



DEVELOPMENT OF 12.0 MW AC / 16.80 MWP DC CAPTIVE SOLAR PV POWER PLANT

SELECTION OF A ENGINEERING, PROCUREMENT AND CONSTRUCTION (EPC) CONTRACTOR FOR

PROCUREMENT OF LAND,
DESIGN, ENGINEERING,
PROCUREMENT, SUPPLY,
TRANSPORT, STORAGE OF
SUPPLY ITEMS, ERECTION,
TESTING, COMMISSIONING,
EXTERNAL TRANSMISSION LINES
AND RIGHT OF WAY, BAY
EXTENSIONS, POWER
EVACUATION SYSTEM FOR THE
DEVELOPMENT OF 12.0 MWAC
(16.80 MWP DC) CAPTIVE SOLAR
POWER PLANT IN KARNATAKA
FOR BAMUL WITH 5 YEARS
COMPREHENSIVE OPERATION
AND MAINTENANCE (O&M)

BENGALURU CO-OPERATIVE MILK UNION LIMITED (BAMUL)

(A Government of Karnataka Enterprises)

Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle,
Bengaluru, Karnataka – 560 029

BAMUL

(TECHNICAL SERVICES DEPARTMENT)

NOTICE INVITING TENDER (NIT)

BAMUL invites sealed bids from the experienced EPC contractors for carrying out for

PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M)

For more details and downloading Bid documents please visit websites www.bamulnandini.coop; www.kppp.karnataka.gov.in; Corrigendum, if any, would be published in BAMUL website only.

**General Manager(Engg)
Mobile No: +91 7760966805**

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SECTION –A:TECHNO-COMMERCIAL BID

BAMUL

Dr. M.H. Marigowda Road (Hosur Road),
Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru,
Karnataka – 560 029

TECHNO - COMMERCIAL BID

Bengaluru Co-operative Milk Union Ltd. (BAMUL) (hereinafter referred to as “**Employer**”), a Government of Karnataka Undertaking company operating as Brand BAMUL Nandini which is renowned for delivering the freshest, purest dairy products, ensuring quality and nutrition for every family. From milk to ghee, their offerings combine tradition and innovation, trusted by millions across India.

BAMUL offers a diverse range of dairy products catering to consumer needs across Karnataka. Its product portfolio includes:

LIQUID DAIRY PRODUCTS:

- ✓ Sachet Milk
- ✓ Sachet Curd
- ✓ Flavoured Milk
- ✓ Spiced Buttermilk
- ✓ Lassi

VALUE-ADDED MILK PRODUCTS:

- ✓ Paneer
- ✓ Butter
- ✓ Ghee
- ✓ Khova

TRADITIONAL SWEETS:

- ✓ Mysore Pak
- ✓ Peda

OPERATIONAL NETWORK:

- ✓ Bengaluru Urban
- ✓ Bengaluru Rural
- ✓ Bengaluru South (Ramanagara)

THE UNION MANAGES:

- ✓ 3 Dairy Processing Plants
- ✓ 6 Chilling Centres
- ✓ 294 Bulk Milk Coolers (BMCs)

DAIRY PROCESSING PLANTS:

BENGALURU DAIRY:

Located in Bengaluru City, the dairy has a milk handling capacity of **10.5 lakh litres per day (LLPD)** and facilitates:

- ✓ Milk: 9.45 lakh litres/day
- ✓ Curd: 2.11 lakh litres/day
- ✓ Peda/Paneer/Mysore Pak: 25,000 kg/day
- ✓ Ghee: 10 tonnes/day
- ✓ Butter: 20 tonnes/day

KANAKAPURA DAIRY:

Located in Ramanagara District (Bengaluru South), the dairy has **10 LLPD milk processing capacity** and facilitates:

- ✓ Cheddar Cheese: 20 tonnes/day
- ✓ Process Cheese: 20 tonnes/day
- ✓ Mozzarella Cheese: 15 tonnes/day
- ✓ UHT Milk: 80,000 litres/day
- ✓ Milk Powder Plant: 95 tonnes/day
- ✓ Butter Production: 5 tonnes/hour
- ✓ Ghee: 15 tonnes/day
- ✓ Powder Storage Capacity: 80,000 tonnes
- ✓ Butter Cold Storage Capacity: 4,000 MT

HOSAKOTE DAIRY / CHILLING CENTER:

Located in Bengaluru Rural District, the dairy has a **2 LLPD raw milk receiving capacity** and facilitates:

- ✓ Milk: 1.6 lakh litres/day
- ✓ Curd: 40,000 litres/day

CHILLING CENTRES:

Chilling Centre	Location	Capacity
Anekal	Bengaluru Rural	1,00,000 litres/day
Byrapatna	Ramanagara (Bengaluru South)	2,00,000 litres/day
Doddaballapura	Bengaluru Rural	1,60,000 litres/day
Kanakapura	Bengaluru Rural	1,20,000 litres/day
Vijayapura	Bengaluru Rural	2,00,000 litres/day
Solur	Bengaluru Rural	1,60,000 litres/day

Table 1: BAMUL – Chilling Centres across Karnataka

BULK MILK COOLER (BMC) NETWORK:

In addition to its chilling centres, BAMUL receives milk through a network of Bulk Milk Coolers (BMCs). These units are designed to chill milk at primary and cluster society levels, maintaining temperatures between **4°C and 5°C**.

