i.e., total sum of all the supply contract, service contract and absolute value of O&M contract performance security submitted by the Contractor will be forfeited the PR shall be calculated as per the formula given below

$$PR. = \frac{(\text{Energy Generated (kWh)} x\ Reference\ inplane\ irradiance\ (W/M2)}{(\text{Installed capacity of the plane (kWp) x Total inplane irradiance (kWh/M2)}}$$

The "Reference in- plane irradiance" is considered 1000 W/m^2 and "Total in-plane irradiance" is the measured value from the weather monitoring station (WMS) at NIWE site. In case if this data is not available, the "Total in- plane irradiance" value will be from the nearest SRRA stations.

- PR are calculated after the completion of 12 months from the Date of completion (DoC) of the SPV Power Plant. The penalties will be levied after calculating the PR at the end of every 12th month from the Date of Completion during the O & M activities of 5 years
- All the penalties to be imposed will be recovered from any due payments to the Contractor or from the performance guarantee.
- **Performance Ratio (PR)-Minimum 78% (for the entire AC capacity installed for 100 kW AC export of energy during the operation)**
- In addition, the Contractor will have to pay the penalty for non-achievement of minimum specified PR during the O&M period (5 years) as compensation calculated at a discounted factor of 9.08% (prevailing practices) as per the given formula under Clause 16.3.
- **In case if the contractor fails to pay the penalty within the stipulated time levied by NIWE, NIWE has the rights to invoke the Bank Guarantee and the customer has to accept the same.**

16.3. Performance guarantee based compensation for the life time of the plant after the O&M period

The Contractor will pay performance guarantee based compensation for non-adherence to the minimum PR for the remaining of the project life equal to the net present value (NPV) of the average penalty imposed per year during the O&M period, calculated at a discounted factor of 9.08% (as per the prevailing practices) as per the given formula.

$$\text{COM}=\sum_{n=1(6)}^{20(25)} \left[\frac{\sum penalty\ amount\ of\ O\&M\ duration}{O\&M\ duration\ (years)} * \frac{1}{(1+\text{Discount factor}\%)^{n}}\right]$$

16.4. OPERATION & MAINTENANCE (O & M)

Any loss of data measurements affecting PR calculations for more than 50 solar hours (sunrise to sunset) in a year, the penalty will be levied as per the following loss of hours.

50-100 Hours -1% of O&M amount for that year
100-150 hours- 3% of O&M amount for that year
>150 hours- 5% of O&M amount for that year

17. OPERATION & MAINTENANCE REQUIREMENTS

The Contractor shall be responsible for 5 years of comprehensive AMC, Warranty, insurance and Operation and Maintenance of the 100 kW (AC) Solar Power from the date of commissioning at the location.

The O&M team will operate the solar plant in accordance with an Operations and Maintenance Agreement (the "O&M Agreement") which shall provide for, at a minimum,

the following services:

- Performing routine and non-routine maintenance on the solar plant during the O&M period;
- Operating the solar plant
- Providing all materials and services necessary for solar Plant maintenance;
- Monitoring the operations of the project via the computer monitoring system;
- Performing all duties for the safe and efficient operation and maintenance as per the standards;
- Complying with all regulatory obligations;

Operator shall perform the work and supply all required spare parts in a prudent and efficient manner and in accordance with:

- Manufacturers and systems designers' specifications, the Annual Operating Plan for the Plant and all operation and maintenance manuals,
- All Indian applicable laws, including environmental protection, pollution, sanitary, employment, and safety laws (Government Rules)
- Prudent Utility practice

Operator shall use all reasonable and practical efforts:

- To maximize plant capacity utilization
- To minimize plant downtime
- To optimize the useful life of all the equipment of the energy project

Contractor shall be responsible for all the required activities for the successful running, optimum energy generation & maintenance of the Solar Photovoltaic Power Plant, covering:

- Monitoring controlling, troubleshooting maintaining of records, registers.
- Supply of all spares, consumables and fixing/application, inverters/PCUs, indoor panels, CTs, PTs, Bus bars, cables terminals kits, Isolators with earth switch, and all other associated equipment of solar plant etc., for a period of five (5) years. The cost of these items (including the cost of spares) shall be included in the price quoted.
- Supply & use of consumables throughout the maintenance period as per recommendations of the equipment manufacturers.
- Conducting periodical checking, testing, overhauling and preventive action.
- **Submission of Monthly Performance Ratio Reports and operating conditions of the solar plant to NIWE**
- Replacement of damaged modules if any, during the period of five (5) years
- Replacement of Inverters/PCUs and all components used in solar plant time to time if required, during the period of five (5) years.
- Insurance covering all risks (Fire & allied perils, flooding, earthquake, terrorists, theft, and burglary)

- Maintaining and replacement of Lightning Arrestors.
- Continuous monitoring the performance of the Solar Power Plant and regular maintenance of the whole system including Modules, PCU's, junction boxes , cables, outdoor/indoor Distribution Board and all associated equipment etc. necessary for extracting and maintaining the maximum energy output from the Solar Power Plant.
- Annual Calibration of Energy Meters through third party accredited agencies. It shall be the responsibility of the Contractor to promptly rectify/ replace the defective meter so as to ensure that the errors in the energy meters are within the specified limit. Cost of calibration and rectification/ replacement, if any shall be borne by the Contractor.
- Periodic Testing/ calibration of all other measuring devices, including devices of solar observatory, as per respective manufacturer's instruction/ guideline.
- Replacing faulty components/equipment and providing any damage liability due to construction defects, malfunctioning, etc.

Operation and maintenance of the solar photovoltaic power plant are required for a period of five (5) years from the date of commissioning and handing over the plant. Which shall be carried out at fixed costs. The period of operation and maintenance will be deemed to commence from the date of commissioning of the solar photovoltaic power plant at the location.

17.1 OPERATION AND PERFORMANCE MONITORING

The operation part consists of necessary deputing manpower to operate the solar photovoltaic power plant at the optimum capacity. Operation procedures such as preparation to start, routine operations with safety precautions, monitoring of solar power plant, etc., shall be carried out as per the manufacturer's instructions to have the trouble-free operation of the complete system.

