



C/o Meghalaya State Housing Financing Cooperative Society,
Upper Nongrim Hills, Behind Bethany Hospital, Shillong, East Khasi Hills District,
Meghalaya – 793003(CIN No. U75144ML2012NPL008509)
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RFE (REQUEST FOR EMPANELMENT)
Of
Agencies for Installation, Commissioning &
Comprehensive Maintenance of 5KW, 10 KW, 15KW, 20KW,
30KW, 40KW and 50KW Hybrid Solar Inverter System
systems in various locations of the State of Meghalaya,
under the Meghalaya Basin Management Agency (MBMA)

Tender Ref. No: **MBMA/ Mission Ginger/ 81/ 2023-2024/(Part-H)**

Date of issue of Tender document: **14th April 2023**

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1. Background

With most of the population of Meghalaya living in rural areas, agriculture remains the main source of income and livelihood. Consequently, the importance of strengthening the agricultural sector is high. Thus, various mission-mode projects have been initiated by the government to undertake end-to-end and focused crop-wise interventions, to bring in transformational changes in their value chains. The various missions of the State include Lakadong Turmeric Mission, Ginger Mission, and Mushroom Mission among others.

Meghalaya Basin Management Agency (MBMA) wants to set up community-based primary and secondary processing units for ginger and other spices across the state. Owing to the remoteness of many of the villages, challenging terrain and unreliable power source, the processing units will be powered by Solar energy solutions. Thus, MBMA is looking for empanelment of agencies for installation, commissioning & comprehensive maintenance of 5KW, 10 KW, 15 KW, 20KW, 30KWW, 40KW and 50KW Hybrid Solar Inverter System

2. Data Sheet

Tender No.	MBMA/ Mission Ginger/ 81/ 2023-2024/(Part-H)
Name of the tender issuer	Meghalaya Basin Management Agency (MBMA)
Purpose of the tender	Installation, Commissioning & Comprehensive Maintenance of 5KW, 10KW, 15KW, 20KW, 30KW, 40KW and 50KW Hybrid Solar Inverter System The detailed specifications of the mentioned component are specified in Annexure I
Quantity to be supplied	The empaneled agencies will qualify for tenders solar panel installment in the state.
Date of issue of tender document	14 th April 2023
Pre-Bid clarification	The Pre-Bid queries can be emailed to us latest by 21 st April 2023 until 5 PM. Email id for sending the pre-bid queries- humanresources@themeghalayanage.com
Last Date & Time for Submission of Bids	28 th April 2023 by 5:00 PM at the MBMA office and the softcopy of the technical bids to be emailed to humanresources@themeghalayanage.com
Date & Time of Price Bid Opening	Will be intimated later to the successful bidder who qualify the technical bid criteria
Address for Communication	Meghalaya Basin Management Agency, C/O Meghalaya State Housing Financing Cooperative Society, Upper Nongrim Hills, Behind Bethany Hospital, Shillong, Meghalaya – 793003 E-mail:- isced@mbda.org.in

INSTRUCTIONS TO BIDDERS

1. MBMA has the right to award the work under this tender to single or multiple vendors and in multiple tranches based on the lowest quote ascertained through this tender.
2. The implementation of Solar Solutions at the said locations is subject to receiving the approval for installation by Vendors from the local authorities.
3. Though adequate care has been taken while preparing this **RFE (REQUEST FOR EMPANELMENT DOCUMENT)**, the Bidders should satisfy themselves that the document is complete in all respects. Intimation of any discrepancy shall be given to this office immediately. If no intimation is received from any Bidder within seven (7) days from the date of notification of Tender/Request for solution (RFE)/ Issue of the RFE documents, it shall be considered that the RFE document is complete in all respects and has been received by the Bidder.
4. MBMA reserves the right to cancel/ withdraw this invitation for bids without assigning any reason and shall bear no liability whatsoever consequent upon such a decision
5. MBMA reserves the right to modify, amend or supplement this document.
6. While this RFE has been prepared in good faith, neither MBMA nor their employees or advisors make any representation or warranty, express or implied, or accept any responsibility or liability, whatsoever, in respect of any statements or omissions herein, or the accuracy, completeness or reliability of information, and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of this RFE, even if any loss or damage is caused by any act or omission on their part.

3. Eligibility Criteria: For Empanelment of Agencies for Installation, Commissioning & Comprehensive Maintenance of 5KW, 10 KW, 15 KW, 20KW, 30KW, 40KW and 50KW Hybrid Solar Inverter System.

The empanelment will remain in force for a period of **two** years i.e., **from May 2023 to May 2025** subject to annual review every year. If the services and/or products provided by the agency/ies are found to be unsatisfactory or at any time it is found that the information provided for empanelment or for any quotation is false, MBDA reserves the right to remove such agency/ies from the empaneled list. The Agency should qualify the following necessary eligibility criteria and possess the required experience, resources, and capabilities in providing services and materials necessary to meet the requirements indicated in the tender document. Agencies not meeting the necessary eligibility criteria will not be considered for further evaluation.

Bidders scoring at least 70 marks out of 100 in technical evaluation will be qualified for financial bid opening.

3.1 Pre-Qualification Criteria: Minimum Eligibility Criteria for Installation, Commissioning & Comprehensive Maintenance of 5KW, 10 KW, 15 KW, 20KW, 30KW, 40KW and 50KW Hybrid Solar Inverter System

S.No	Criteria	Required Documentation
1	A Bidder may be a single entity or any combination of them with a formal intent to enter into an agreement or under an existing agreement to form a Consortium. In case of Consortium, both the member companies shall be registered in India under the Indian Companies Act 1956 for the last 3 yrs as on date of issue of this RFE	All related documents i.e. Company incorporation certificate, ROC registration, MoA of Company, AoA of Company, PAN, GST registration, etc.
2	In the last 5 (Five) years, the agency should have solely undertaken and completed at least 2 (two) similar projects of same nature* for municipal/ state/ central government/, PSUs or any other government departments. The contract value for the project should be at least INR 25 Lakhs	Work order/ completion certificate from client
3	Financial Capacity: The agency should have an average annual turnover of at least INR 1 Cr (One Crores) for last 3 (three) consecutive financial years (FY 18 to FY 21) in last 5 years (FY 2021-22, FY 2021-202, FY 2019-2020, FY 2018-2019, FY 2017-2018)	Summary of the Turnover should be certified by Statutory Auditor/ Registered Chartered Accountant
4	The Bidder should not have been barred by the Central Government, any State Government, a statutory authority or a public sector undertaking, as the case may be, from participating in any project, and the bar subsists as on the date of the Proposal.	Self-Attested Undertaking/Declaration

Only Eligible Bidders will be taken up for Technical and Financial Evaluation.

***Similar Projects:** Installation, Commissioning & Comprehensive Maintenance of 5KW, 10 KW, 15 KW, 20KW, 30KW, 40KW and 50KW Hybrid Solar Inverter System for municipal/ state/ central government/, PSUs or any other government departments and having contract value of at least 25 Lakhs.

3.2 Evaluation

The tender evaluation committee, appointed by MBMA, and each of its members individually, shall evaluate the proposals based on their responsiveness to, meeting minimum eligibility criteria requirements, applying the evaluation criteria, sub-criteria, and the point system specified in the tender document. Each responsive proposal will be given a technical score. A proposal shall be rejected at this stage if it does not respond to the laid criteria or if it fails to achieve the minimum technical score indicated in the tender document.

From the time the proposals are opened to the time the contract is awarded, any query clarifications should be done only before the per-bid meeting. MBMA has the right to seek clarification from the bidder anytime. Any effort by the firm to influence the client in the client's proposal evaluation, proposal comparison or contract award decisions may result in the rejection of the Firm's proposal.

The mode of evaluation shall be based on the criteria specified in the tender document for technical and financial evaluation.

The bids of those Agencies which would meet the minimum conditions of eligibility specified in this section below will be evaluated in two stages:

- I. Technical evaluation of proposals by qualified bidders
- II. Financial bid opening of qualified bidders and final evaluation

3.3 Technical Evaluation and Financial Bid Opening

The Technical Proposal evaluation of eligible bidders will be done out of total 100 marks in two parts:

- I. Evaluation of past project experience (Score of 40 marks) and Evaluation of Financial capacity and presence in NER (Score of 20 marks): Maximum of 60 marks will be given based on the information and credentials submitted by the bidders in terms of relevant past project experience and financial capacity.
- II. Evaluation of the technical proposal by the Tender Evaluation Committee. (Score of 40 marks). Maximum of 40 marks will be given based on the information and credentials submitted by the bidders. The bidders shall be invited to submit their technical proposal to the Evaluation Committee (date and time of the same shall be communicated to the eligible and qualified bidders).
- III. Bidders scoring at least 70 marks out of 100 in technical evaluation will be qualified for the Financial Bid opening and subsequent empanelment.
- IV. Bidder quoting the lowest price will be the most preferred bidder for awarding the project.
- V. In case of tie between bidders in the lowest evaluated package price, the bidder having the highest financial turnover in the preceding 3 financial years will be given preference.

The Technical Evaluation of the proposals shall be based on following parameters:

Installation, Commissioning & Comprehensive Maintenance of 5KW, 10 KW, 15 KW, 20KW, 30KW, 40KW and 50KW Hybrid Solar

Inverter System

S.No	Criteria	Marks
Financial capacity and presence in NER (20)		
1	The Agency must be in existence for at least a period of three years and should have a registered office in the North-East Region of India.	10
2	The agency should have an average turnover of at least INR 1 Crores (Rupees One Crores) per year in any 3 (three) consecutive financial years in last 5 years (FY 2021-22, FY 2021-202, FY 2019-2020, FY 2018-2019, FY 2017-2018) (10 marks for the firm with highest average annual turnover, other firms to be awarded pro-rated marks)	10
Work Experience (40)		
3	The agency should have undertaken similar projects of 'installation, commissioning & comprehensive maintenance of solar energy solutions' for spice processing machineries in North-East Region. The minimum capacity of such projects should be 10 Kw. (2.5 marks for each project)	10
4	The agency should have undertaken similar projects of 'installation, commissioning & comprehensive maintenance of solar energy solutions' for spice processing machineries in Meghalaya. The minimum capacity of such projects should be 10 Kw. (5 marks for each project)	10
5	The agency should have undertaken similar projects of Installation, Commissioning & Comprehensive Maintenance of Solar Inverter System of Minimum 10 KW in rural or remote areas. (2 marks for each project)	10
6	In the last 5 (Five) years, the agency should have solely undertaken and completed at least 2 similar projects* of installation, commissioning & comprehensive maintenance of solar inverter solutions for municipal/ state/ central government/, PSUs or any other government departments. (2 marks for each project)	10
Certification and accreditation (20)		
7	The agency with requisite certificates (Valid till October 2022) from authorised institutes/departments/bodies, preferably one or more of the following: <ol style="list-style-type: none"> 1. International Electrotechnical Commission (IEC) Photo voltaic (PV) module qualification certificate. 2. Bureau of Indian Standards (BIS) for PV module, Inverter and Battery. 3. ISO 9001:2015 for quality management systems 	20
Inventory (20)		
8	Existing inventory and mobilisation capability of the requisite item and materials. (Self-declaration of existing inventory for materials specified in Annexure I)	20
TOTAL		100

***Similar Projects:** Installation, Commissioning & Comprehensive Maintenance of 5KW, 10 KW, 15 KW, 20KW, 30KW, 40KW and 50KW Hybrid Solar Inverter System for municipal/ state/ central government/, PSUs or any other government departments and having contract value of at least 25 Lakhs.