KEY HIGHLIGHTS:

- ✓ Total BMCs: 294 nos.
- ✓ Milk procurement through BMCs: Approximately 10 lakh litres/day.
- ✓ Transportation: Milk is collected and transported through tanker networks

PLANNED EXPANSION PROJECTS:

To meet growing market demand, BAMUL has proposed the following expansion initiatives:

1. Establishment of a **2 LLPD Dairy / Cold Storage Facility** at Anekal Chilling Centre.
2. Expansion of the **Liquid Milk Processing Plant** at Bengaluru Dairy from **10.5 LLPD to 15 LLPD**.
3. Setting up an **Ice Cream Plant** with a capacity of **15,000 litres / day** at Dabaspete.
4. Establishment of a **Cattle Feed Plant** with a capacity of **500 MT/day**.
5. Installation of a **Yogurt Production Facility** with a capacity of **5,000 litres/day**.
6. Establishment of a **Plastic Injection Moulding Plant** for manufacturing crates and pouch films.

These projects are aimed at strengthening BAMUL's processing capacity, value-added product portfolio, storage infrastructure, and supply chain efficiency across its operational regions.

The details of BAMUL Units and their Contract Demand along with Average monthly consumption units in Karnataka are summarized below.

Sr. No.	BAMUL and its existing units	Contract Demand, kVA	Avg. units/month, kWh
1.	Bengaluru Dairy	1750 kVA	9,59,252.0
2.	Kanakapura Dairy	3000 kVA	13,36,623.0
3.	Hosakote Dairy	700 kVA	2,64,373.0
4.	Anekal Chilling centre	180 kVA	37,773.0
5.	Byrapatna Chilling centre	360 kVA	1,07,186.0
6.	Dodaballapura Chilling centre	300 kVA	48,416.0
7.	Kanakapura Chilling centre	360 kVA	59,216.0
8.	Vijayapura Chilling centre	300 kVA	62,850.0
9.	Solur Chilling centre	300 kVA	78,130.0
TOTAL		7,250 kVA	29,53,819.0 kWh

Table 2: BAMUL Existing Units and their Contract Demand and Average Electricity Consumption per month

With reference to above, BAMUL has huge demand for energy requirement for their facilities across Karnataka. So, the management has decided to setup a 12.0 MW AC / 16.80 MWp DC Captive Solar Power Plant anywhere in Karnataka (hereinafter referred to as the "Project") on turnkey EPC contract basis. BAMUL has decided to carry out the bidding process for selection of the Bidder to execute the Project on turnkey basis (hereinafter referred to as "Contractor") to whom the Project may be awarded.

BAMUL invites sealed Bids under **Single Bid** from reputed, resourceful & competent Sole entity, hereby referred to as Bidder (the "**Bidder**").

PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M)

The selected Bidder shall have to enter into a Contract with BAMUL for executing the Project provided in Contract Agreement on turnkey basis as per the specifications set out in the contract with BAMUL ("**the Contract**").

Bidders can download the Bid document from www.kppp.karnataka.gov.in

A Bidder is eligible to submit only one Bid for the Project as Sole Bidder.

Bids shall be submitted in accordance with the Bid terms and conditions. The last date for submission of sealed bid is as per the notification. BAMUL reserves the right to reject any or all the bids without assigning any reasons whatsoever and without any liability.

A **Pre-bid meeting** has been scheduled as per notification at BAMUL office located at Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029.

Clarifications required may be forwarded in advance and clarifications issued during the pre-bid meeting, amendments to NIT terms, if any, shall be uploaded in the form of Bulletins on the E-procurement website. Proposals shall be submitted in accordance with the Bid terms and conditions and the amendments issued, if any.

The **last date for submission of bids** is as per notification. Bidders are requested to check E-Procurement website from time to time before submitting their bids.