Daily work of the operators in the solar photovoltaic power plant involves;

- Cleaning of modules (once in 10 days), logging the voltage, current, power factor, power, and energy output of the solar power plant
- Note down failures, interruption in supply and tripping of different relays, the reason for such tripping, duration of such interruption, etc.

17.2 MAINTENANCE

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 a month and shall include activities such as cleaning and checking the health of the SPV system, cleaning of module surface (to be taken up once in 10 days), tightening of all electrical connections, checking of the tilt angle of module mounting structure and any other activity that may be required for the proper functioning of the SPV system as a whole.
- Regular periodic checks of the Modules, PCU's shall be carried out as a part of routine preventive maintenance.

- In order to meet the maintenance requirements, stock of consumables is to be maintained as well as various spare as recommended by the manufacturer at least for five (5) years to be kept for usage.
- Particular care shall be taken for outdoor equipment to prevent corrosion. Cleaning of the junction boxes, cable joints, insulators, etc. shall also be carried out at every month interval.
- Resistance of the earthing system, as well as individual earthing, is to be measured and recorded every month. If the earth resistance is more than 3 ohms, suitable action is to be taken to bring down the same.
- According to the recommendations, stock of special tools and tackles shall be maintained for Modules, PCU's and other major electrical equipment.
- Solar module surface shall be thoroughly cleaned on a regular basis (every 10 days in normal cases. But it is to be cleaned on a daily basis whenever required in case of severe dust deposition due to dust storms or other natural phenomena or anthropogenic activities) to ensure maximum possible generation. The manufacturer's approved method of cleaning shall be adopted for the purpose, but the cleaning activity has to once in 10 days under normal conditions.
- A maintenance record is to be compulsorily to be maintained by the Contractor to record the regular maintenance work carried out as well as any breakdown maintenance along with the date of maintenance, reasons for the breakdowns, steps taken to attend the breakdown, duration of the breakdown, etc.
- The Schedules will be drawn such that some of the jobs other than breakdown, which may require a comparatively long stoppage of the Power Plant, shall be carried out preferably during the non-sun period.
- The Contractor will attend to any breakdown jobs immediately for repair/replacement /adjustments and complete at the earliest working round the clock. During breakdowns (not attributable to normal wear and tear) at the O&M period, the Contractor shall immediately report the accidents, if any, to the Engineer in Charge at the site showing the circumstances under which it happened and the extent of damage and or injury caused.
- The Contractor shall comply with the provision of all relevant acts of Central or State Governments including payment of Wages Act 1936, Minimum Wages Act 1948, Owner's Liability Act 1938, Workmen's Compensation Act 1923, Industrial Disputes Act 1947, Maturity Benefit Act 1961, Mines Act 1952, Employees State Insurance Act 1948, Contract Labour (Regulations & Abolishment) Act 1970, Electricity Act 2003, Grid Code, Metering Code, MNRE guidelines, owners Guidelines or any modification thereof or any other law relating whereto and rules made thereunder from time to time.
- The Contractor shall, at his own expense, provide all amenities to his workmen as per applicable laws and rules.
- The Contractor shall ensure that all safety measures are taken at the site to avoid accidents to his Workmen.
- If negligence / mal-operation of the Contractor's operator results in failure of equipment, such equipment should be repaired replaced by Contractor at free of cost.

- **If any jobs covered in the O&M scope are not carried out by the Contractor during the O&M period, pro-rata deduction will be made based on the quantum of work from the O&M contract bills.**

17.3 TOOLS AND TACKLES

The Contractor shall arrange and stock for all the necessary tools and tackles for carrying out all the maintenance work covered under this contract.

18. HANDING OVER

At the end of the Operation and Maintenance period of 5 years, the Contractor shall hand over the complete system to NIWE in the best working condition. Any component found defective/inefficient/worn out shall be rectified/ replaced/ made good at the Contractor's cost before handing over the system to the Owner. 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.

19. STAFF

The power plant will be under the charge of an engineer employed by the successful Contractor and supported by adequate staff as and when necessary during the O&M period.

20. TRAINING

During the commissioning of the plant, training will be imparted to the O&M staff and to the Owner's technical personnel.

This operational training shall cover the following:

- The nature, purpose, and limitations of all plant and equipment
- The detailed operating instructions on each section and equipment of the plant
- Normal start-up and shutdown program for the plant
- The emergency procedures and all related HSE issues according to the standards.

The basis for the training shall be the O&M manual provided by the OEM's of various equipment.

21. ENERGY METER:

- **Supply , installation , calibration, testing and commissioning of Energy meter (3 phase 4 wire 415 AC) shall be provided at NIWE substation / near by the inverter (Energy meter and other required instruments shall be borne by the contractor) for calculating the total Energy in kWh.**
- **Energy meter should be compatible to transmit the data digitally to scada and as per NIWE requirement.**