3.4 Payment Schedule

The agency will be paid based on the following payment schedule:

S.No	Payment Phases	Fee Payable	Timeline	Percentage of Fee
1	Phase 1	Payment of 30% of the contract value will be made within 10 days of signing of the contract. This Advance Payment shall be adjusted against Invoices /bills raised by the successful Bidder.	Within 10 days of signing of the contract	10%
2	Phase 2	On successfully dispatching of materials from factory and receiving of invoice by MBMA		20%
3	Phase 3	On dispatch of the materials after successful inspection and reaching the state of Meghalaya		20%
4	Phase 4	On successful installation of the materials in the designated project area		20%
5	Phase 5	Final Payment: 10% of the contract value will be made after acceptance of all documentation and reports of the Event subject to approval from designated officers of the client.	After 1 Month	30%

The client will require 15 working days for release of payment for each milestone and raising of invoice. The Agency must ensure that any additional work done by the EMA has to be approved by the client, otherwise it will not be considered for payments.

All billed items are to be signed off by the officers deputed by the client regarding quantity, quality, and successful completion as per agreed timelines. These need to be backed up by relevant evidence (Photographs, Videos, Lists signed off by Competent Authority).

3.5 Cost of Logistics

The cost of transportation of the above-mentioned goods to Shillong and Tura, Meghalaya needs mention under cost of logistics. Further, the per kilometer cost of transportation from Shillong and from Tura to various locations needs mention as the installation will be done in various locations (mostly remote areas) of the state of Meghalaya.

4. Bid Submission

Steps to be followed for submission of bid:

1. The bid shall be submitted in two parts, the Technical Bid & the Price Bid.
 - i. **The Technical bid** must be sealed in another envelope marked as “Technical Bid” and shall contain the following:
 - The bidder should duly fill and sign and complete the ‘Letter of Technical proposal’ annexed in Annexure II
 - The bidder should have details as per Annexure-III, duly filled in, signed, and complete in all respects. No alteration/modification in the format shall be permitted.
 - A self-declaration that the tenderer has not been blacklisted by any State Government/ Central Govt. / PSU in India as per Annexure IV.
 - Audited balance sheet and profit & loss account along with a copy of the acknowledgment of Income Tax return of last three consecutive financial years from last 4 years along with Annexure III duly filled in, signed, and complete in all respects
 - ii. The Price bid shall be sealed in an envelope marked as “Price Bid” and shall contain the price bid as per Annexure II duly completed in all respects.
 - iii. The rate quoted should be inclusive of GST. No extra cost will be borne towards the transport of goods except otherwise specified in section 3.5 of the document. No price increase on account of change in tax structure, duties, levies, charges, etc. shall be permitted.
 - iv. The two separate envelopes containing technical bid and price bid should be sealed in one envelope and should be addressed as per the tender schedule super-scribed as **“Tender for empanelment of agencies for installation, commissioning & comprehensive maintenance of 5KW, 10 KW, 15 KW, 20KW, 30KW, 40KW and 50KW Hybrid Solar Inverter System in various locations of the State of Meghalaya, under the Meghalaya Basin Management Agency”**.

5. General Terms and Conditions of the Bid

Note: Bidders must note the below-mentioned conditions carefully and comply strictly while submitting their bids:

1. Bidder shall prepare the bid and submit it in a sealed envelope addressed to “**Chief Executive Officer, Meghalaya Basin Management Agency, Shillong**” and send it through Speed Post/Registered Post/Courier only (no hand delivery will be entertained). Each envelope should bear the name of the bidder, along with the tender number. However, the authorities shall not be responsible for postal and other delays in receipt of the bids.
2. Bidders are requested to check for any notice /amendment/ clarification etc. to the Tender Document through the **website** www.mbda.gov.in / www.mbma.org.in / **Notice board of the office of MBMA- Shillong**. No separate notification will be issued for such notice/amendment/clarification etc. in the print media or individually.
3. The Bidders should note that Prices should not be indicated in the technical bid and should be quoted only in the Price Bid as per Annexure II. In case the prices are indicated in the technical bid, the bid shall stand rejected.
4. For the **EVALUATION PROCESS** the Technical proposals will be evaluated based on compliance with eligibility criteria, technical specifications, and other terms & conditions stipulated in the tender document. The financial proposal will be opened only to those bidders who qualify for the technical evaluation. The Committee reserves the right to reject any or all the tenders without assigning any reason thereof.
5. The **AWARD OF CONTRACT** for Financial bids with the lowest price quotation for the assignment as per Annexure-II will be considered for negotiations and award of the contract. However, where there is a tie between bidders in the lowest evaluated package price, the bidder having the highest financial turnover in the preceding 3 financial years will be given preference.
6. The **WARRANTY** of the Inverters and Batteries which are to be Supplied should be **NEW** as of the date of receipt and should be having all components required. The entire System including accessories will remain under onsite comprehensive maintenance and warranty for a period of one year for the inverter and three years for batteries from the date of successful commissioning and testing.

7. The bids not submitted in a prescribed format or in the prescribed manner, shall be rejected by the Tender Committee at the risk and responsibility of the bidder.
8. All the information as called for in the tender document should be submitted truly, clearly, legibly, transparently, unambiguously, and without using abbreviations.
9. In the financial bid the total figures should be written in figures followed by words
10. Each page of the tender document should be signed by the bidder with a seal, in token of having understood and accepted the terms and conditions of the contract, and serially numbered and a page marked.
11. **The bidder can withdraw from bidding on or before the last bid submission date.** The bidder or his authorized representative (one person only) will be allowed to be present at the time of opening of tenders.
12. The Tendering Authority reserves the right to accept any bid, and to annul the bid process and reject all bids at any time prior to award of contract, without assigning reasons & without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders of the grounds for the action.
13. All transit risks shall be the responsibility of the supplier.
14. All the disputes shall be subjected to the jurisdiction of Civil Courts situated in Meghalaya.
15. Any matter which has not been covered under these provisions shall be governed as per the provisions of MBMA.
16. If the work is found unsatisfactory or, if the firm dishonors the contract, the Performance Security Deposit may be forfeited, and the job may be entrusted to another firm. In this regard, the decision of the Committee is final and binding on the contractor.
17. Any notice given by one party to the other pursuant to this contract shall be sent in writing to **CEO- Meghalaya Basin Management Agency, Shillong.**
18. Payment Terms: All payments will be made within 30 days of submission of invoice, based on completion of respective terms & conditions. TDS will be deducted as per the rules. The invoice will be raised in favour of **CEO- Meghalaya Basin Management Agency, Shillong.**
19. The work shall be COMPLETED in all respect within 120 days from the date of issue of work order.

Special Terms for this Tender

From previous experience the government has realized that bidding companies may find the remoteness of installation locations challenging and may not be able to deliver on their commitment. Therefore, before allocating larger quantities of work, each empaneled agency will be asked to perform a demo of 10 KW solar capacity at 1 location at the discovered L1 price with an objective to test the efficacy of the installed solar solution systems in remote geographies in Meghalaya.

Failure to timely and effectively perform during the demo installation will result in disqualification of the short-listed agency and their price-bid as well. In this case, the agencies who have demonstrated the efficacy of their installed units will be selected for empanelment and the lowest bid amongst them will be considered as the L1 price.

Annexure I - Technical Specifications

Annexure I (a) – Technical Specification for 5KW Hybrid Solar Inverter System

SI.NO	Material	Capacity	Quantity
1	Solar Modules 72 cells, 6 in series 2 in parallel ,Total 12 no's	335W,24V	1
2	Solar Battery ,Tabular Battery Lead Acid C10 Rated (10 in Series)	12v,200AH	1
3	MMS Ground Mounted(For all modules)		1
4	Battery Rack (2 Racks with 5 Batteries in Each Rack)	200AH ,20 batteries	1
5	Solar Array Junction Box (AJB) with SPD and MCB	2 in 1 out	1
6	Grid Input Protection Box(GIPB) with SPD and MCB	230Vac,5KW	1
7	SOLAR PCU 120Vdc,6.2KVA, Single Phase Output	240Vdc,5KW	1
8	Remote Monitoring System(Single Phase)with 2 Channel T&H Module		1
9	Changeover switch	230vac,32A	1
10	Copper Cable (R+B) Module to Module	6 Sq.mm	10m+10m
11	Copper Cable (R+B) Module to Inverter	10 Sq.mm	50m+50m
12	Copper Cable (R+B) Battery to Battery	16 Sq.mm	10m+10m
13	Copper Cable (R+B) Battery to Inverter	16 Sq.mm	5m+5m
14	Copper Cable (R+B) GIPB to Inverter	6 Sq.mm	5m+5m
15	Copper Cable (R+B) Inverter to Change over switch	6 Sq.mm	3m+3m
16	Copper Cable (R+B) Change over switch to DB	6 Sq.mm	2m+2m
17	Copper Cable (R+B) DB to Load wiring	6 Sq.mm	As per site
18	Copper Cable (R+B) DB to Load wiring	4 Sq.mm	As per site
19	Copper Cable (R+B) DB to Load wiring	2.5 sq.mm	As per site
20	Copper Cable (R+B) DB to Load wiring	1.5 sq.mm	As per site
21	Isolator	500Vdc,63A	1
22	MCB Double pole	230Vac,32A	2
23	MCB Double pole	230Vac,16A	1
24	MCB Double pole	230Vac,10A	1
25	Earthing Kit		3
26	Copper Earthing Cable, Green	10 sq.mm	35m
27	Lightning Arrestor set		1
28	Consumables		1

TECHNICAL SPECIFICATIONS OF THE SOLAR COMPONENTS

The proposed project shall be commissioned as per the technical specifications given below. Any shortcomings will lead to the cancellation of the Letter of Award & the Competent Authority's decision will be final and binding on the bidder.

SOLAR PV MODULE:

The PV modules used must qualify to the latest edition of the IEC PV module qualification test.

- The total solar PV array capacity should not be less than the allocated capacity and should comprise of solar crystalline modules of minimum Wp mentioned in the bill of materials/ above wattage. Module capacity less than minimum the mentioned Wp shall not be accepted.
- PV modules must be tested and approved by one of the IEC authorized test centers. The module frame shall be made of corrosion-resistant materials, preferably having anodized aluminum.
- The panels should have IEC 61215 with 5000 Pa load handling capacity for cyclone resilient.