1. **NAME OF THE WORK:**

PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M)

2. PROFORMA FOR TECHNICAL EVALUATION OF BIDDERS

- a. The Bidder who are submitting their bids must furnish the following details along with documentary evidence of their claims. However, any surrogated submission in any form will disqualify them from consideration.

b. DETAILS OF THE BIDDER:

Name of the Bidder	Address of the Bidder	Contact Person (Authorized Representative of Sole Bidder)	Emergency contact mode/No. / Email ID, etc., of Authorized Representative

c. QUALIFYING CRITERIA:

Sr. No.	Description	Document particulars
i.	Average annual financial turnover during the last three years, ending 31 st March 2026 (Audited Balance sheet/Provisional Balance Sheet&CA certified copy of turnover). Bidder shall submit Provisional Balance Sheet for FY 2025-26.	Rs.26 Crore / annum
ii.	Net worth of the Company	Bidders should have positive net worth in all the three preceding FY ending in 2025-26.
iii.	Bidder should have minimum Rs. 10 Cr. of fund based / non fund based credit limits	A document proof to be submitted.
iv.	Experience of having successfully completed similar work (Government/Private) during last five years ending from the date of publication of NIT.	<p>Satisfactorily completed at least:</p> <p>1. Single Project with Ground Mounted Projects /Solar Rooftop Projects with minimum contracted capacity of 60% of the proposed capacity in MW AC capacity anywhere in India.</p> <p>OR</p> <p>2. At least 2 projects with Ground Mounted Projects / Solar Rooftop Projects with minimum contracted capacity of 40% of the proposed capacity in MW AC capacity anywhere in India.</p> <p>OR</p>

Sr. No.	Description	Document particulars
		3. At least 3 projects with Ground Mounted Projects / Solar Rooftop Projects with minimum contracted capacity of 25% of the proposed capacity in MW AC capacity anywhere in India.
v.	Provident Fund Account No., if available	
vi.	PAN No. (mandatory), copy to be enclosed	
vii.	Name of the Authorized Representative, Mobile Number and E-mail address (mandatory) The Bidder should submit a Power of Attorney along with Board Resolution as per the format at Annexure - VI , authorizing the signatory of the Bid to commit the Bidder.	
viii.	ESI No., if available	
ix.	GST Number (mandatory)	
x.	TIN, if available	
xi.	The Bidder should possess at least Class 1 Electrical License registered with Government of Karnataka	
xii.	The Bidder shall be LLP / Pvt. Ltd. Company / Ltd. Company. No Proprietorship & Partnership Firms are eligible to participate in this bid process.	
xiii.	The Bidder shall furnish the required bank detail/Cancelled cheques. a) Name of the Bank b) Branch c) Account No. d) IFSC Code	

3. **BID DOCUMENTS:**

The Bid document consists of:

Sr. No.	Title
1.	Section - A: Techno-commercial Bid
2.	Section - B: Terms and conditions
3.	Section - C: Special Conditions
4.	Section - D: General Conditions of Contract
5.	Section - E: Specifications & Technical details
	ANNEXURES

Sr. No.	Title
6.	Annexure – I: Letter of Bid
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4. **BID SECURITY / EARNEST MONEY DEPOSIT (EMD):**

- a) The bid shall be accompanied by an **Bid Security / Earnest Money Deposit (EMD)** as per notification.
- b) The Bank Guarantee shall be irrevocable and remain in full force for a period of **90 (Ninety) days from the Bid Due Date(BDD)** inclusive of a claim period of 30 (Thirty) days or for such extended period as may be mutually agreed between Employer and the Bidder, and agreed to by the Bank, and shall continue to be enforceable till all amounts under this Guarantee have been paid.
- i. **The Bid Security / EMD of original BG along with Bid Document Fee paid in E-procurement portal shall be submitted along with Techno Commercial Bid to BAMUL office.**Bids not accompanied with EMD are liable for rejection.
- c) **REFUND OF EMD:**No interest will be paid on EMD amount. The EMD shall be returned to unsuccessful bidder without any interest immediately after the award of work to the successful Bidder.

The Price Bid will be opened of techno – commercially eligible Bidders after technical bid evaluation process. The date of opening of Price Bids shall be intimated to the Technically Qualified Bidders.

5. You are advised to read the enclosed Terms & Conditions before filling the documents and submit your Bids before the due date and time as stated above. Kindly quote your competitive rates and best offer while submitting the Bid, as BAMUL does not intend to hold negotiation.
6. BAMUL reserves the right to accept/reject any or all bids or cancel/postpone the bid without prior notice /assigning any reason and without any damage/compensation thereof to the bidders.
7. In the event of any conflict between the Invitation to bid, GCC and various specifications, the decision of BAMUL shall be final and binding upon the parties.
8. All drawings, specifications, data notices and other writings required under the contract shall be in the English language. The metric system of measurement shall be exclusively used under this contract.