22. GENERAL:

a) Design, Engineering, Supply, Construction, Erection, Testing, Commissioning, Grid Synchronization with comprehensive AMC for a period of 5 years from the date of commissioning including warranty, Insurance and O&M of a 100 kW (AC) Solar m-Si (monocrystalline solar module technology- MONOPERC) PV Power Plant at National Institute of Wind Energy, Chennai, Tamil Nadu from the Date of Commissioning (i.e., Power evacuation to the existing LT Panel at NIWE substation) for a period of 5 years.
b) The New machineries /equipment's/ components/materials to be supplied for the establishment of the 100 kW (AC) SPV plant shall be in good working condition.
c) The contractor shall give warranty that the Goods shall be free from defects arising from any act or omission of the Contractor or arising from design, materials, and workmanship, under normal use in the conditions. The warranty is for a period of 5 years from the date of commissioning and grid synchronization of the 100 kW (AC) SPV plant at the specified location.
d) The contractor has to make necessary arrangements for the continuous supply of deionized water to the required level of 75ppm for the cleaning of the solar modules after commissioning of the 100 kW (AC) SPV plant. The permanent arrangement for the supply of the required quality water is part of the Scope of Work.
e) The latest available only licensed software version must be provided/used for any type of work or with the system supplied, and version must be made available along with the equipment.
f) The contractor has to provide training/demonstration to designated NIWE officials during the entire contract period at the location.
g) Contractor should provide the proposed detailed work plan, methodology, and time schedule to complete the Scope of Work in the stipulated time.
h) The contractor has to obtain all necessary approvals and permits from the respective authorities to procure, transport, install grid integration, commissioning, etc in order to complete the work in a timely manner. In this, the Owner may facilitate the Contractor in a possible manner only. Thus the quote should cover the expenses in taking necessary approvals and permits from the respective authorities.
i) Contractor shall submit complete literature regarding Equipment/Machinery. **Solar panel shall be 100% Indian Make**, and 40% of the other equipment shall be of Indian Make.
j) The Models enlisted in ALMM list issued by MNRE are only eligible to participate in this tender.
k) The Contractor will be responsible for the safe delivery of all materials required for the installation and commissioning of the 100 kW (AC) SPV plant at the location at their own cost. Therefore, the price quoted must be inclusive of freight and insurance.
l) The Contractor shall provide a list of Tools/Tackles for installation, operation, and maintenance of the plant. The list shall be submitted along with the bid. The list shall be verified and certified mutually at the site of delivery.
m) The Contractor shall provide a list of critical spares and deliver them along with equipment. The list shall be submitted along with the bid.
n) The Scope of Work/Supply over-rides all other similar related clauses appearing

anywhere in the bid documents, and such clauses are deemed to have been modified to the extent stipulated above.

o) The installation, commissioning, and handing over of the 100 kW(AC) SPV plant at the location is to be completed within the stipulated period of **2 months** from the date of the Purchase Order with the technical specifications as mentioned in the Annexure (Technical Compliance sheet)

p) The rates ordered should be firm and would not be increased at any time by the Contractor

q) Conditions in the technical document, technical specifications, and special conditions of this tender document would override the general conditions, wherever applicable.

r) Bidder must visit the site at NIWE, Chennai (Monday to Friday 09.00 AM to 5.30 PM) where the work is proposed. Certificate to the effect that the vendor of the bidding firm has visited the site shall be obtained from the concerned NIWE, Chennai Official. (National Institute of Wind Energy, Velachery – Tambaram Main Road, Pallikaranai, Chennai 600100.)

s) Contractor should dismantle the existing structures, concrete construction and panels at their own cost. After dismantling NIWE will provide the area for storage of dismantled materials.

t) Contractor shall have to make his own arrangements for supply of water to his labor camps and for installation & commissioning works. All pumping installations, pipe network and distribution system will have to be carried out by the contractor at his own

risk and cost. The Owner does not guarantee the supply of water and this does not relieve the contractor of his responsibility in making his own arrangement and for the timely completion of the various works as stipulated.

u) Contractor has to make arrangements for power supply for construction & commissioning of the project successfully.

v) Contractor must provide Walkway and construction of passage for cleaning of SPV power plant.

w) The contractor can submit a maximum of two PV Syst simulation reports using Atlas data for the project site (NIWE Chennai) along with Technical offer. The contractor can submit more than one PV Syst report based on different combination of PV modules and inverters to obtain a minimum Performance Ratio (PR) of 78% or above etc.)

x) The contractor shall provide the necessary technical support for re-location of the solar power plant within or outside NIWE if any such request made by NIWE within 5 years for which cost shall be mentioned separately by the contractor.

Bid Form
Annexure 1

IV.TECHNICAL AND COMMERCIAL BID SUBMISSION FORM

Ref No. …… Date ……..

To
The Division Head (Finance & Administration),
National Institute of Wind Energy,
Velachery – Tambaram Main
Road, Pallikaranai,
Chennai - 600100

Dear Sirs,

We hereby submit our bid for "……" for NIWE, Chennai as outlined in your bidding document. We have understood the instructions and the terms and conditions mentioned in the bidding documents furnished by you and have thoroughly examined the detailed scope of work laid down by you and are fully aware of nature and scope of work required.

- We hereby confirm our acceptance and compliance to the provisions and terms and conditions contained in the bidding documents.
- We declare that the work will be executed strictly in accordance with the requirement.
- Our proposal shall remain valid for acceptance for a period of 120 days from the date of opening of the 'Technical & Commercial Proposal' by NIWE.
- We confirm that the prices quoted by us in the 'Price Bid' are firm and shall not be subject to any variation for the entire period of the contract.
- We confirm that the prices quoted by us in the 'Price Bid' include all taxes, duties and levies payable by us.
- We hereby furnish our 'Technical and Commercial Bid' comprising the following as per prescribed formats

i. Technical and Commercial Bid Submission form (Bid Form 1)
ii. Documents in support of meeting Qualifying Requirements stipulated in NIT
iii. Certificate towards Technical literature
iv. Acceptance of Fraud Prevention Policy
v. Any additional literature in support of Bid documents (please specify)

Yours truly,
Signature.....
Name.....

Designation …..

- Date.....
- Place.....

Annexure - 2

V. Manufacturer's Authorization On the letter head

To:
The Division Head (Finance & Administration),
National Institute of Wind Energy,
Velachery – Tambaram Main Road,
Pallikaranai,
Chennai 600100

Sub: Letter of Authorization
Ref: Notice Inviting Tender No.: …… dated ……
For ……(Name of the tender)…….

Dear Sir,

We hereby confirm that:

a. we are the manufacturers of …….

b. M/s_____(Name of Bidder)_____are authorized to supply the (se) item (s) to you.

c. They shall supply and provide allied support & subsequent maintenance services during the currency of the contract.

d. we extend our full guarantee and warranty with respect to the Goods offered by the above firm in reply to this NIT and subsequent maintenance, supply of spares & services in the event of award of contract.

e. In the event of their failure to perform any of the activities detailed above w.r.t products manufactured & supplied by us we undertake to arrange to perform the same, without any additional financial implication to NIWE.