The following information must be mentioned in the ID used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions).

- Name of the manufacturer of the PV module.
- I-V curve for the module Wattage, I_{max}, V_{max}, and FF (Fill Factor) for the module
- Unique Serial No and Model No of the module

Materials Warranty

- Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (5) years from the date of sale to the original customer ("Customer")
- Defects and/or failures due to manufacturing.
- Defects and/or failures due to quality of materials
- Non-conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at the Owner's sole option.

Performance Warranty

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

Preferred Make

MNRE Approved (Empanelled) (WAREE, VIKRAM, MICROSUN, KOTAK, EMMVEE, ENFROS) or Any Reputed Make.

MOUNTING STRUCTURE

- a. **Hot dip galvanized MS / GI / Anodized aluminum of size not less than 50 mm x 50 mm x 6mm size shall be used for mounting the modules/ panels/arrays.** Each structure should have an angle of inclination as per the site conditions to take maximum irradiation.
- b. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels. Installation of solar structures should not damage the roof in any way. If any concrete or foundation is required, it should be precast type.
- c. **South facing with 22 degree inclined towards north should be followed despite whatever roofing type is. The structure also should be able to withstand wind speed of 200 - 250 km/h.**

DC COMBINER BOX/ARRAY JUNCTION BOX:

- a. The junction boxes are to be provided in the PV array for termination of connecting cables. The Junction Boxes (JBs) shall be made of GRP/FRP/Powder Coated Aluminum /cast aluminum alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands
- b. Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification

BATTERY:

- Lead acid
- All the batteries should have a C/10 rate of discharge. The voltage of each battery should be of 12V, 200AH.
- Battery should conform to the latest BIS/ International standards. A copy of the relevant test certificate for the battery should be furnished.
- The battery should be warranted for a minimum of 5 years.
- The battery should be installed inside the premises of consumers on a Battery rack of acid resistant material to bear the required battery load. The non-reactive acid proof mat should be provided around the floor space of the battery bank.

Preferred Make

MNRE Approved (Empanelled) (Exide, Luminous, Amaron, Eastman, Okaya) or Any Reputed Make.

PCU/ INVERTER:

The power conditioning unit should be provided to convert DC power produced by SPV modules, into AC power. The power conditioning unit/inverter should be Off-Grid type. Typical technical features of the inverter shall be as follows:

Power conditioning unit with inbuilt charge controller of capacity & ratings as specified in the below for various capacity of Solar Power Plants should convert DC power into AC power, and must conform to standards IEC 61683.

The PCU will have the following features:

- IGBT based MPPT charging.
- Output voltage 230V, +/-3% Modified/ Pure sine wave for Single Phase.
- Output frequency: 50 Hz, +/- 0.5 Hz.
- Capacity of PCU/ Inverter is specified at 0.8 lagging power factor.
- THD: less than 3% Efficiency: >85% at full load.
- Provision to Remotely Shutdown the Inverter
- Ambient Temp 50 degree Celsius (max.)
- Operating humidity 95% maximum

Protections:

- Over voltage (automatic shutdown)
- Under voltage (automatic shutdown)
- Overload - Short circuit (circuit breaker & electronics protection against sustained fault)
- Over Temperature
- Battery, PV reverse polarity

Indicators

- Array on
- MPPT charger on
- Battery connected, charging
- Inverter ON
- Load on solar/ battery
- Grid charger on
- Load on Grid
- Grid on
- Fault

Display Parameters

- Charging current
- Charging voltage
- Voltage of PV panels
- Output voltage
- Grid voltage
- Inverter loading (kW) & Energy Generation (kWh)
- Output frequency
- Fault / fault code

Cooling: Air Cooled

The PCU/ inverters should be tested from the MNRE approved test centers / NABL /BIS accredited testing- calibration laboratories. In the case of imported power conditioning units, these should be approved by international test houses.

Preferred Make: Luminous, Studer, Eastman or Any Reputed make.

REMOTE MONITORING SYSTEM:

Remote monitoring is the ability to visualize, track, and control assets and facilities without having to be on-premise. This capability is made possible through numerous technologies such as wireless networks, sensors, transmitters, receivers, data processing, cloud storage, and analytics. Together, these technologies provide greater visibility into asset performance, predict equipment failure, and reduce resource consumption, enabling cost-effective and efficient operations all the time. Centralized monitoring Accurate monitoring improved team efficiency faster response to incidents Compliance to regulatory requirements Business continuity in the event of disasters Lower operating costs.

Specifications:

The system should be able to monitor the Following Parameters

1. Solar ,Battery , Grid , Inverter voltages
2. Battery Charging and Discharging, Solar, Grid and Load Currents.
3. Solar and Grid Peak Voltages.
4. Battery, Grid, Load Peak Currents.
5. 2 Channels of Temperature and Humidity.

6. Recharge and Server charges for 1 year should be provided.
7. Two different Login should be provided for Department and User.
8. Storage of Data should be there for at least 2 years.
9. Alerts, Consumption and Generation Data should be sent through E-Mail every day.
10. Provision to Remotely Shutdown the Inverter should be provided in the Software Application.
11. Provision to ON/OFF the Inverter System through Mobile Android application using Bluetooth Module which is inbuilt in the RMS.
12. Provision to Upgrade the Firmware in the RMS Remotely.

PROTECTIONS

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

LIGHTNING PROTECTION

The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying the required number of Lightning Arresters. Lightning protection should be provided as per IEC 62305 standards.

CABLES

Cable size as mentioned in the bill of materials to be used in the Project shall have the following characteristics:

- Temp. Range: $-10\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$
- Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- Flexible
- Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be selected to keep the voltage drop (power loss) of the entire Project to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use.
- The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e., twenty-five (25) Operational Years.

Preferred Make:

Polycab, Finolex, Havells, RR Kabels or Any Reputed Make.

Annexure I (b) – Technical Specification for 10KW Hybrid Solar Inverter System

SI.NO	Material	Capacity	Quantity
1	Solar Modules 72 cells,11 in series 2 in parallel, Total 22 no's	335W,24V	1
2	Solar Battery, Tabular Battery Lead Acid C10 Rated (20 in Series)	12v,200AH	1
3	MMS Ground Mounted (For all modules)		1
4	Battery Rack (2 Racks with 5 Batteries in Each Rack)	200AH ,20 batteries	2
5	Solar Array Junction Box (AJB) with SPD and MCB	2 in 1 out	1
6	Grid Input Protection Box (GIPB) with SPD and MCB	230Vac,10KW	1
7	SOLAR PCU 240Vdc,12.5KVA, Single Phase Output	240Vdc,10KW	1
8	Remote Monitoring System (Single Phase) with 2 Channel T& H Module		1
9	Changeover switch	230vac,63A	1
10	Copper Cable (R+B) Module to Module	6 Sq.mm	10m+10m
11	Copper Cable (R+B) Module to Inverter	16 Sq.mm	50m+50m
12	Copper Cable (R+B) Battery to Battery	16 Sq.mm	10m+10m
13	Copper Cable (R+B) Battery to Inverter	16 Sq.mm	5m+5m
14	Copper Cable (R+B) GIPB to Inverter	10 Sq.mm	5m+5m
15	Copper Cable (R+B) Inverter to Change over switch	10 Sq.mm	3m+3m
16	Copper Cable (R+B) Change over switch to DB	10 Sq.mm	2m+2m
17	Copper Cable (R+B) DB to Load wiring	6 Sq.mm	As per site
18	Copper Cable (R+B) DB to Load wiring	4 Sq.mm	As per site
19	Copper Cable (R+B) DB to Load wiring	2.5 sq.mm	As per site
20	Copper Cable (R+B) DB to Load wiring	1.5 sq.mm	As per site
21	Isolator	500Vdc,63A	1
22	MCB Double pole	230Vac,32A	2
23	MCB Double pole	230Vac,16A	1
24	MCB Double pole	230Vac,10A	1
25	Earthing Kit		3
26	Copper Earthing Cable, Green	10 sq.mm	35m
27	Lightning Arrestor set		1
28	consumables		1

TECHNICAL SPECIFICATIONS OF THE SOLAR COMPONENTS

The proposed project shall be commissioned as per the technical specifications given below. Any shortcomings will lead to the cancelation of the Letter of Award & the Competent Authority's decision will be final and binding on the bidder.

SOLAR PV MODULE:

The PV modules used must qualify to the latest edition of the IEC PV module qualification test.

- The total solar PV array capacity should not be less than the allocated capacity and should comprise of solar crystalline modules of minimum Wp mentioned in the bill of materials/ above wattage. Module capacity less than minimum the mentioned Wp shall not be accepted.
- PV modules must be tested and approved by one of the IEC authorized test centers. The module frame shall be made of corrosion-resistant materials, preferably having anodized aluminum.
- The panels should have IEC 61215 with 5000 Pa load handling capacity for cyclone resilient.

The following information must be mentioned in the ID used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions).

- Name of the manufacturer of the PV module.
- I-V curve for the module Wattage, I_{max}, V_{max}, and FF (Fill Factor) for the module
- Unique Serial No and Model No of the module

Materials Warranty

- Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (5) years from the date of sale to the original customer ("Customer")
- Defects and/or failures due to manufacturing.
- Defects and/or failures due to quality of materials
- Non-conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at the Owner's sole option.

Performance Warranty

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

Preferred Make

MNRE Approved (Empanelled) (WAREE, VIKRAM, MICROSUN, KOTAK, EMMVEE, ENFROS) or Any Reputed Make.

MOUNTING STRUCTURE

- d. **Hot dip galvanized MS / GI / Anodized aluminum of size not less than 50 mm x 50 mm x 6mm size shall be used for mounting the modules/ panels/arrays.** Each structure should have an angle of inclination as per the site conditions to take maximum irradiation.
- e. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels. Installation of solar structures should not damage the roof in any way. If any concrete or foundation is required, it should be precast type.
- f. **South facing with 22 degrees inclined towards north should be followed despite whatever roofing type is. The structure also should be able to withstand wind speed of 200 - 250 km/h.**

DC COMBINER BOX/ARRAY JUNCTION BOX:

- c. The junction boxes are to be provided in the PV array for termination of connecting cables. The Junction Boxes (JBs) shall be made of GRP/FRP/Powder Coated Aluminum /cast aluminum alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands
- d. Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification

BATTERY:

- Lead acid
- All the batteries should have a C/10 rate of discharge. The voltage of each battery should be of 12V, 200AH.
- Battery should conform to the latest BIS/ International standards. A copy of the relevant test certificate for the battery should be furnished.
- The battery should be warranted for a minimum of 5 years.
- The battery should be installed inside the premises of consumers on a Battery rack of acid resistant material to bear the required battery load. The non-reactive acid proof mat should be provided around the floor space of the battery bank.

Preferred Make

MNRE Approved (Empaneled) (Exide, Luminous, Amaron, Eastman, Okaya) or Any Reputed Make.