SECTION - B: TERMS AND CONDITIONS

Sub: PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M)

- 1** The following words and expressions shall have the meaning hereby assigned to them except where the subject or context otherwise required.
 - 1.1 “Company” shall mean BAMUL, incorporated under the Companies Act, 1956, having its Registered office at Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029 and include its successors and assigns.
 - 1.2 “Bidder” shall mean the Single Bidder/ Entity to whom the contract is awarded and shall include his/their legal representative/s assigns.Consortium/Joint Biddingis notallowed in this bidding process.
 - 1.3 “Site” shall mean, theproposed location of the project site anywhere in Karnataka.
 - 1.4 “Contract” shall mean instructions to Bidders, conditions of contract, scope of work / Work Order/ Purchase Order.
 - 1.5 “Notice in Writing” or “Written notice” shall mean a notice written, typed or printed characters, sent (unless delivered personally or otherwise proved to have been received) by registered post to the last known private or business address and of registered office of the addresses and shall be deemed to have received. When in the ordinary course of post, it would have been delivered.
 - 1.6 “Contract Price” means the sum named in the bid subject to such additions thereto or deductions there from as may be made under the provisions of the Contract.
 - 1.7 “Commercial Operation Date (COD)” means the actual commissioning date of respective units of the Power Project where upon the EPC Contractor starts injecting power from the Power Project to the Delivery Point.
 - 1.8 “Engineer-In-Charge” means a graduate electrical engineer nominated by BAMUL to work and over view the implementation of the Project.
- 2** Bidders are advised to go through all the documents and affix the signature in each page with seal. The bidders will sign each and every page of the Bid document for having accepted the same. The signature on these documents shall be deemed to be acceptance of all terms and conditions of bid and any other documents forming parts of the bid documents.
- 3** Bids not properly filled, over-written or with arithmetical mistakes, delayed or generally not complying with the conditions are liable to be rejected.

- 4 By submitting a bid for the work, the Bidder will be deemed to have satisfied himself that the rates quoted by him in the bid will be adequate to complete such work according to the specifications and conditions mention hereto in the NIT and he has taken into account all conditions and difficulties that may be encountered during its progress/execution. Any complaint in this regard after submission of offer shall not be entertained.

5 INSTRUCTIONS TO BIDDERS:

i. GENERAL TERMS:

1. GENERAL TERMS OF BIDDING:

- 1.1 **A Bidder must be a Single Business Entity (Sole Entity).Consortium / Joint Bidding is not allowed in this bidding process.**

- 1.2 **Single business entity means the Private Limited / Limited Company / LLP**

- 1.3 The **Bidder** may at its option, form an appropriate Special Purpose Vehicle under the Companies Act, 2013 (the “**SPV**”) to execute the draft Contract and implement the Project.

- 1.3.1 In case the Selected Bidder is a Single Business Entity and exercises its option to incorporate a SPV, then it shall hold at least 51% (fifty one percent) of subscribed and paid-up equity share capital of the SPV, until the term of the Contract. This condition is applicable only in case the Single Business Entity incorporates an SPV to execute the draft Contract and implement the Project.

- 1.4 Notwithstanding anything to the contrary contained in this bid, the detailed terms specified in the Contract shall have overriding effect; provided, however, that any conditions or obligations imposed on the Bidder hereunder shall continue to have effect in addition to its obligations under Contract.

- 1.5 The validity period of the EMD shall not be less than 90 (Ninety) days from the Bid Due Date (BDD) and may be extended as may be mutually agreed between BAMUL and the Bidder. The Bid shall be summarily rejected if the Bidder fails to submit the EMD as specified in the Bidding Process.

- 1.6 Any condition or qualification or any other stipulation contained in the Bid submission shall render the Bid submission liable to rejection as a non-responsive Bid submission.

- 1.7 The Bid submission and all related correspondence and documents in relation to the Bidding Documents shall be in English language. Supporting documents and printed literature furnished by the Bidder with the Bid may be in any other language provided that they are accompanied by appropriate translations of the pertinent passages in the English language, duly authenticated and certified by the Bidder. Supporting materials, which are not translated into English, may not be considered. For the purpose of

interpretation and evaluation of the Bid, the English language translation shall prevail.

- 1.8 The Bidding Documents and all attached documents are and shall remain the property of BAMUL and are transmitted to the Bidders solely for the purpose of preparation and submission of a Bid in accordance herewith. Bidders are to treat all information as strictly confidential and shall not use it for any purpose other than for preparation and submission of their Bid. BAMUL will not return any Bid or any information provided along therewith.
- 1.9 This Bid is not transferable.
- 1.10 Any award of Right pursuant to this Bid shall be subject to the terms of Bidding Documents.
- 1.11 Any entity which has been barred by the Central/ any State Government, or any entity owned or controlled by them, within a period of 10 years preceding the bid due date shall be deemed ineligible and shall not be permitted to participating in this bidding process.
- 1.12 A Bidder should, in the last three years, 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 nor have had any contract terminated for breach by such Bidder.
- 1.13 The following conditions shall be adhered to while submitting a Bid:
 - a. Bidders should submit clearly marked and referenced continuation sheets in the event that the space provided in the prescribed forms in the Annexes to Appendices is insufficient. Alternatively, Bidders may format the prescribed forms making due provision for incorporation of the requested information;
 - b. information supplied by a Bidder must apply to the Bidder named in the Bid and not, unless specifically requested, to other associated companies;
 - c. Bidders should demonstrate their Eligibility Criteria in accordance with **Section-A – Proforma for Technical Evaluation** of this Bid.