Annexure- 3

VI. BID SECURING DECLARATION

Date:_____ Tender No. _____

To (insert complete name and address of the purchaser) I/We. The undersigned, declare that:

I/We understand that, according to your conditions, bids must be supported by a Bid Securing Declaration.

I/We accept that I/We may be disqualified from bidding for any contract with you for a period of one year from the date of notification if I am /We are in a breach of any obligation under the bid conditions, because I/We

a) have withdrawn/modified/amended, impairs or derogates from the tender, my/our Bid during the period of bid validity specified in the form of Bid; or

b) having been notified of the acceptance of our Bid by the purchaser during the period of bid validity (i) fail or reuse to execute the contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the Instructions to Bidders.

I/We understand this Bid Securing Declaration shall cease to be valid if I am/we are not the successful Bidder, upon the earlier of (i) the receipt of your notification of the name of the successful Bidder; or (ii) thirty days after the expiration of the validity of my/our Bid.

Signed: (insert signature of person whose name and capacity are shown)
in the capacity of (insert legal capacity of person signing the Bid Securing Declaration)

Name: (insert complete name of person signing he Bid Securing Declaration) Duly

authorized to sign the bid for an on behalf of (insert complete name of Bidder)

Dated on _____ day of _____ (insert date of signing)

Corporate Seal (where appropriate)

(Note: In case of a Joint Venture, the Bid Securing Declaration must be in the name of all partners to the Joint Venture that submits the bid)

Annexure- 4

VII.PROFORMA FOR BANK GUARANTEE FOR CONTRACT PERFORMANCE

Bank Guarantee No……. **Date:**

The Division Head (Finance & Administration),
National Institute of Wind Energy,
Velachery – Tambaram Main Road, Pallikaranai,
Chennai 600100 Dear Sirs,

In consideration of the NIWE, (hereinafter referred to as the 'Purchaser' which expression shall unless repugnant to the context or meaning thereof include its successors, administrators and assigns) having awarded to M/s …… …… with its Registered/Head Office at ..... (hereinafter referred to as the 'Seller' which expression shall unless repugnant to the context or meaning thereof, includes its successors, administrators, executors & assigns) a Contract by issue of Purchaser's Purchase Order No…….. dated.....and the same having been unequivocally accepted by the seller resulting in a 'Contract' valued at …… for.....(scope of work/contract) and the seller having agreed to provide a contract performance guarantee of the faithful performance of the entire contract equivalent to five percent (5%) of the said value of the contract to the purchaser.

We, ……(Name & Address of Bank) having our Head Office at ……(hereinafter referred to as the 'Bank' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors & assigns), do hereby guarantee and undertake to pay the Purchaser, on demand any and all monies payable by the Seller to the extent of …… as aforesaid at any time up to (*) ……..without any demur, reservation contest, recourse, or protest and/or without any reference to the Seller. Any such demand made by the Purchaser on the Bank shall be conclusive and binding notwithstanding any difference between the Purchaser and Seller or any dispute pending before any court Tribunal, Arbitrator or any other Authority. The bank undertakes not to revoke this guarantee during its currency without previous consent of the purchaser and further agrees that this guarantee herein contained shall continue to be enforceable till the purchaser discharges this guarantee.
The Purchaser shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee, from time to time to extend the time for performance of Contract by the Seller. The Purchaser shall have the fullest liberty, without affecting this guarantee to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Seller, and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied in the contract between the

Purchaser and the Seller or any other course of remedy or security available to the Purchaser. The Bank shall not be released of its obligations under these presents by any exercise by the Purchaser of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the purchaser or any other indulgence shown by the Purchaser or by any other matter or thing whatsoever which under law would, but for this provision, have the effect of relieving the Bank.
The Bank also agrees that the purchaser at its option shall be entitled to enforce this guarantee against the bank as a principal debtor, in the first instance without proceeding against the seller and notwithstanding any security or other guarantee that the purchaser may have in relation to the seller's liabilities.

Notwithstanding anything contained herein above our liability under this guarantee is restricted to ..... and it shall remain in force up to and including ……(*)..... and shall be extended from time to time for such period (not exceeding one year), as may be desired by M/s .....on whose behalf this guarantee has been given.

Dated this ……day of ……20……..at ……

WITNESS
SIGNATURE ……
NAME …….
OFFICIAL ADDRESS ……
BANK'S COMMON SEAL …….

Annexure - 5

VIII. Bidder details

Bidders Name and Address:

The Division Head (Finance & Administration),
National Institute of Wind Energy,
Velachery – Tambaram Main Road,
Pallikaranai,
Chennai 600100

Dear Sirs,

We, hereby authorize the Owner to make all our payments through Electronic Fund Transfer System. The details for facilitating the payments are given below:

(TO BE FILLED IN CAPITAL LETTERS)

NAME OF THE BENEFICIARY	
ADDRESS	
PIN CODE	
TELEPHONE NO. (WITH STD CODE)	
BANK PARTICULARS	
A)BANK NAME	
B) BANK TELEPHONE NO. (WITH STD CODE)	
C) BRANCH ADDRESS	
D) BANK FAX NO (WITH STD CODE)	
E) BRANCH CODE	
F) 9 DIGIT MICR CODE OF THE BANK BRANCH (ENCLOSE	
G) BANK ACCOUNT NUMBER	
H) 11 DIGIT IFSC CODE OF THE BANK BRANCH	
I) BANK ACCOUNT TYPE (TICK ONE)	
SAVING CURRENT LOAN CREDIT OTHERS	
IF OTHERS, SPECIFY	
5. PERMANENT ACCOUNT NUMBER (PAN)	
6. E-MAIL Address for Intimation regarding release of payments	

I/We hereby declare that the particulars given above are correct and complete. If the transaction is delayed or credit is not affected at all for reasons of incomplete or incorrect information, I/We would not hold the Owner responsible SIGNATURE.