PCU/ INVERTER:

The power conditioning unit should be provided to convert DC power produced by SPV modules, into AC power. The power conditioning unit/inverter should be Off-Grid type. Typical technical features of the inverter shall be as follows:

Power conditioning unit with inbuilt charge controller of capacity & ratings as specified in the below for various capacity of Solar Power Plants should convert DC power into AC power, and must conform to standards IEC 61683.

The PCU will have the following features:

- IGBT based MPPT charging.
- Output voltage 230V, +/-3% Modified/ Pure sine wave for Single Phase.
- Output frequency: 50 Hz, +/- 0.5 Hz.
- Capacity of PCU/ Inverter is specified at 0.8 lagging power factor.
- THD: less than 3% Efficiency: >85% at full load.
- Provision to Remotely Shutdown the Inverter
- Ambient Temp 50 degree Celsius (max.)
- Operating humidity 95% maximum

Protections:

- Over voltage (automatic shutdown)
- Under voltage (automatic shutdown)
- Overload - Short circuit (circuit breaker & electronics protection against sustained fault)
- Over Temperature
- Battery, PV reverse polarity

Indicators

- Array on
- MPPT charger on
- Battery connected, charging
- Inverter ON
- Load on solar/ battery
- Grid charger on
- Load on Grid
- Grid on
- Fault

Display Parameters

- Charging current
- Charging voltage
- Voltage of PV panels
- Output voltage
- Grid voltage
- Inverter loading (kW) & Energy Generation (kWh)
- Output frequency

- Fault / fault code

Cooling: Air Cooled

The PCU/ inverters should be tested from the MNRE approved test centers / NABL /BIS accredited testing- calibration laboratories. In the case of imported power conditioning units, these should be approved by international test houses.

Preferred Make: Luminous, Studer, Eastman or Any Reputed make.

REMOTE MONITORING SYSTEM:

Remote monitoring is the ability to visualize, track, and control assets and facilities without having to be on-premise. This capability is made possible through numerous technologies such as wireless networks, sensors, transmitters, receivers, data processing, cloud storage, and analytics. Together, these technologies provide greater visibility into asset performance, predict equipment failure, and reduce resource consumption, enabling cost-effective and efficient operations all the time. Centralized monitoring Accurate monitoring improved team efficiency faster response to incidents Compliance to regulatory requirements Business continuity in the event of disasters Lower operating costs.

Specifications:

The system should be able to monitor the Following Parameters

13. Solar, Battery, Grid, Inverter voltages
14. Battery Charging and Discharging, Solar, Grid and Load Currents.
15. Solar and Grid Peak Voltages.
16. Battery, Grid, Load Peak Currents.
17. 2 Channels of Temperature and Humidity.
18. Recharge and Server charges for 1 year should be provided.
19. Two different Login should be provided for Department and User.
20. Storage of Data should be there for at least 2 years.
21. Alerts, Consumption and Generation Data should be sent through E-Mail every day.
22. Provision to Remotely Shutdown the Inverter should be provided in the Software Application.
23. Provision to ON/OFF the Inverter System through Mobile Android application using Bluetooth Module which is inbuilt in the RMS.
24. Provision to Upgrade the Firmware in the RMS Remotely.

PROTECTIONS

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

LIGHTNING PROTECTION

The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying the required number of Lightning Arresters. Lightning protection should be provided as per IEC 62305 standards.

CABLES

Cable size as mentioned in the bill of materials to be used in the Project shall have the following characteristics:

- Temp. Range: -10°C to $+80^{\circ}\text{C}$
- Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- Flexible
- Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be selected to keep the voltage drop (power loss) of the entire Project to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use.
- The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e., twenty-five (25) Operational Years.

Preferred Make:

Polycab, Finolex, Havells, RR Kabels or Any Reputed Make.

Annexure I (c) – Technical Specification for 15KW Hybrid Solar Inverter System

SI.NO	Material	Capacity	Quantity
1	Solar Modules 72 cells,17 in series 2 in parallel, Total 34no's	335W,24V	1
2	Solar Battery, Tabular Battery Lead Acid C10 Rated (30 in Series)	12V,200AH	1
3	MMS Ground Mounted (For all modules)		1
4	Battery Rack (2 Racks with 5 Batteries in Each Rack)	200AH ,20 batteries	3
5	Solar Array Junction Box (AJB) with SPD and MCB	2 in 1 out	1
6	Grid Input Protection Box (GIPB) with SPD and MCB	230Vac,15KW	1
7	SOLAR PCU 360Vdc,18.75KVA ,Single Phase Output	360Vdc,15KW	1
8	Remote Monitoring System (Single Phase) with 2 Channel T& H Module		1
9	Changeover switch	230vac,63A	1
10	Copper Cable (R+B) Module to Module	6 Sq.mm	30m+30m
11	Copper Cable (R+B) Module to Inverter	16 Sq.mm	60m+60m
12	Copper Cable (R+B) Battery to Battery	16 Sq.mm	10m+10m
13	Copper Cable (R+B) Battery to Inverter	16 Sq.mm	5m+5m
14	Copper Cable (R+B) GIPB to Inverter	10 Sq.mm	5m+5m
15	Copper Cable (R+B) Inverter to Change over switch	10 Sq.mm	3m+3m
16	Copper Cable (R+B) Change over switch to DB	10 Sq.mm	2m+2m
17	Copper Cable (R+B) DB to Load wiring	6 Sq.mm	As per site
18	Copper Cable (R+B) DB to Load wiring	4 Sq.mm	As per site
19	Copper Cable (R+B) DB to Load wiring	2.5 sq.mm	As per site
20	Copper Cable (R+B) DB to Load wiring	1.5 sq.mm	As per site
21	Isolator	500Vdc,63A	1
22	MCB Double pole	230Vac,32A	2
23	MCB Double pole	230Vac,16A	1
24	MCB Double pole	230Vac,10A	1
25	Earthing Kit		3
26	Copper Earthing Cable, Green	10 sq.mm	40m
27	Lightning Arrestor set		1
28	consumables		1

TECHNICAL SPECIFICATIONS OF THE SOLAR COMPONENTS

The proposed project shall be commissioned as per the technical specifications given below. Any shortcomings will lead to the cancelation of the Letter of Award & the Competent Authority's decision will be final and binding on the bidder.

SOLAR PV MODULE:

The PV modules used must qualify to the latest edition of the IEC PV module qualification test.

- The total solar PV array capacity should not be less than the allocated capacity and should comprise of solar crystalline modules of minimum Wp mentioned in the bill of materials/ above wattage. Module capacity less than minimum the mentioned Wp shall not be accepted.
- PV modules must be tested and approved by one of the IEC authorized test centers. The module frame shall be made of corrosion-resistant materials, preferably having anodized aluminum.
- The panels should have IEC 61215 with 5000 Pa load handling capacity for cyclone resilient.

The following information must be mentioned in the ID used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions).

- Name of the manufacturer of the PV module.
- I-V curve for the module Wattage, I_{max}, V_{max}, and FF (Fill Factor) for the module
- Unique Serial No and Model No of the module

Materials Warranty

- Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (5) years from the date of sale to the original customer ("Customer")
- Defects and/or failures due to manufacturing.
- Defects and/or failures due to quality of materials
- Non-conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at the Owner's sole option.

Performance Warranty

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

Preferred Make

MNRE Approved (Empaneled) (WAREE, VIKRAM, MICROSUN, KOTAK, EMMVEE, ENFROS) or Any Reputed Make.

MOUNTING STRUCTURE

- g. **Hot dip galvanized MS / GI / Anodized aluminum of size not less than 50 mm x 50 mm x 6mm size shall be used for mounting the modules/ panels/arrays.** Each structure should have an angle of inclination as per the site conditions to take maximum irradiation.
- h. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels. Installation of solar structures should not damage the roof in any way. If any concrete or foundation is required, it should be precast type.
- i. **South facing with 22 degree inclined towards north should be followed despite whatever roofing type is. The structure also should be able to withstand wind speed of 200 - 250 km/h.**

DC COMBINER BOX/ARRAY JUNCTION BOX:

- e. The junction boxes are to be provided in the PV array for termination of connecting cables. The Junction Boxes (JBs) shall be made of GRP/FRP/Powder Coated Aluminum /cast aluminum alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands
- f. Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification

BATTERY:

- Lead acid
- All the batteries should have a C/10 rate of discharge. The voltage of each battery should be of 12V, 200AH.
- Battery should conform to the latest BIS/ International standards. A copy of the relevant test certificate for the battery should be furnished.
- The battery should be warranted for a minimum of 5 years.
- The battery should be installed inside the premises of consumers on a Battery rack of acid resistant material to bear the required battery load. The non-reactive acid proof mat should be provided around the floor space of the battery bank.

Preferred Make

MNRE Approved (Empaneled) (Exide, Luminous, Amaron, Eastman, Okaya) or Any Reputed Make.

PCU/ INVERTER:

The power conditioning unit should be provided to convert DC power produced by SPV modules, into AC power. The power conditioning unit/inverter should be Off-Grid type. Typical technical features of the inverter shall be as follows:

Power conditioning unit with inbuilt charge controller of capacity & ratings as specified in the below for various capacity of Solar Power Plants should convert DC power into AC power, and must conform to standards IEC 61683.

The PCU will have the following features:

- IGBT based MPPT charging.
- Output voltage 230V, +/-3% Modified/ Pure sine wave for Single Phase.
- Output frequency: 50 Hz, +/- 0.5 Hz.
- Capacity of PCU/ Inverter is specified at 0.8 lagging power factor.
- THD: less than 3% Efficiency: >85% at full load.
- Provision to Remotely Shutdown the Inverter
- Ambient Temp 50 degree Celsius (max.)
- Operating humidity 95% maximum

Protections:

- Over voltage (automatic shutdown)
- Under voltage (automatic shutdown)
- Overload - Short circuit (circuit breaker & electronics protection against sustained fault)
- Over Temperature
- Battery, PV reverse polarity

Indicators

- Array on
- MPPT charger on
- Battery connected, charging
- Inverter ON
- Load on solar/ battery
- Grid charger on
- Load on Grid
- Grid on
- Fault

Display Parameters

- Charging current
- Charging voltage
- Voltage of PV panels
- Output voltage
- Grid voltage
- Inverter loading (kW) & Energy Generation (kWh)
- Output frequency

- Fault / fault code

Cooling: Air Cooled

The PCU/ inverters should be tested from the MNRE approved test centers / NABL /BIS accredited testing- calibration laboratories. In the case of imported power conditioning units, these should be approved by international test houses.

Preferred Make: Luminous, Studer, Eastman or Any Reputed make.