2. Certification From BAMUL Representative of Site Feasibility Before Submitting the Bid:

It is the responsibility of Bidder to arrange a land visit for BAMUL representative to check the feasibility of land with nearest GSS and obtain the Certificate from BAMUL representative and the same has to be uploaded along with Bid.

The Bidder shall submit the land documents to BAMUL legal team and obtain the legal Due Diligence and Title Scrutiny Report (TSR) from BAMUL legal team and the same has to be uploaded along with Bid. The bidder shall be permitted to submit the Land Documents and Title Search Report (TSR) already available from another legal firm, subject to verification and vetting by the BAMUL Legal Team.

3. VERIFICATION OF INFORMATION:

- 3.1 It shall be deemed that by submitting a Bid, the Bidder has:
- made a complete and careful examination of the Bidding Documents;
 - received all relevant information requested from the BAMUL;
 - acknowledged and accepted the risk of inadequacy, error or mistake in the information provided in the Bidding Documents;
 - satisfied itself about all matters, things and information necessary and required for submitting an informed Bid, execution of the Project in accordance with the Bidding Documents and performance of all of its obligations thereunder;
 - acknowledged and agreed that inadequacy, lack of completeness or incorrectness of information provided in the Bidding Documents shall not be a basis for any claim for compensation, damages, extension of time for performance of its obligations, loss of profits etc. from the BAMUL, or a ground for termination of the Contract; and
 - agreed to be bound by the undertakings provided by it under and in terms hereof.
- 3.2 BAMUL shall not be liable for any omission, mistake or error on the part of the Bidder in respect of any of the above or on account of any matter or thing arising out of or concerning or relating to Bid, the Bidding Documents or the Bidding Process, including any error or mistake therein or in any information or data given by BAMUL.

4. BID SECURITY / EARNEST MONEY DEPOSIT (EMD):

Technical bid should accompany EMD as per notification

5. SUBMISSION OF BID:

- 5.1 The price bids of techno commercially accepted bids will be opened on a specified date which will be communicated to the bidders for participation to witness the same.
- 5.2 Bids have to acquaint themselves with the conditions prevailing at site, before submitting the Bids.
- 5.3 Bids shall furnish their quotation in the schedule enclosed to the bid documents. Proposals should be written in both words and figures.
- 5.4 All technically and commercially acceptable bidders those who have accepted business rules provided by our service provider would be required to participate in the online bidding process, on a date and time to be intimated by service provider.
- 5.5 **The price-bids of the techno-commercially qualified bidder(s) shall be opened and such eligible bidders shall be intimated about place, date and time of opening of the price bids. The opening of the price bids can also be witnessed by the bidder or his authorized representatives.**
- 5.6 Acceptance of the bid will be intimated to successful bidder through a Letter of Award (LOA) and this letter shall be treated as authorization for start of work with Land Registration. The bidder shall sign the said copy of LOA and send to the BAMUL within seven working days (7) from the date of receipt of the same. In the event of failure on the part of the bidder to sign and return the LOA within the specified time, the EMD shall be liable to be forfeited at the sole discretion of the owner.

- 5.7 BAMUL reserves the right to award part of the work or the whole, as may be considered necessary.
- 5.8 Bids received late are liable for rejection.
- 5.9 EMD will be forfeited, if the Bidder withdraws or alter/modify the Bid terms in any respect within the period of validity specified in the Bid document after the due date of submission of bids. Bids submitted without EMD will not be considered.

ii. **TERMS & CONDITIONS:**

1. The work shall generally be governed by BAMUL's General Conditions of Contract (GCC) which is annexed herewith at **Section - D**.

2. **PERIOD OF CONTRACT:**

- a) **Project Execution shall be Twelve (12) months from the date of Registration of land to BAMUL.**
- b) The Comprehensive Operation & Maintenance (O&M) Contract shall be for a period of five (5) years from the date of Commercial Operation Date (COD) of the Solar PV Power Plant or as would be mentioned in the Work Order. COD means commissioning of entire 12.0 MWac/ 16.80 MWp.
- c) BAMUL reserves the right to terminate the contract at short notice at any time earlier than the contract period.
- d) Contract Schedule shall be as defined in "8.Delivery Time Schedule".