DATE

(AUTHORISED SIGNATORY)

Name: OFFICIAL STAMP

Annexure- 6

IX. Abstract of Eligible/Completed Projects of the Firm

Sl. No	Name of Project	Name of Client (Address, phone & email)	Capital cost of project (In Rs. lakhs.)	Date of Commencement of the Project	Date of Completion of the Project	Duration
1						
2						
3						

Note:

The Firm should attach separate sheets to provide brief particulars of other relevant experience. Only Projects/work completed before the Tender issue date should be mentioned. Sufficient documentary evidence of the work (Work Order and Completion Certificate) satisfying the condition shall be attached.

Annexure-7

IX. Price Bid / BOQ

Sl. No.	Item Description	Total Price
1.	Design, Engineering, Supply, Construction, Erection , Testing , Commissioning, Grid synchronization of Hybrid **Roof-Top** 100 kW(AC) Mono crystalline (PERC) Solar PV Power Plant at NIWE, Chennai, Tamil Nadu with 5 years of warranty & Insurance from the date of commissioning. (EPC Contract)	
2.	Comprehensive O&M for 5 Years from the date of commissioning for Hybrid **Roof-Top** 100 kW(AC) Mono crystalline (PERC) Solar PV Power Plant at NIWE, Chennai, Tamil Nadu. 1st Year	
	2nd Year	
	3rd Year	
	4th Year	
	5th Year	
	Grand Total	

** GST Will be paid as per rules

Signature of supplier, seal and date:

Contact Person Details:

Signature of contact Person:

Annexure - 8

XI.DOCUMENTS TO BE UPLOADED

	Particulars	
	Scanned Copy of Annexure 4 / NSIC /MSME certificate	
	Registration copy and GST Certificate of the organization	
	Auditor Certificate confirming the Turnover for the past three years 2018-19,2019-20,2020-21	
	Five Customer feedback Certificate for One year successful completion of Offshore Wind Resource Assessment using floating Buoy as per Clause 13 of GPC	
	Technical Compliance Sheet as per Annexure 8	
	Duly filled Annexure 6, Annexure 10 and Annexure 11	
	Eligibility criteria form duly filled in	
	Commitment /Undertaking letter as per clause 4.0 (1) from the vendor letter head	
	Documentary evidence to prove the compliance on Stage 2 maturity level as per CARBON TRUST -2018 shall be submitted along with the bid.	

Annexure - 9

Technical Compliance Sheet for 100 KW (AC) NIWE ROOF TOP, Chennai Solar PV project						
Serial No.	**Tender chapter**	**Item**	**Tender Clause**	**Specifications**	**Required**	**Compliance Statement**
1	1	PV Modules	1.1	Technology	Crystalline Silicon- Mono PERC	
				Specifications	1 Minimum 380 Wp Rated Power at STC,Minimum Efficiency of 19 % at STC , 2. Maximum Temperature Coefficient of Pmax: -0.45%/°C, 3. Minimum 4 Bus bars,	

				General Specifications	1. PID compliant, salt mist & ammoniaresistant. 2. High transmittance tempered/arc glass, (c) durable layered structure for back sheet with moisture barrier properties, elongation retention and UV resistance. 3. UV resistant Encapsulant 4. Edge tapesfor sealing are not allowed. 5. Anodized Aluminum module frames 6. The Models enlisted in ALMM list issued by MNRE 7. Resistant junction boxes with minimum three numbers of bypass diodesand two numbers of MC4 connectors, (h)IP67 degree of protection, 8. RF Identification (RFID) Tag inside themodule lamination 9. PV modules must be warranted for minimum of 10 years against all material, manufacturing defects and workmanship.	

Technical Compliance Sheet for 100 KW (AC) NIWE ROOF TOP, Chennai Solar PV project

Serial No.	Tender chapter	Item	Tender Clause	Specifications	Required	Compliance Statement	Remarks
1	1	PV Modules	1.1	General Specifications	10. PV modules must be warranted for linear degradation rate of power output except for first year and shall guarantee 90% of the initial rated power output at the end of 10 years and 80 % by the end of 25 years.		
		PV Modules	1.2	Standards and Certification	Copies of certificates of the following standards: IS 14286, IEC 61215 Ed.2, IEC61730-1 Ed1.2, IEC 61730-2 Ed1.1, IEC 61701 Ed.2		
2	2	(A) String Combiner Box	2.1	Technical requirements	1. As per the design requirement of Solar Array and Strings 2. As per the design requirement of Solar Array and Strings		

					3. SPD Type II		
			2.2	General Specifications	1. Enclosure with at least IP67, 2. Mechanical impact resistance at least IK07.		
			2.3	Standards and Certification	Copies of certificates of the following standards: IEC 60529, IEC62262, IEC 60269-1 IEC 60269-6, IEC 61643-12, IEC 62852		
		(B) String Monitoring Unit	Parameters to be measured		String current, Bus voltage, Output current,Cabinet Temperature, DC disconnector switch ON/OFF status, SPD operating status.		

Technical Compliance Sheet for 100 KW (AC) NIWE ROOF TOP, Chennai Solar PV project							
Serial No.	**Tender chapter**	**Item**	**Tender Clause**	**Specifications**	**Required**	**Compliance Statement**	**Remarks**
3	3	DCCables	3.1	Insulation and Conductor	XLPE cable with copper conductor		
				Voltage Rating	1.1 kV DC		
			3.2	General Specifications	UV resistant, Single core, Armoured, Flame Retardant Low Smoke (FRLS), Flame Retardant Non Corrosive (FRNC)		
			3.3	Standards and Certifications	1. DC Cable: IS 7098- Part 1		