REMOTE MONITORING SYSTEM:

Remote monitoring is the ability to visualize, track, and control assets and facilities without having to be on-premise. This capability is made possible through numerous technologies such as wireless networks, sensors, transmitters, receivers, data processing, cloud storage, and analytics. Together, these technologies provide greater visibility into asset performance, predict equipment failure, and reduce resource consumption, enabling cost-effective and efficient operations all the time. Centralized monitoring Accurate monitoring improved team efficiency faster response to incidents Compliance to regulatory requirements Business continuity in the event of disasters Lower operating costs.

Specifications:

The system should be able to monitor the Following Parameters

1. Solar, Battery, Grid, Inverter voltages
2. Battery Charging and Discharging, Solar, Grid and Load Currents.
3. Solar and Grid Peak Voltages.
4. Battery, Grid, Load Peak Currents.
5. 2 Channels of Temperature and Humidity.
6. Recharge and Server charges for 1 year should be provided.
7. Two different Login should be provided for Department and User.
8. Storage of Data should be there for at least 2 years.
9. Alerts, Consumption and Generation Data should be sent through E-Mail every day.
10. Provision to Remotely Shutdown the Inverter should be provided in the Software Application.
11. Provision to ON/OFF the Inverter System through Mobile Android application using Bluetooth Module which is inbuilt in the RMS.
12. Provision to Upgrade the Firmware in the RMS Remotely.

PROTECTIONS

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

LIGHTNING PROTECTION

The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying the required number of Lightning Arresters. Lightning protection should be provided as per IEC 62305 standards.

CABLES

Cable size as mentioned in the bill of materials to be used in the Project shall have the following characteristics:

- Temp. Range: $-10\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$
- Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- Flexible
- Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be selected to keep the voltage drop (power loss) of the entire Project to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use.
- The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e., twenty-five (25) Operational Years.

Preferred Make:

Polycab, Finolex, Havells, RR Kabels or Any Reputed make.

Annexure I (d) – Technical Specification for 20KW Hybrid Solar Inverter System

SI.NO	Material	Capacity	Quantity
1	Solar Modules 72 cells,11 in series 4 in parallel, Total 44 no's	335W,24V	1
2	Solar Battery, Tabular Battery Lead Acid C10 Rated (20 in Series, 3 sets in parallel)	12v,200AH	1
3	MMS Ground Mounted (For all modules)		1
4	Battery Rack (2 Racks with 5 Batteries in Each Rack)	200AH ,60 batteries	6
5	Solar Array Junction Box (AJB) with SPD and MCB	4 in 1 out	1
6	SOLAR PCU 240Vdc,25KVA, 3 Phase Output	240Vdc,20KW	1
7	Remote Monitoring System (3 Phase) with 2 Channel T&H Module		1
8	ACDB (GIPB with Changeover switch & Indicators)	415V,20KW	1
9	Copper Cable (R+B) Module to Module	6 Sq.mm	50m+50m
10	Copper Cable (R+B) Module to Inverter	25 Sq.mm	50m+50m
11	Copper Cable (R+B) Battery to Battery	25 Sq.mm	15m+15m
12	Copper Cable (R+B) Battery to Inverter	25 Sq.mm	20m+20m
13	Copper Cable (R+Y+B+N) GIPB to Inverter	16 Sq.mm	5m+5m+5m+5m
14	Copper Cable (R+Y+B+N) DB to Load wiring	10 Sq.mm	As per site
15	Copper Cable (R+Y+B+N) DB to Load wiring	6 Sq.mm	As per site
16	Copper Cable (R+Y+B+N) DB to Load wiring	4 sq.mm	As per site
17	Copper Cable (R+Y+B+N) DB to Load wiring	2.5 sq.mm	As per site
18	Isolator	500Vdc,100A	1
19	MCB Four pole	415Vac,50A	2
20	MCB Four pole	415Vac,32A	1
21	MCB Four pole	415Vac,16A	1
22	Earthing Kit		3
23	Copper Earthing Cable, Green	10 sq.mm	50m
24	Lightning Arrestor set		1
25	consumables		1

TECHNICAL SPECIFICATIONS OF THE SOLAR COMPONENTS

The proposed project shall be commissioned as per the technical specifications given below. Any shortcomings will lead to the cancelation of the Letter of Award & the Competent Authority's decision will be final and binding on the bidder.

SOLAR PV MODULE:

The PV modules used must qualify to the latest edition of the IEC PV module qualification test.

- The total solar PV array capacity should not be less than the allocated capacity and should comprise of solar crystalline modules of minimum Wp mentioned in the bill of materials/ above wattage. Module capacity less than minimum the mentioned Wp shall not be accepted.
- PV modules must be tested and approved by one of the IEC authorized test centers. The module frame shall be made of corrosion-resistant materials, preferably having anodized aluminum.
- The panels should have IEC 61215 with 5000 Pa load handling capacity for cyclone resilient.

The following information must be mentioned in the ID used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions).

- Name of the manufacturer of the PV module.
- I-V curve for the module Wattage, I_{max} , V_{max} , and FF (Fill Factor) for the module
- Unique Serial No and Model No of the module

Materials Warranty

- Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (5) years from the date of sale to the original customer ("Customer")
- Defects and/or failures due to manufacturing.
- Defects and/or failures due to quality of materials
- Non-conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at the Owner's sole option.

Performance Warranty

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

Preferred Make

MNRE Approved (Empaneled) (WAREE, VIKRAM, MICROSUN, KOTAK, EMMVEE, ENFROS) or Any Reputed Make.

MOUNTING STRUCTURE

- j. **Hot dip galvanized MS / GI / Anodized aluminum of size not less than 50 mm x 50 mm x 6mm size shall be used for mounting the modules/ panels/arrays.** Each structure should have an angle of inclination as per the site conditions to take maximum irradiation.
- k. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels. Installation of solar structures should not damage the roof in any way. If any concrete or foundation is required, it should be precast type.
- l. **South facing with 22 degrees inclined towards north should be followed despite whatever roofing type is. The structure also should be able to withstand wind speed of 200 - 250 km/h.**

DC COMBINER BOX/ARRAY JUNCTION BOX:

- g. The junction boxes are to be provided in the PV array for termination of connecting cables. The Junction Boxes (JBs) shall be made of GRP/FRP/Powder Coated Aluminum /cast aluminum alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JBs shall be such that input & output termination can be made through suitable cable glands
- h. Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification

BATTERY:

- Lead acid
- All the batteries should have a C/10 rate of discharge. The voltage of each battery should be of 12V, 200AH.
- Battery should conform to the latest BIS/ International standards. A copy of the relevant test certificate for the battery should be furnished.
- The battery should be warranted for a minimum of 5 years.
- The battery should be installed inside the premises of consumers on a Battery rack of acid resistant material to bear the required battery load. The non-reactive acid proof mat should be provided around the floor space of the battery bank.

Preferred Make

MNRE Approved (Empaneled) (Exide, Luminous, Amaron, Eastman, Okaya) or Any Reputed Make.

PCU/ INVERTER:

The power conditioning unit should be provided to convert DC power produced by SPV modules, into AC power. The power conditioning unit/inverter should be Off-Grid type. Typical technical features of the inverter shall be as follows:

Power conditioning unit with inbuilt charge controller of capacity & ratings as specified in the below for various capacity of Solar Power Plants should convert DC power into AC power, and must conform to standards IEC 61683.

The PCU will have the following features:

- IGBT based MPPT charging.
- Output voltage 415V, +/-3% Modified/ Pure sine wave for Three Phase.
- Output frequency: 50 Hz, +/- 0.5 Hz.
- Capacity of PCU/ Inverter is specified at 0.8 lagging power factor.
- THD: less than 3% Efficiency: >85% at full load.
- Provision to Remotely Shutdown the Inverter
- Ambient Temp 50 degree Celsius (max.)
- Operating humidity 95% maximum

Protections:

- Over voltage (automatic shutdown)
- Under voltage (automatic shutdown)
- Overload - Short circuit (circuit breaker & electronics protection against sustained fault)
- Over Temperature
- Battery, PV reverse polarity

Indicators

- Array on
- MPPT charger on
- Battery connected, charging
- Inverter ON
- Load on solar/ battery
- Grid charger on
- Load on Grid
- Grid on
- Fault

Display Parameters

- Charging current
- Charging voltage
- Voltage of PV panels
- Output voltage
- Grid voltage
- Inverter loading (kW) & Energy Generation (kWh)
- Output frequency
- Fault / fault code

Cooling: Air Cooled

The PCU/ inverters should be tested from the MNRE approved test centers / NABL /BIS accredited testing- calibration laboratories. In the case of imported power conditioning units, these should be approved by international test houses.

Preferred Make: Luminous, Studer, Eastman or Any Reputed make.

REMOTE MONITORING SYSTEM:

Remote monitoring is the ability to visualize, track, and control assets and facilities without having to be on-premise. This capability is made possible through numerous technologies such as wireless networks, sensors, transmitters, receivers, data processing, cloud storage, and analytics. Together, these technologies provide greater visibility into asset performance, predict equipment failure, and reduce resource consumption, enabling cost-effective and efficient operations all the time. Centralized monitoring Accurate monitoring improved team efficiency faster response to incidents Compliance to regulatory requirements Business continuity in the event of disasters Lower operating costs.

Specifications:

The system should be able to monitor the Following Parameters

1. Solar, Battery, Grid, Inverter voltages
2. Battery Charging and Discharging, Solar, Grid and Load Currents.
3. Solar and Grid Peak Voltages.
4. Battery, Grid, Load Peak Currents.
5. 2 Channels of Temperature and Humidity.
6. Recharge and Server charges for 1 year should be provided.
7. Two different Login should be provided for Department and User.
8. Storage of Data should be there for at least 2 years.
9. Alerts, Consumption and Generation Data should be sent through E-Mail every day.
10. Provision to Remotely Shutdown the Inverter should be provided in the Software Application.
11. Provision to ON/OFF the Inverter System through Mobile Android application using Bluetooth Module which is inbuilt in the RMS.
12. Provision to Upgrade the Firmware in the RMS Remotely.

PROTECTIONS

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

LIGHTNING PROTECTION

The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying the required number of Lightning Arresters. Lightning protection should be provided as per IEC 62305 standards.

CABLES

Cable size as mentioned in the bill of materials to be used in the Project shall have the following characteristics:

- Temp. Range: – 10 °C to +80 °C.
- Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- Flexible
- Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be selected to keep the voltage drop (power loss) of the entire Project to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use.
- The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e., twenty-five (25) Operational Years.

Preferred Make:

Polycab, Finolex, Havells, RR Kabels or Any Reputed make.