3. **PRICING:**

- a) Rates quoted shall include land and all materials, labour, machinery expenses and hire charges, all other duties including Customs duties if any, transport, maintenance incidents, enabling works etc., including GST, based on the conditions mentioned herein.

Unless otherwise specified in the bid schedule the rates of all items will be deemed to include all leads, lifts and descent in the work.

- b) Rates quoted shall exclude NA conversion, Stamp duty for land registration & registration charges.
- c) The work executed shall be maintained in good condition for a period of five (5) years from the date of COD including repair required if any at contractor's cost. If the contractor fails to fulfill his obligation during the maintenance period, the same shall be done by the BAMUL at contractor's risk and cost.

d) **PRICE SPLIT:**

The quoted prices (100%) shall be bifurcated in to Four (4) components. A detailed billing break up & schedule including GST with HSN code shall be drafted with the successful bidder during the execution and same shall be made part of the work order/contract. BAMUL may issue multiple work orders and wrap up with single contract for addressing the taxation. However, the decision of BAMUL will be final.

Component	Sub comp	Details	% in Contract Value
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Component	Sub comp	Details	% in Contract Value
		Project Execution:	
1		Land Procurement:	
	1	Sale Deed	
2		PV Module & Inverter:	
	1	PV Module & Inverter	
		Balance of System (BOS):	
	1	BOS Supply & Erection	
	2	Civil Services for Plant Equipment's	
	3	Power Evacuation System	
3	4	All Project Related Approvals (NA Conversion, Power Evacuation, CEIG, others approvals)	
	5	Levelling, Road, Drain, Compound wall & Bore Well	
	6	Control Room (CR) with Admin office & Board Room	
		Comprehensive Maintenance Contract	
4	1	Comprehensive Operation and Maintenance for initial period of 5 years.	

- e) **The Contract prices shall be firm and fixed during the period of CONTRACT.** During the execution of the project any price variation in land cost, raw material sourcing, manufactured/assembled material supply, installation, construction, labour cost, inflation, currency fluctuation etc., shall not be considered. **BAMUL will not pay any additional price above the Contract Price for any change in price variations.**

4. GST & Taxes:

- i. BAMUL GST Number is: 29AAAAB0974H1ZS
- ii. All Financial and Commercial transactions for this Project shall take place between BAMUL and the Sole Entity (in case of Sole entity Bidder).
- iii. The Contractor shall submit the GST number. The Contract Price shall consist of GST cost.
- iv. Contractor shall indicate the applicable GST rate in the bills, i.e., CGST, SGST or IGST along with Service Account Code.
- v. Statutory deduction towards all applicable taxes shall be made as per rules.
- vi. Anti-Dumping Duty, Safe Guard Duty for PV Module, Inverter if any shall be to the cost of Bidder.
- vii. Bidder shall ensure the customer take credit of GST input for all the invoiced material.

5. **EVALUATION AND COMPARISON OF BIDS:**

Technically qualified will be eligible for commercial bid opening

6. The bid shall be valid for a period of "Three (3) months" from the Bid Due Date.
7. The Contractor should obtain "**Work Compensation Policy and Erection Risk Policy**" and should be produced before the start of work.
8. **Paying Authority:** Paying authority shall be Head of Finance, BAMUL, Bengaluru based on certification by Engineer-in-charge of BAMUL.
9. **Penalty:** Damage / Loss caused due to the act of negligence attributing to the contractor or his labour would be deducted from the payment as per the decision of BAMUL's Engineer-in-Charge.
Any damage to the BAMUL's property caused by the contractor during the execution of work shall be charged to the contractor and the amount of damage shall be left to the sole discretion of BAMUL's Engineer-in-Charge.
10. **Commencement of Work:** Contractor has to mobilize and start the work within 7 working days from the time of notice or as per the instructions of Engineer in-charge.
11. **Termination:** If either party hereto commits a breach of any of the terms and provisions contained in this CONTRACT and required to be observed / completed with on its party other than delay in payment or non-payment by BAMUL and CONTRACTOR of any amounts when due, the party affected by such breach shall notify the other party of such breach and the party committing the breach shall have fifteen (15) days from the receipt of such notice to correct or commence action to correct such breach.