4	4	Invertor Type /Power Conditioning Unit	4.1	Technical Requirements	1. Rated AC power 120 kVA, 2. Maximum input voltage of 1000 V DC 3. Output Voltage range 3 Phase 4 wire (415 AC) 4. Frequency 50hZ 5. Minimum Inverter efficiency of 97 %, 6. Degree of protection : IP 54 for Indoor , IP 66 for outdoor 7. Total Harmonic Distortion: < 3% at 100 % load.		
			4.2	General specifications	1. Integrated MPPT with PCU, 2. SPD Type II, 3. Standalone UPS with 2 hours backup to meet auxiliary power requirement of PCU, 4. Communication interface with SCADA		
Technical Compliance Sheet for 100 KW (AC) NIWE ROOF TOP, Chennai Solar PV project							
Serial No.	**Tender chapter**	**Item**	**Tender Clause**	**Specifications**	**Required**	**Compliance Statement**	**Remarks**
4	4	Invertor Type /Power Conditioning Unit	4.3	Standards and Certifications	IEC 61683 Ed.1, IEC 61727, IEC 62109-1 Ed.1, IEC 62109-2 Ed.1, IEC 61000-6-2 Ed.2, IEC 61000-6-4 Ed.2.1, IEC 60068-2-1:2007, IEC 60068-2-2:2007, IEC 60068-2-14:2009, IEC 60068-2-30:2005, IS 16221 (Part 1): 2016, IS16221 (Part 2): 2015, IS 16169: 2014		

5	5	AC Cables	5.1	Technical Requirements	LT Cable (Inverter to NIWE Substation) XLPE insulated PVC sheathed cables.HT Cable (Inverter to NIWE substation Inter connection point)		
			5.2	General Specifications	UV resistant, Armored, Flame RetardantLow Smoke (FRLS)		
			5.3	Standards and Certifications	IS 7098-1		
			5.2.6	LT Cable	LT cable (from the inverter to LT NIWE Substation) shall be laid through the GI Tray with supports. The output of invertor LT cables should be connected to NIWE substation LT panel with required MCCB and Automatic change over switch and other necessary equipment (panels, controls, indication lamps and measurement instruments etc.,)		

Technical Compliance Sheet for 100 KW (AC) NIWE ROOF TOP, Chennai Solar PV project							
Serial No.	**Tender chapter**	**Item**	**Tender Clause**	**Specifications**	**Required**	**Compliance Statement**	**Remarks**
6	6	Distribution Switch gear	6.1	Technical Requirements	MCCB : 1. Rated voltage of 415V, 2. Release: Thermal magnetic/ microprocessor, 3. 4 pole type with rated insulationlevel of 690V. 4. 2.1 x short circuit breaking capacity		
			6.2	General Specifications	Panel of Modular type with compartmentalized construction with IP54 as per IS 2147 and outdoor protection of IP 65.		

			6.3	Standards and Certifications	IEC 61439-1, IEC 61439-2, IEC 60947-1, IEC 60947-2, IEC 60947-3, IEC 60947-4-1, IEC 60947-5-1, IEC 60947-11, IS 694, IEC 61869, IS 3043, IEC 60255		
7	7	UPS	7.1	General Specifications	1. Data/ logger/ SCADA 2. HMI of SCADA 3. Emergency Lighting 4. Inverter's Auxiliary supply 5. UPS battery backup system for minimum 2 hours.		
8	8	Earthing	8.1	Standards andCodes	IS 3043, IEEE 80, IEEE 142		
			8.2	General Specifications	1. Earth grid shall be formed consisting of a number of earth electrodes. 2. Earth electrode of high tensile low carbon with high conductivity carbon. Inspection chamber and lid shall be provided.		

Technical Compliance Sheet for 100 KW (AC) NIWE ROOF TOP, Chennai Solar PV project							
Serial No.	**Tender chapter**	**Item**	**Tender Clause**	**Specifications**	**Required**	**Compliance Statement**	**Remarks**
9	9	Lighting Protection System	9.0	General	1. Early streamer emission air terminal as per NFC 17-102:2011. Protection level -1. 2. Highly insulated poly plastic adapter to fix the ESE air terminal with the FRP mast. 3. Down Conductor- EN 50164-2 4. EN 50164-6 or equivalent standard. 5. Earth termination system with NFC 17-102. 6. Earth electrodes EN50164-2 7. Earth enhancing compounds EN 50164-7		

					8. Type tests reports NFC 17-102:2011		
10	10	SCADA	10.1	General Requirements	• The SCADA shall perform the following operations, which include the measurement and continuous recording at an interval of 1 minute and 10 minutes 1. DC bus output of SCB 2. Inverter output power, energy, voltage , current and pf 3. AC and DC side power of the inverter 4. Energy delivered to the grid in kWh 5. System frequency 6. Current and voltage of each sub array/string 7. Any other parameter considered necessary by supplier based on current prudent practice 8. SCADA should be compatible with transmitting the data to the NIWE server or any other institution as directed by NIWE. 9. Should provide a complete state of the art SCADA system with accessories for safe, reliable and efficient operation of entire solar plant and its auxiliary system.		
Technical Compliance Sheet for 100 KW (AC) NIWE ROOF TOP, Chennai Solar PV project							
Serial No.	**Tender chapter**	**Item**	**Tender Clause**	**Specifications**	**Required**	**Compliance Statement**	**Remarks**

10	10	SCADA	10.4	Software Requirements	Industry standard operating systems like WINDOWS, etc. 1. MODBUS (TCP/IP, RTU, ASCII) 2. IEC 60870-5-101/104 3. Any other protocol		
11	11	List of deliverables	11.0	General	1. Solar Photovoltaic (SPV) Modules 2. String Combiner Box (SCB) & String Monitoring Unit (SMU) 3. DC Cables 4. Power Conditioning Unit 5. AC Cables 6. Distribution Switch Gear 7. Uninterrupted Power Supply (UPS) 8. Earthing Approvals 9. Lighting Protection System 10. SCADA 11. All other required materials and instruments.		
12	12	Civil Works	12.0	General Requirements	Shall conform to relevant Indian Standards such as BIS, IRC, NBC, etc.		
13	13	Module Mounting Structure (MMS)	13.1	General	1. Capable of withstanding wind load of 170km/hr. 2. Grounting material for SPV structures as per M25 (1:2:2) concrete specification. 3. If on roof top PCC foundation and bottom array to a height of 60cm from the ground.		