Annexure I (e) – Technical Specification for 30KW Hybrid Solar Inverter System

Sl.No	Material	Capacity	Quantity
1	Solar Modules 144 cells mono PERC Half cut ,15 in series 3 in parallel, Total 45 no's	525W,42V	1
2	Solar Battery, Tubular Gel VRLA Battery 2 TGI 600 with Battery Rack	360Vdc,600A H	1
3	MMS Ground Mounted (For all modules)		1
4	Solar Array Junction Box (AJB) with SPD and MCB	3 in 1 out	1
5	ACDB (GIPB with Changeover switch & Indicators)	415V,30KW	1
6	SOLAR PCU 360Vdc,37.5KVA ,3 Phase Output	360Vdc,30KW	1
7	Remote Monitoring System (3 Phase) with 2 Channel T&H Module		1
8	Copper Cable (R+B) Module to Module	6 Sq.mm	50m+50m
9	Copper Cable (R+B) Module to Inverter	25 Sq.mm	50m+50m
10	Copper Cable (R+B) Battery to Battery	35 Sq.mm	15m+15m
11	Copper Cable (R+B) Battery to Inverter	35 Sq.mm	20m+20m
12	Copper Cable (R+Y+B+N) GIPB to Inverter	25 Sq.mm	5m+5m+5m+5m
13	Copper Cable (R+Y+B+N) DB to Load wiring	16 Sq.mm	As per site
14	Copper Cable (R+Y+B+N) DB to Load wiring	10 Sq.mm	As per site
15	Copper Cable (R+Y+B+N) DB to Load wiring	6 sq.mm	As per site
16	Copper Cable (R+Y+B+N) DB to Load wiring	4 sq.mm	As per site
17	Isolator	1000Vdc,100A	1
18	MCB Four pole	415Vac,63A	2
19	MCB Four pole	415Vac,32A	1
20	MCB Four pole	415Vac,16A	1
21	Earthing Kit		5
22	Copper Earthing Cable, Green	10 sq.mm	50m
23	Lightning Arrestor set		2
24	consumables		1

TECHNICAL SPECIFICATIONS OF THE SOLAR COMPONENTS

The proposed project shall be commissioned as per the technical specifications given below. Any shortcomings will lead to the cancelation of the Letter of Award & the Competent Authority's decision will be final and binding on the bidder.

SOLAR PV MODULE:

The PV modules used must qualify to the latest edition of the IEC PV module qualification test.

- The total solar PV array capacity should not be less than the allocated capacity and should comprise of solar crystalline modules of minimum Wp mentioned in the bill of materials/ above wattage. Module capacity less than minimum the mentioned Wp shall not be accepted.
- PV modules must be tested and approved by one of the IEC authorized test centers. The module frame shall be made of corrosion-resistant materials, preferably having anodized aluminum.
- The panels should have IEC 61215 with 5000 Pa load handling capacity for cyclone resilient.

The following information must be mentioned in the ID used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions).

- Name of the manufacturer of the PV module.
- I-V curve for the module Wattage, I_{max}, V_{max}, and FF (Fill Factor) for the module
- Unique Serial No and Model No of the module

Materials Warranty

- Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (5) years from the date of sale to the original customer ("Customer")
- Defects and/or failures due to manufacturing.
- Defects and/or failures due to quality of materials
- Non-conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at the Owner's sole option.

Performance Warranty

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

Preferred Make

MNRE Approved (Empaneled) (WAREE, VIKRAM, MICROSUN, KOTAK, EMMVEE, ENFROS) or Any Reputed Make.

MOUNTING STRUCTURE

- m. **Hot dip galvanized MS / GI /Anodized aluminum of size not less than 50 mm x 50 mm x 6mm size shall be used for mounting the modules/ panels/arrays.** Each structure should have an angle of inclination as per the site conditions to take maximum irradiation.
- n. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels. Installation of solar structures should not damage the roof in any way. If any concrete or foundation is required, it should be precast type.
- o. **South facing with 22 degrees inclined towards north should be followed despite whatever roofing type is. The structure also should be able to withstand wind speed of 200 - 250 km/h.**

DC COMBINER BOX/ARRAY JUNCTION BOX:

- i. The junction boxes are to be provided in the PV array for termination of connecting cables. The Junction Boxes (JBs) shall be made of GRP/FRP/Powder Coated Aluminum /cast aluminum alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands
- j. Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification

BATTERY:

- Gel VRLA Battery.
- All the batteries should have a C/10 rate of discharge. The voltage of each battery should be of 2VDC, 600AH Tubular Gel VRLA Battery.
- Battery should conform to the latest BIS/ International standards. A copy of the relevant test certificate for the battery should be furnished.
- The battery should be warranted for a minimum of 5 years.
- The battery should be installed inside the premises of consumers on a Battery rack of acid resistant material to bear the required battery load. The non-reactive acid proof mat should be provided around the floor space of the battery bank.

Preferred Make

MNRE Approved (Empaneled) (Exide, Luminous, Amaron, HBL, Okaya) or Any Reputed Make.

PCU/ INVERTER:

The power conditioning unit should be provided to convert DC power produced by SPV modules, into AC power. The power conditioning unit/inverter should be Off-Grid type. Typical technical features of the inverter shall be as follows:

Power conditioning unit with inbuilt charge controller of capacity & ratings as specified in the below for various capacity of Solar Power Plants should convert DC power into AC power, and must conform to standards IEC 61683.

The PCU will have the following features:

- IGBT based MPPT charging.
- Output voltage 415V, +/-3% Modified/ Pure sine wave for Three Phase.
- Output frequency: 50 Hz, +/- 0.5 Hz.
- Capacity of PCU/ Inverter is specified at 0.8 lagging power factor.
- THD: less than 3% Efficiency: >85% at full load.
- Provision to Remotely Shutdown the Inverter
- Ambient Temp 50 degree Celsius (max.)
- Operating humidity 95% maximum

Protections:

- Over voltage (automatic shutdown)
- Under voltage (automatic shutdown)
- Overload - Short circuit (circuit breaker & electronics protection against sustained fault)
- Over Temperature
- Battery, PV reverse polarity

Indicators

- Array on
- MPPT charger on
- Battery connected, charging
- Inverter ON
- Load on solar/ battery
- Grid charger on
- Load on Grid
- Grid on
- Fault

Display Parameters

- Charging current
- Charging voltage
- Voltage of PV panels
- Output voltage
- Grid voltage
- Inverter loading (kW) & Energy Generation (kWh)
- Output frequency
- Fault / fault code

Cooling: Air Cooled

The PCU/ inverters should be tested from the MNRE approved test centers / NABL /BIS accredited testing- calibration laboratories. In the case of imported power conditioning units, these should be approved by international test houses.

Preferred Make: Luminous, Studer, Eastman or Any Reputed make.

REMOTE MONITORING SYSTEM:

Remote monitoring is the ability to visualize, track, and control assets and facilities without having to be on-premise. This capability is made possible through numerous technologies such as wireless networks, sensors, transmitters, receivers, data processing, cloud storage, and analytics. Together, these technologies provide greater visibility into asset performance, predict equipment failure, and reduce resource consumption, enabling cost-effective and efficient operations all the time. Centralized monitoring Accurate monitoring improved team efficiency faster response to incidents Compliance to regulatory requirements Business continuity in the event of disasters Lower operating costs.

Specifications:

The system should be able to monitor the Following Parameters

1. Solar, Battery, Grid, Inverter voltages
2. Battery Charging and Discharging, Solar, Grid and Load Currents.
3. Solar and Grid Peak Voltages.
4. Battery, Grid, Load Peak Currents.
5. 2 Channels of Temperature and Humidity.
6. Recharge and Server charges for 1 year should be provided.
7. Two different Login should be provided for Department and User.
8. Storage of Data should be there for at least 2 years.
9. Alerts, Consumption and Generation Data should be sent through E-Mail every day.
10. Provision to Remotely Shutdown the Inverter should be provided in the Software Application.
11. Provision to ON/OFF the Inverter System through Mobile Android application using Bluetooth Module which is inbuilt in the RMS.
12. Provision to Upgrade the Firmware in the RMS Remotely.

PROTECTIONS

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

LIGHTNING PROTECTION

The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying the required number of Lightning Arresters. Lightning protection should be provided as per IEC 62305 standards.

CABLES

Cable size as mentioned in the bill of materials to be used in the Project shall have the following characteristics:

- Temp. Range: – 10 °C to +80 °C.
- Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- Flexible
- Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be selected to keep the voltage drop (power loss) of the entire Project to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use.
- The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e., twenty-five (25) Operational Years.

Preferred Make:

Polycab, Finolex, Havells, RR Kabels or Any Reputed Make.

Annexure I (f) – Technical Specification for 40KW Hybrid Solar Inverter System

Sl.No	Material	Capacity	Quantity
1	Solar Modules 144 cells mono PERC Half cut ,15 in series 4 in parallel, Total 60 no's	545W,42V	1
2	Solar Battery, Tubular Gel VRLA Battery 2 TGI 800 with Battery Rack	360Vdc,800A H	1
3	MMS Ground Mounted (For all modules)		1
4	Solar Array Junction Box (AJB) with SPD and MCB	4 in 1 out	1
5	ACDB (GIPB with Changeover switch & Indicators)	415V,40KW	1
6	SOLAR PCU 360Vdc,50KVA ,3 Phase Output	360Vdc,40KW	1
7	Remote Monitoring System (3 Phase) with 2 Channel T& H Module		1
8	Copper Cable (R+B) Module to Module	6 Sq.mm	50m+50m
9	Copper Cable (R+B) Module to Inverter	25 Sq.mm	50m+50m
10	Copper Cable (R+B) Battery to Battery	35 Sq.mm	15m+15m
11	Copper Cable (R+B) Battery to Inverter	35 Sq.mm	20m+20m
12	Copper Cable (R+Y+B+N) GIPB to Inverter	35 Sq.mm	5m+5m+5m+5m
13	Copper Cable (R+Y+B+N) DB to Load wiring	25 Sq.mm	As per site
14	Copper Cable (R+Y+B+N) DB to Load wiring	16 Sq.mm	As per site
15	Copper Cable (R+Y+B+N) DB to Load wiring	10 sq.mm	As per site
16	Copper Cable (R+Y+B+N) DB to Load wiring	6 sq.mm	As per site
17	Isolator	1000Vdc,200A	1
18	MCB Four pole	415Vac,100A	2
19	MCB Four pole	415Vac,63A	1
20	MCB Four pole	415Vac,32A	1
21	Earthing Kit		5
22	Copper Earthing Cable, Green	10 sq.mm	70m
23	Lightning Arrestor set		2
24	consumables		1

TECHNICAL SPECIFICATIONS OF THE SOLAR COMPONENTS

The proposed project shall be commissioned as per the technical specifications given below. Any shortcomings will lead to the cancellation of the Letter of Award & the Competent Authority's decision will be final and binding on the bidder.

SOLAR PV MODULE:

The PV modules used must qualify to the latest edition of the IEC PV module qualification test.

- The total solar PV array capacity should not be less than the allocated capacity and should comprise of solar crystalline modules of minimum Wp mentioned in the bill of materials/ above wattage. Module capacity less than minimum the mentioned Wp shall not be accepted.
- PV modules must be tested and approved by one of the IEC authorized test centers. The module frame shall be made of corrosion-resistant materials, preferably having anodized aluminum.
- The panels should have IEC 61215 with 5000 Pa load handling capacity for cyclone resilient.