If the party committing the breach fail or neglect to remedy or commence action to remedy such breach within the said fifteen (15) days from the date of service of the notice as aforesaid, the party affected by the breach may thereafter serve on the party committing the breach a written notice of seven (7) clear days terminating this CONTRACT.
12. **Breach of Contract:** Any breach of the conditions of this contract by the contractor or by any one employed by him or acting on behalf, BAMUL has the right at any time to terminate this contract by giving one month notice in writing to the contractor by a registered mail. BAMUL shall have no further liability to make any payment in terms of the agreement and in such an event the Security Deposit will be forfeited.
13. **PERFORMANCE BANK GUARANTEE (PBG) / SECURITY DEPOSIT:**
 - i. The successful bidder has to furnish Security Deposit / PBG as per notification as specified by way of Bank Guarantee from Indian Nationalized Banks / Scheduled Banks registered in India in favor of BAMUL within 15 days from the receipt of LOA. The Bank Guarantee shall be strictly as per BAMUL format. Bank Guarantee should be valid for the specific period. Bank Guarantee issued by Co-operative Banks and Gramin Banks will not be accepted.
 - ii. Bank Guarantee from Indian Nationalized Banks / Scheduled Banks registered in India in favour of BAMUL within 30 days from the receipt of LOA. The Bank

Guarantee shall be strictly as per BAMUL format. Bank Guarantee should be valid for the specific period. Bank Guarantee issued by Co-operative Banks and Gramin Banks will not be accepted. On receipt of the BG, BAMUL will issue the Work Order.

- iii. The Security Deposit / PBG shall bear no interest and will be refunded within 15 Days from the successful commissioning of the Solar PV Power Plant in all aspects.

- 14. Statutory deduction towards all applicable taxes shall be made as per rules.
- 15. All safety appliances like safety belt, helmets, safety shoes etc. have to be provided by the contractor to all his workers and supervisors. None of the workmen without safety appliances shall be allowed to work at site.
- 16. The contractor shall abide with all the provisions contained in Factories Act and Rules/Regulations/Bylaws/Orders made there under.
- 17. The contractor should obtain Insurance Policy to cover the risk of the labourers under Employee's Compensation Act and should be produced before starting the work. This is mandatory for those contractors who do not have ESI number of their own.
- 18. Contractor should furnish the PF & ESI code numbers obtained from respective authorities and also produce the same to the Personnel Department before commencement of the work. However, in case a contractor who does not have PF & ESI code number, should apply for PF & ESI code numbers from the respective authorities based on the LOA/Work Order issued to them and produce the same to Personnel Department.
- 19. A supervisor with experience should be deployed by the Contractor to ensure that the contract workers work safely and in accordance with all the provisions of Factories Act, Rules, Regulations, Byelaws and orders made there under.
- 20. The Contractor shall be responsible for all the safety measures as per the rules in the interest of safety of all the laborers working under him. Necessary safety appliances shall be provided to all the laborers at Contractor's cost.

Wherever it is observed that the Contractor has not provided safety appliances to the workers engaged by him, the BAMUL management reserves the right to issue the necessary safety appliances to his workers on cost recoverable basis.

- 21. **Jurisdiction:** Only courts in Bengaluru shall have jurisdiction regarding the matters relating to this Contract.

22. OBLIGATIONS OF THE AGENCY / CONTRACTOR WITH REGARD TO STATUTES:

The Contractor shall be solely responsible as regards salary, wages and service conditions and terms extended by the Contractor to his employees/workmen and shall in that connection maintain requisite records and comply with all laws, enactment, rules and regulations and orders dealing with employment of contract labour, payment of employee's compensation, contribution under ESI Act, 1948, if applicable, and PF/EPF Act 1952, payment of minimum wages, payment of bonus, fire and safety regulations, regulations relating to employment of female workforce, security requirements and

such other and regulations as may be applicable at present made applicable hereafter. The wages prescribed by the appropriate Government under the Minimum Wages Act, 1948 and all provisions of the Contract Labour Regulation Act and Factories Act shall be complied with by the Contractor. Contractor shall insure all employees for accidents and third-party losses and produce the policy before commencement of Contract. All employees of the Contractor shall be covered under Workmen Compensation Insurance and Group Accident Insurance cover, by the Agency.

23. **INDEMNIFICATION:** The Contractor shall indemnify and keep indemnified BAMUL from and against all actions, claims, demands and/or liabilities whatsoever arising out of this agreement or consequent upon breach of any of provisions of this agreement and/or against any claim, action or demand by any of the Contractor's Employees, person(s), firms, institutions under any law, rule or regulation having the force of law, including but not limited to, claims against BAMUL under Employee's Compensation Act, 1923. The Employees State Insurance Act, the Employees Provident Fund Act, 1952, The Contract Labour (Abolition & Regulation) Act, 1970 and the Minimum Wages Act, 1948 and any amendments thereto.
24. **FRAUD PREVENTION POLICY OF BAMUL:** Fraud Prevention Policy is being followed at BAMUL, which provides a system for prevention / detection / reporting of any fraud. It also forbids everyone from involvement in any fraudulent activity and that where any fraudulent activity is suspected by anyone, the matter must be reported to the 'Nodal Officer' (Chief Vigilance Officer) as soon as he / she comes to know of any fraud or suspected fraud.
25. The bids shall be valid for a period of Three (3) months from the Bid Due Date.
26. No additional conditions shall be inserted in '**Price Bid**', while submitting the bidder.
27. Price Bids not properly filled, over-written or with arithmetical mistakes, delayed or generally not complying with the conditions are liable to be rejected.
28. Bidders shall make no alterations in the Bid documents.
29. BAMUL reserves the right to reject any or all the Bids without assigning any reasons.