Technical Compliance Sheet for 100 KW (AC) NIWE ROOF TOP, Chennai Solar PV project							
Serial No.	**Tender chapter**	**Item**	**Tender Clause**	**Specifications**	**Required**	**Compliance Statement**	**Remarks**
13	13	Module Mounting Structure (MMS)	13.2	Galvanization	MMS structure shall be hot-dip galvanized with minimum thickness of 75 microns.		
14	14	Plant Layout	14.0	General	Project Plant Layout		
15	15	Performance Measurement Procedure	15.1	Performance Ratio	$= \frac{\text{(Energy Generated (kWh)x Reference inplane irradiance (W/M2)}}{\text{(Installed capacity of the plane (kWp)x Total inplane irradiance (kWh/ M2)}}$		
16	16	Completion of Project and Penalty	16.1	Project completion	Design engineering supply, Construction, Erection , Testing , commissioning, Grid synchronization, of Hybrid **Roof-Top** 100 kW(AC) Mono crystalline (PERC) Solar PV Power Plant at NIWE, Chennai, Tamil Nadu with 5 years of comprehensive AMC, Warranty, insurance and O&M from the date of commissioning. 100 kW(AC) Solar m-Si (monocrystalline solar module technology- MONOPERC) PV Power Plant at National Institute of Wind Energy, Chennai, Tamil Nadu, has to be completed in all respects on or before **31.03.2022.**		
			16.2	Performance ratio (PR) Minimum 78%	The contractor shall maintain a minimum PR of 78% for the entire duration of O&M activities 5 years		
				Penalty	PR are calculated after the completion of 12 months from the Date of completion (DoC) of the SPV Power Plant. The penalties will be levied after calculating the PR at the end of every 12^{th} month from the Date of Completion during the O & M activates of 5 years		

Technical Compliance Sheet for 100 KW (AC) NIWE ROOF TOP, Chennai Solar PV project					
Item	**Tender Clause**	**Specifications**	**Required**	**Compliance Statement**	**Remarks**
Completion of Project and Penalty	16.2	Penalty	All the penalties to be imposed will be recovered from any due payments to the Contractor or from the performance guarantee.		
			Performance Ratio (PR)-Minimum 78% (for the entire AC capacity installed for 100 kW AC export of energy during the operation)		
			In addition, the Contractor will have to pay the penalty for non-achievement of minimum specified PR during the O&M period (5 years) as compensation calculated at a discounted factor of 9.08% (prevailing practices) as per the given formula under Clause 16.3.		
			In case if the contractor fails to pay the penalty within the stipulated time levied by NIWE, NIWE has the rights to invoke the Bank Guarantee and the customer has to accept the same.		
	16.3	Performance guarantee based compensation for the life time of the plant after the O&M period	COM= $\sum_{n=1(6)}^{20(25)} [\frac{\sum penalty\ amount\ of\ O\&M\ duration}{O\&M\ duration\ (years)} * \frac{1}{(1+\text{Discount factor}\%)^n}]$		
	16.4	Operation & Maintenance (O & M)	Any loss of data measurements affecting PR calculations for more than 50 solar hours (sunrise to sunset) in a year • 50-100 Hours -1% of O&M amount for that year • 100-150 hours- 3% of O&M amount for that year • >150 hours- 5% of O&M amount for that year		

Technical Compliance Sheet for 100 KW (AC) NIWE ROOF TOP, Chennai Solar PV project						
Tender chapter	**Item**	**Tender Clause**	**Specifications**	**Required**	**Compliance Statement**	**Remarks**
17	Operation & Maintenance (O&M) Requirements	17.0	General	The Contractor shall be responsible for 5 years of comprehensive AMC, Warranty, insurance and Operation and Maintenance of the 100 kW (AC) Solar Power from the date of commissioning at the location.		
				All Indian applicable laws, including environmental protection, pollution, sanitary, employment and safety laws (Government Rules).		
				1. To maximum plant capacity 2. To minimize plant downtime. 3. To optimize the useful life of all the equipment of the energy project.		
18	Handing Over	18.0	O&M	At the end of 5 years, shall handover the complete system to NIWE in the best working condition.		
19	Staff	19.0	Power Plant Staff	Under the charge of an Engineer supported by adequate staff.		
20	Training	20.0	During Commissioning of plant	Training to O&M staff and Owner's technical personnel. 1. About nature, purpose and limitations of all plant and equipment. 2. Detailed operating instructions. 3. Normal start-up and shutdown program for the plant. 4. The emergency procedures and all related HSE issues as per the standards.		

Technical Compliance Sheet for 100 KW (AC) NIWE ROOF TOP, Chennai Solar PV project						
Tender chapter	**Item**	**Tender Clause**	**Specifications**	**Required**	**Compliance Statement**	**Remarks**

21	Energy Meter	21.0	Energy Meter	1. Supply, installation, calibration, testing and commissioning of Energy meter (3 phase 4 wire 415 AC) at NIWE substation / near by the inverter (Energy meter and other required instruments shall be borne by the contractor) for calculating the total Energy in kWh. 2. Energy meter should be compatible to transmit the data digitally to SCADA and NIWE as per NIWE requirement.		
22	General	22.0	General scope of work	1. The Contractor has to make necessary arrangements for the continuous supply of deionized water to the required level of 75ppm for cleaning solar modules. 2. Solar panel shall be 100% Indian Make, and 40% of the other equipment shall be of Indian Make. 3. The Models enlisted in ALMM list issued by MNRE are only eligible to participate in the tender. 5. Bidders must visit the site at NIWE, Chennai (Monday to Friday between 9am to 5.30pm). 6. Contractor has to make arrangements for power supply for construction & commissioning of the project successfully. 7. Contractor must provide Walkway for cleaning of SPV power plant. 8. The Contractor can submit a maximum of two PV syst simulation reports using Atlas data for the project site along with technical offer. More than one PV syst report for PR of 78%.		