The following information must be mentioned in the ID used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions).

- Name of the manufacturer of the PV module.
- I-V curve for the module Wattage, I_{max}, V_{max}, and FF (Fill Factor) for the module
- Unique Serial No and Model No of the module

Materials Warranty

- Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (5) years from the date of sale to the original customer ("Customer")
- Defects and/or failures due to manufacturing.
- Defects and/or failures due to quality of materials
- Non-conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at the Owner's sole option.

Performance Warranty

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

Preferred Make

MNRE Approved (Empaneled) (WAREE, VIKRAM, MICROSUN, KOTAK, EMMVEE, ENFROS) or Any Reputed Make.

MOUNTING STRUCTURE

- p. **Hot dip galvanized MS / GI / Anodized aluminum of size not less than 50 mm x 50 mm x 6mm size shall be used for mounting the modules/ panels/arrays.** Each structure should have an angle of inclination as per the site conditions to take maximum irradiation.
- q. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels. Installation of solar structures should not damage the roof in any way. If any concrete or foundation is required, it should be precast type.
- r. **South facing with 22 degrees inclined towards north should be followed despite whatever roofing type is. The structure also should be able to withstand wind speed of 200 - 250 km/h.**

DC COMBINER BOX/ARRAY JUNCTION BOX:

- k. The junction boxes are to be provided in the PV array for termination of connecting cables. The Junction Boxes (JBs) shall be made of GRP/FRP/Powder Coated Aluminum /cast aluminum alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands
- l. Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification

BATTERY:

- Gel VRLA Battery.
- All the batteries should have a C/10 rate of discharge. The voltage of each battery should be of 2VDC, 600AH Tubular Gel VRLA Battery.
- Battery should conform to the latest BIS/ International standards. A copy of the relevant test certificate for the battery should be furnished.
- The battery should be warranted for a minimum of 5 years.
- The battery should be installed inside the premises of consumers on a Battery rack of acid resistant material to bear the required battery load. The non-reactive acid proof mat should be provided around the floor space of the battery bank.

Preferred Make

MNRE Approved (Empaneled) Exide, Luminous, Amaron, HBL, Okaya) or Any Reputed Make.

PCU/ INVERTER:

The power conditioning unit should be provided to convert DC power produced by SPV modules, into AC power. The power conditioning unit/inverter should be Off-Grid type. Typical technical features of the inverter shall be as follows:

Power conditioning unit with inbuilt charge controller of capacity & ratings as specified in the below for various capacity of Solar Power Plants should convert DC power into AC power, and must conform to standards IEC 61683.

The PCU will have the following features:

- IGBT based MPPT charging.
- Output voltage 415V, +/-3% Modified/ Pure sine wave for Three Phase.
- Output frequency: 50 Hz, +/- 0.5 Hz.
- Capacity of PCU/ Inverter is specified at 0.8 lagging power factor.
- THD: less than 3% Efficiency: >85% at full load.
- Provision to Remotely Shutdown the Inverter
- Ambient Temp 50 degree Celsius (max.)
- Operating humidity 95% maximum

Protections:

- Over voltage (automatic shutdown)
- Under voltage (automatic shutdown)
- Overload - Short circuit (circuit breaker & electronics protection against sustained fault)
- Over Temperature
- Battery, PV reverse polarity

Indicators

- Array on
- MPPT charger on
- Battery connected, charging
- Inverter ON
- Load on solar/ battery
- Grid charger on
- Load on Grid
- Grid on
- Fault

Display Parameters

- Charging current
- Charging voltage
- Voltage of PV panels
- Output voltage
- Grid voltage
- Inverter loading (kW) & Energy Generation (kWh)
- Output frequency

- Fault / fault code

Cooling: Air Cooled

The PCU/ inverters should be tested from the MNRE approved test centers / NABL /BIS accredited testing- calibration laboratories. In the case of imported power conditioning units, these should be approved by international test houses.

Preferred Make: Luminous, Studer, Eastman or Any Reputed make.

REMOTE MONITORING SYSTEM:

Remote monitoring is the ability to visualize, track, and control assets and facilities without having to be on-premise. This capability is made possible through numerous technologies such as wireless networks, sensors, transmitters, receivers, data processing, cloud storage, and analytics. Together, these technologies provide greater visibility into asset performance, predict equipment failure, and reduce resource consumption, enabling cost-effective and efficient operations all the time. Centralized monitoring Accurate monitoring improved team efficiency faster response to incidents Compliance to regulatory requirements Business continuity in the event of disasters Lower operating costs.

Specifications:

The system should be able to monitor the Following Parameters

1. Solar, Battery, Grid, Inverter voltages
2. Battery Charging and Discharging, Solar, Grid and Load Currents.
3. Solar and Grid Peak Voltages.
4. Battery, Grid, Load Peak Currents.
5. 2 Channels of Temperature and Humidity.
6. Recharge and Server charges for 1 year should be provided.
7. Two different Login should be provided for Department and User.
8. Storage of Data should be there for at least 2 years.
9. Alerts, Consumption and Generation Data should be sent through E-Mail every day.
10. Provision to Remotely Shutdown the Inverter should be provided in the Software Application.
11. Provision to ON/OFF the Inverter System through Mobile Android application using Bluetooth Module which is inbuilt in the RMS.
12. Provision to Upgrade the Firmware in the RMS Remotely.

PROTECTIONS

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

LIGHTNING PROTECTION

The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying the required number of Lightning Arresters. Lightning protection should be provided as per IEC 62305 standards.

CABLES

Cable size as mentioned in the bill of materials to be used in the Project shall have the following characteristics:

- Temp. Range: – 10 °C to +80 °C.
- Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- Flexible
- Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be selected to keep the voltage drop (power loss) of the entire Project to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use.
- The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e., twenty-five (25) Operational Years.

Preferred Make:

Polycab, Finolex, Havells, RR Kabels or Any Reputed Make.

Annexure I (g) – Technical Specification for 50KW Hybrid Solar Inverter System

SI.NO	Material	Capacity	Quantity
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1	Solar Modules 144 cells mono PERC Half cut ,15 in series 5 in parallel, Total 75 no's	525W,42V	1
2	Solar Battery, Tubular Gel VRLA Battery 2v TGI 1000 with Battery Rack	360Vdc,1000AH	1
3	MMS Ground Mounted (For all modules)		1
4	Solar Array Junction Box (AJB) with SPD and MCB	5 in 1 out	1
5	ACDB (GIPB with Changeover switch & Indicators)	415V,50KW	1
6	SOLAR PCU 360Vdc,62.5KVA ,3 Phase Output	360Vdc,50KW	1
7	Remote Monitoring System (3 Phase) with 2 Channel T&H Module		1
8	Copper Cable (R+B) Module to Module	6 Sq.mm	60m+60m
9	Copper Cable (R+B) Module to Inverter	35 Sq.mm	50m+50m
10	Copper Cable (R+B) Battery to Battery	50 Sq.mm	15m+15m
11	Copper Cable (R+B) Battery to Inverter	50 Sq.mm	20m+20m
12	Copper Cable (R+Y+B+N) GIPB to Inverter	50 Sq.mm	5m+5m
13	Copper Cable (R+Y+B+N) DB to Load wiring	25 Sq.mm	As per site
14	Copper Cable (R+Y+B+N) DB to Load wiring	16 Sq.mm	As per site
15	Copper Cable (R+Y+B+N) DB to Load wiring	10 sq.mm	As per site
16	Copper Cable (R+Y+B+N) DB to Load wiring	6 sq.mm	As per site
17	Isolator (For Battery & Solar)	1000Vdc,200A	2
18	MCB Four pole	415Vac,100A	2
19	MCB Four pole	415Vac,63A	1
20	MCB Four pole	415Vac,32A	1
21	Earthing Kit		6
22	Copper Earthing Cable, Green	10 sq.mm	80m
23	Lightning Arrestor		3
24	consumables		1

TECHNICAL SPECIFICATIONS OF THE SOLAR COMPONENTS

The proposed project shall be commissioned as per the technical specifications given below. Any shortcomings will lead to the cancelation of the Letter of Award & the Competent Authority's decision will be final and binding on the bidder.

SOLAR PV MODULE:

The PV modules used must qualify to the latest edition of the IEC PV module qualification test.

- The total solar PV array capacity should not be less than the allocated capacity and should comprise of solar crystalline modules of minimum Wp mentioned in the bill of materials/ above wattage. Module capacity less than minimum the mentioned Wp shall not be accepted.
- PV modules must be tested and approved by one of the IEC authorized test centers. The module frame shall be made of corrosion-resistant materials, preferably having anodized aluminum.
- The panels should have IEC 61215 with 5000 Pa load handling capacity for cyclone resilient.

The following information must be mentioned in the ID used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions).

- Name of the manufacturer of the PV module.
- I-V curve for the module Wattage, I_{max}, V_{max}, and FF (Fill Factor) for the module
- Unique Serial No and Model No of the module

Materials Warranty

- Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (5) years from the date of sale to the original customer ("Customer")
- Defects and/or failures due to manufacturing.
- Defects and/or failures due to quality of materials
- Non-conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at the Owner's sole option.

Performance Warranty

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

Preferred Make

MNRE Approved (Empaneled) (WAREE, VIKRAM, MICROSUN, KOTAK, EMMVEE, ENFROS) or Any Reputed Make.

MOUNTING STRUCTURE

- s. **Hot dip galvanized MS / GI / Anodized aluminum of size not less than 50 mm x 50 mm x 6mm size shall be used for mounting the modules/ panels/arrays.** Each structure should have an angle of inclination as per the site conditions to take maximum irradiation.
- t. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels. Installation of solar structures should not damage the roof in any way. If any concrete or foundation is required, it should be precast type.
- u. **South facing with 22 degrees inclined towards north should be followed despite whatever roofing type is. The structure also should be able to withstand wind speed of 200 - 250 km/h.**

DC COMBINER BOX/ARRAY JUNCTION BOX:

- m. The junction boxes are to be provided in the PV array for termination of connecting cables. The Junction Boxes (JBs) shall be made of GRP/FRP/Powder Coated Aluminum /cast aluminum alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands
- n. Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification

BATTERY:

- Gel VRLA Battery.
- All the batteries should have a C/10 rate of discharge. The voltage of each battery should be of 2VDC, 1000AH Tubular Gel VRLA Battery.
- Battery should conform to the latest BIS/ International standards. A copy of the relevant test certificate for the battery should be furnished.
- The battery should be warranted for a minimum of 5 years.
- The battery should be installed inside the premises of consumers on a Battery rack of acid resistant material to bear the required battery load. The non-reactive acid proof mat should be provided around the floor space of the battery bank.

Preferred Make

MNRE Approved (Empaneled) (Exide, Luminous, Amaron, HBL, Okaya) or Any Reputed Make.