[Type here]	**Technical Compliance Sheet for 100 KW (AC) NIWE ROOF TOP, Chennai Solar PV project**						
SerialNo.	**Tender chapter**	**Item**	**Tender Clause**	**Specifications**	**Required**	**Compliance Statement**	**Remarks**
22	22	General			9. Contractor should dismantle the existing structures, concrete construction and panels at their own cost. NIWE will provide the area for storage of dismantled materials. 10. Contractor shall submit complete literature regarding Equipment/Machinery. Solar panel shall be 100% Indian Make, and 40% of the other equipment shall be of Indian Make. 11. Supply, installation, commissioning, and handing over of the 100 kW (AC) SPV plant at the location is to be completed within the stipulated period of **2 months** from the date of the Purchase Order with the technical specifications as mentioned. 12. The contractor shall provide the necessary technical support for re-location of the solar power plant within or outside NIWE if any such request made by NIWE within 5 years for which cost shall be mentioned separately by the contractor.		
* All technical details, such as, make, model, capacity, manufacturer, self-certification on Make in India (as per MNRE guideline)							

APPENDIX I

LIST OF ELECTRICAL /CIVIL/DOCUMENTS/DRAWINGS TO BE SUBMITTED

(Successful Bidders shall submit all Electrical & Civil Design Documents vetted by Certified Government Approved Agencies to NIWE)

Sl. No.	**Document/Drawing Title**
1	Design Basis Report (Annual Energy Yield for 25 Years, PV Syst Report, Shadow Analysis Report)

2	Electrical System Calculation & Parameters of PV Plant
3	DC Single Line Diagram & Capacity Calculation
4	AC Single Line Diagram
5	DC solar Cables (Module to SCB) - Sizing & Drop calculation, Schedule
6	DC solar Cables (Module to SCB) - GTP, GA, vendor document, Type Test Certificates and MQP
7	String Combiner Box - GTP, GA, Schematic Diagrams, vendor document, MQP and Type Test Certificates
8	DC Cable (SCB to Inverter) - Sizing & Drop calculation, Schedule
9	DC Cable (SCB to Inverter) - GTP, GA, vendor document, MQP and Type Test Certificates
10	DC Cables - Overall Cable Routing Layout & Trench Details
11	Inverter - GTP, GA, Schematic Diagrams, vendor document, MQP and Type Test Certificates
12	AC LT Power Cables (Inverter to LT Panel at NIWE substation)- Sizing & Drop calculation and schedule
13	AC LT Power Cables (Inverter to LT Panel at NIWE substation)- GTP, GA, vendor document, MQP and Type Test Certificates
14	UPS for control room - Sizing Calculation including Battery capacity
15	UPS - GTP, GA & vendor documents and MQP
16	DC System with Batteries - Sizing Calculation

17	DC System with Batteries - GTP, GA & vendor documents, MQP and DCDB details.
18	Lightning arrestors of PV Array - Design calculation and GTP, GA & vendor documents
19	Layout for Overall Lightning Protection
20	AC Earthing - GA and Layout (Design)
21	DC Earthing for PV Array & SCB - Design calculation, GA and Layout (Design), (Calculation)

22	AC DB - GTP, GA, vendor documents, SLD & Schematics and MQP
23	SCADA - Configuration /Architecture Diagram with list of I/O signals
25	SCADA - Vendor Documents, GA drawing & Schematics and MQP
26	Control and Communication Cables - GTP, GA and vendor documents, MQP and schedule
27	Overall plant layout
28	Lightning Arrestor foundation details
29	Module Mounting Structure - Design document

APPENDIX II

LIST OF TESTS (IEC 61215) SUGGESTED FOR SPV PANELS AT MNRE/NABL ACCREDITED LAB

Sl. No	Clause	Testing	Testing / measuring equipment material needed
1	5	Marking and documentation	- All equipment as described in clause 5 of IEC61215-1:2016 in Testing and measuring equipment list
2	11.1	Visual inspection (MQT 01)	- All equipment as described in clause 4.1 of IEC61215 2:2016 in Testing and measuring equipment list
3	11.2	Maximum power determination (MQT 02)	- All equipment as described in clause 4.2 of IEC61215-2:2016 in Testing and measuring equipment list
4	11.3	Insulation test (MQT 03)	- All equipment as described in clause 4.3 of IEC61215-2:2016 in Testing and measuring equipment list
5	11.4	Measurement of temperature coefficients (MQT04)	- All equipment as described in clause 4.4 of IEC61215-2:2016 in Testing and measuring equipment list
6	11.5	Measurement of nominal module operating temperature (NMOT) (MQT 05)	- All equipment as described in clause 4.5 of IEC61215-2:2016 in Testing and measuring equipment list
7	11.6	Performance at STC (MQT 06.1) and NMOT (MQT 06.2)	- All equipment as described in clause 4.6 of IEC61215-2 1st Edition in Testing and measuring equipment list

8	11.7	Performance at low irradiance (MQT 07)	- All equipment as described in clause 4.7 of IEC61215-2:2016 in Testing and measuring equipment list
9	11.8	Outdoor exposure test (MQT 08)	- All equipment as described in clause 4.8 of IEC61215-2:2016 in Testing and measuring equipment list
10	11.9	Hot-spot endurance test (MQT 09)	- All equipment as described in clause 4.9 of IEC61215-2:2016 in Testing and measuring equipment list
11	11.10	UV preconditioning (MQT 10)	- All equipment as described in clause 4.10 of IEC61215-2:2016 in Testing and measuring equipment list
12	11.11	Thermal cycling test (MQT 11)	- All equipment as described in clause 4.11 of IEC61215-2:2016 in Testing and measuring equipment list
13	11.12	Humidity-freeze test (MQT 12)	- All equipment as described in clause 4.12 of IEC61215-2:2016 in Testing and measuring equipment list

Annexure-10

XIII. DECLARATION

(To be given by Bidders in Company letter head by Authorized signatory)

"All the information provided herein and attached hereto are true to the best of knowledge and belief of …… (Company/Bidder name). It is further certified that in the event of any false information provided by ……. (Company/Bidder name):

a. the bid submitted by us is liable for rejection summarily at any stage of bidding process and the EMD/Bid Security submitted by our firm is liable to be forfeited in addition to the relevant action under appropriate rules.

b. In case of contract is awarded to us, the contract is liable for termination and the Security deposit/Performance security submitted by our firm is liable to be forfeited in addition to the relevant action under appropriate rules.

Authorised Signatory with date