PCU/ INVERTER:

The power conditioning unit should be provided to convert DC power produced by SPV modules, into AC power. The power conditioning unit/inverter should be Off-Grid type. Typical technical features of the inverter shall be as follows:

Power conditioning unit with inbuilt charge controller of capacity & ratings as specified in the below for various capacity of Solar Power Plants should convert DC power into AC power, and must conform to standards IEC 61683.

The PCU will have the following features:

- IGBT based MPPT charging.
- Output voltage 415V, +/-3% Modified/ Pure sine wave for Three Phase.
- Output frequency: 50 Hz, +/- 0.5 Hz.
- Capacity of PCU/ Inverter is specified at 0.8 lagging power factor.
- THD: less than 3% Efficiency: >85% at full load.
- Provision to Remotely Shutdown the Inverter
- Ambient Temp 50 degree Celsius (max.)
- Operating humidity 95% maximum

Protections:

- Over voltage (automatic shutdown)
- Under voltage (automatic shutdown)
- Overload - Short circuit (circuit breaker & electronics protection against sustained fault)
- Over Temperature
- Battery, PV reverse polarity

Indicators

- Array on
- MPPT charger on
- Battery connected, charging
- Inverter ON
- Load on solar/ battery
- Grid charger on
- Load on Grid
- Grid on

- Fault

Display Parameters

- Charging current
- Charging voltage
- Voltage of PV panels
- Output voltage
- Grid voltage
- Inverter loading (kW) & Energy Generation (kWh)
- Output frequency
- Fault / fault code

Cooling: Air Cooled

The PCU/ inverters should be tested from the MNRE approved test centers / NABL /BIS accredited testing- calibration laboratories. In the case of imported power conditioning units, these should be approved by international test houses.

Preferred Make: Luminous, Studer, Eastman or Any Reputed make.

REMOTE MONITORING SYSTEM:

Remote monitoring is the ability to visualize, track, and control assets and facilities without having to be on-premise. This capability is made possible through numerous technologies such as wireless networks, sensors, transmitters, receivers, data processing, cloud storage, and analytics. Together, these technologies provide greater visibility into asset performance, predict equipment failure, and reduce resource consumption, enabling cost-effective and efficient operations all the time. Centralized monitoring Accurate monitoring improved team efficiency faster response to incidents Compliance to regulatory requirements Business continuity in the event of disasters Lower operating costs.

Specifications:

The system should be able to monitor the Following Parameters

1. Solar, Battery, Grid, Inverter voltages
2. Battery Charging and Discharging, Solar, Grid and Load Currents.
3. Solar and Grid Peak Voltages.
4. Battery, Grid, Load Peak Currents.
5. 2 Channels of Temperature and Humidity.
6. Recharge and Server charges for 1 year should be provided.

7. Two different Login should be provided for Department and User.
8. Storage of Data should be there for at least 2 years.
9. Alerts, Consumption and Generation Data should be sent through E-Mail every day.
10. Provision to Remotely Shutdown the Inverter should be provided in the Software Application.
11. Provision to ON/OFF the Inverter System through Mobile Android application using Bluetooth Module which is inbuilt in the RMS.
12. Provision to Upgrade the Firmware in the RMS Remotely.

PROTECTIONS

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

LIGHTNING PROTECTION

The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying the required number of Lightning Arresters. Lightning protection should be provided as per IEC 62305 standards.

CABLES

Cable size as mentioned in the bill of materials to be used in the Project shall have the following characteristics:

- Temp. Range: -10°C to $+80^{\circ}\text{C}$.
- Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- Flexible
- Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be selected to keep the voltage drop (power loss) of the entire Project to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use.
- The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e., twenty-five (25) Operational Years.

Preferred Make:

Polycab, Finolex, Havells, RR Kabels or Any Reputed Make.

Annexure II: Letter of Technical Proposal

To,
Chief Executive Officer,
Meghalaya Basin Management Agency,
Shillong –
Meghalaya-793003

Date:

Sub: Tender for empanelment of agencies for installation, commissioning & comprehensive maintenance of solar energy solutions in various locations of the State of Meghalaya, under the Meghalaya Basin Management Agency

Regarding Technical Proposal

Dear Sir,

1. With reference to the RFE dated_____for the above captioned project, and clarification issued by MBMA, thereof, we_____, having examined all relevant documents and understood their contents, hereby submit our Proposal for selection as _____ . The proposal is unconditional and unqualified.
2. All information provided in the Proposal and in the Appendices is true and correct and all documents accompanying such Proposal are true copies of their respective originals.
3. This statement is made for the express purpose of appointment as the Agency for the aforesaid Project.
4. We shall make available to the MBMA any additional information it may deem necessary or require for supplementing or authenticating the Proposal.
5. We acknowledge the right of the MBMA, to reject our application without assigning any reason or otherwise and hereby waive our right to challenge the same on any account whatsoever.
6. We certify that in the last three years, we or any of our Associates have neither failed to perform on any contract, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial pronouncement or arbitration award against the Bidder, nor been expelled from any project or contract by any public authority nor have had any contract terminated by any public authority for breach on our part.

We declare that:

a. We have examined and have no reservations to the RFE Documents, including any Addendums issued by the MBMA.

b. We have not directly or indirectly or through an agent engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, in respect of any tender or request for proposal issued by or any agreement entered into with the MBMA or any other public sector enterprise or any government, Central or State; and

c. We hereby certify that we have taken steps to ensure that, no person acting for us or on our behalf will engage in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.

7. We understand that you may cancel the Selection Process at any time and that you are neither bound to accept any Proposal that you may receive nor to select the Agency, without incurring any liability to the Bidders.

8. If our Firm is qualified, we shall make our technical proposal to the MBMA on the date specified upon intimation received from the MBMA.

9. The undersigned is authorized to sign the documents being submitted through this RFE. (A copy of Power of Attorney may be enclosed)

10. In the event our firm is selected as the Agency for this project we shall enter into a contract with the MBMA.

11. The Financial Proposal is being submitted in a separate cover. This Technical Proposal read with the Financial Proposal shall constitute the Application which shall be binding on us.

12. The information provided herewith is true and correct to our best knowledge. If any discrepancies are found in the information provided or if the information provided is not correct, our firm would be fully responsible for that. We understand in such cases our bids are liable to be rejected.

Yours faithfully,

(Signature, name and designation of the authorized signatory/ authorized signatory of Lead Member in case of Consortium) (Name and seal of the Bidder)

Annexure III: Details of the Organisation

1	Name and address of the Supplier (With pin code)	
2	Year of starting the organization & registration number (photocopy of registration certificate or any other relevant document to be enclosed)	
3	Name and Contact number of the Proprietor or Point of Contact	
4	Status of Supplier	Proprietorship / Partnership/ PvtLtd / Limited/others
5	a) GSTIN and PAN No. of Income Tax Dept. (Photocopy of Income Tax (IT)) returns for the last 2 Financial Year years to be enclosed	
6	Audit reports for last consecutive 3 years from the last 4 years (Certified copy of Chartered Account' report in P&L account to be enclosed)	
7	Experience of Supplier/supplier relating to supply of solarenergy-based solutions (supporting certificates to be enclosed)	
8	Particulars of Physical Infrastructure and total strength of staff available in the organization relating to Supplier/supply/testing etc.,	

Signature of the bidder and address with seal

Date:

Annexure IV – Document Enclosure form

Sl.No.	Description	Whether the Document is enclosed or not	Page No. From and to
1	Details of Organization as per Table –I	YES/NO	
2	Copies showing the legal status, places of registration and principal place of business of the firm	YES/NO	
3	Copies of audited financial statements for the last 2 financial years	YES/NO	
4	Copies of GST registration and GST returns filled in the last 2 financial years	YES/NO	
5	Copies of income tax registration and income tax returns filled in the last 2 financial years	YES/NO	
6	Acceptance to give 5 years guarantee for trouble free operation and maintenance.	YES/NO	
7	Address of the nearest official Service Centre of the company.	YES/NO	
8	Letter of declaration to confirm that the bidder has not been blacklisted by any State Government/ Central Govt. / PSU in India	YES/NO	
9	BID security in the form of cheque or DD from a Nationalized Bank drawn in favour of “The Chief Executive Officer’ Meghalaya Basin Management Agency; Shillong, Meghalaya” for a value of Rs. _____	YES/NO	

I abide by all the above terms & conditions.

SIGNATURE OF THE BIDDER and with office seal

PLACE:

DATE:

Annexure V - PRICE SCHEDULE

PARTICULARS TO BE SUBMITTED IN THE FINANCIAL BID (SECOND COVER).

Price Schedule for Tender for empanelment of agencies for installation, commissioning & comprehensive maintenance of 10 KW, 15 KW, 20KW, 30KW, 40KW and 50KW Hybrid Solar Inverter System in various locations of the State of Meghalaya, under the Meghalaya Basin Management Agency (MBMA) rates quoted by the bidder:

- I. The rates should be mentioned item wise clearly both in words and figures Item-wise details of rates quoted.
- II. Rates should be inclusive of GST.
- III. Rates should be inclusive of Annual Maintenance Contract (AMC) from Year 2 to 5 but separately mentioned.
- IV. Rates should include an average transportation cost for supply of solution category in the region of operation of the bidder.

CONDITIONS:

1. If our tender is accepted, we hereby undertake to abide as per the stipulated Terms and Conditions to supplier and supply, installation, and maintenance of solar energy-based solutions.
2. We agree to abide by this tender and if the work is awarded to us, in executing the above contract we will strictly observe the laws against fraud and corruption in force in India namely "Prevention of corruption act 1988".
3. We understand that you are not bound to determine the price based on the lowest offer that MBMA may receive.
4. We accept that all disputes between parties will be adjudicated by a competent court in Shillong, Meghalaya, India.

Lot	Description of Goods	Qty	Unit Cost	Total Cost	AMC
Lot#1	Installation, Commissioning & Comprehensive Maintenance of 5 KW Hybrid Solar Inverter System				
Lot#2	Installation, Commissioning & Comprehensive Maintenance of 10 KW Hybrid Solar Inverter System				
Lot#3	Installation, Commissioning & Comprehensive Maintenance of 15 KW Hybrid Solar Inverter System				
Lot#4	Installation, Commissioning & Comprehensive Maintenance of 20KW Hybrid Solar Inverter System				
Lot#5	Installation, Commissioning & Comprehensive Maintenance of 30KW Hybrid Solar Inverter System				
Lot#6	Installation, Commissioning & Comprehensive Maintenance of 40KW Hybrid Solar Inverter System				
Lot#7	Installation, Commissioning & Comprehensive Maintenance of 50KW Hybrid Solar Inverter System				

I, _____ (Name of signatory) on behalf of the bidder _____ (Name of the bidder), hereby certify that I have noted the technical specifications of solutions mentioned in Annexure I and the prices quoted above are as per the details specified and in compliance with Annexure I.

Dated this..... day of 2023

Signature

(Name and Address of the Tender with seal)

(In the capacity of Duly authorized to sign the Tender for and on behalf of _____)