SPECIAL CONDITIONS OF CONTRACT (SCC)

i. SCOPE OF WORK:

1. PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M)

TERMS OF REFERENCE IN CASE OF SPV FORMATION FOR PROJECT EXECUTION:

- 1.1 **A Bidder can be a Single Business Entity (Sole Entity). No Consortium is allowed in this Bidding Process.**
- 1.2 The Bidder may at its option, form an appropriate Special Purpose Vehicle under the Companies Act, 2013 (the “SPV”) to execute the draft Contract and implement the Project.
- 1.3 **Shareholding Commitments:**
 - a. In case the Selected Bidder is a **Single Business Entity** and exercises its option to incorporate a SPV, then it shall hold at least 51% (fifty one percent) of subscribed and paid-up equity share capital of the SPV, until the term of the Contract. This condition is applicable only in case the Single Business Entity incorporates an SPV to execute the draft Contract and implement the Project.
2. Registration of 60 Acres($\pm 5\%$) of land in the name of BAMUL and to obtain all relevant approvals pertaining to Land, Plant and Project including wheeling banking arrangement including RoW for Transmission line.
3. BAMUL shall pay all the statutory fee, deposits, Bank Guarantee pertaining to Project development.
4. All associated civil engineering works including design for:
 - a. Soil testing, earthwork for Site grading, cutting, filling, levelling & compacting of land
 - b. Construction of foundation & mounting structures for SPV panels
 - c. Compound Wall of SPV plant with security gate (s)
 - d. Installation of fire safety systems
 - e. Construction of control room.
 - f. Arrangement of water supply for module washing and daily usage from the nearby available resource.
 - g. Construction of Storm water drainage & sewage network wherever required based on site condition
 - h. Construction of Main Approach Road and Peripheral and internal road network within plant for easy access to main locations for CMC.
 - i. Street lighting and area lighting within plant.

5. The equipment and materials for 12.0 MWac (16.80 MWp) Solar PV Power Plant with associated system (Typical) shall include but not be limited to the receipt, unloading, storage, erection, testing and commissioning of all supplied material for the following:
 - 5.1 Solar PV modules of suitable rating, in array totaling minimum of 12.0 MWac(16.80 MWp) Solar PV Power Plant including mounting frames, structures, fasteners, array foundation and module interconnection.
 - 5.2 Inverter with SCADA compatibility, common AC power evacuation panel with bus bars and circuit breakers LT & HT Power Interfacing Panels, Plant Monitoring Desk, AC & DC Distribution boards.
 - 5.3 Design and construction step-up substation from Inverter voltage level to suit the grid interface voltage level through power transformer, associate switchgear, metering equipment, communication equipment, auxiliary transformers, etc.
 - 5.4 Relay and protection system, DC battery Charger & system.
 - 5.5 HT Power, LT Power and Control Cables including end terminations and other required accessories for both AC & DC power.
 - 5.6 Auxiliary power system for internal power distribution.
 - 5.7 Outdoor HT panels/Vacuum Circuit Breakers, CTs, PTs, Bus bars, cables terminals kits. Bay shall complete with proper protection scheme consisting of breakers, instrument transformers, Isolators with earth switch, LAs etc.
 - 5.8 Main and Check meter with all necessary rated CT's and PT's at the plant substation and interface substation (DISCOM / KPTCL) as per the specification and design approved by relevant authority.
 - 5.9 Transmission line and all the required equipment's at DISCOM / KPTCL substation for evacuating the power generated shall meet the specifications of DISCOM / KPTCL. Any modification in the specifications and inclusion of new equipment's insisted by DISCOM / KPTCL from time to time shall be part of the project scope. Contractor shall meet the all these requirements without any additional cost implications to BAMUL. Shared Transmission line with any other solar plant or any other project shall not be accepted.
 - 5.10 Data acquisition system (SCADA Latest) with remote monitoring facilities including SMU level. As per Captive power plant regulations, Provision for specific data transfer to the State Load Dispatch Centre (SLDC) and any other relevant authorities shall also be provided.
 - 5.11 Lightning arrestors for entire plant area.
 - 5.12 PVC pipes, cable trays and accessories/trenches.
 - 5.13 Earthing of the entire plant as per relevant standards.
 - 5.14 Control room equipment related to solar power plant system, pooling station etc.
 - 5.15 Testing, maintenance and monitoring of equipment for period of comprehensive maintenance.
 - 5.16 Mandatory spares & consumables for CMC period.
 - 5.17 IP PTZ type CCTV cameras not less than 28X shall be provided as specified in the relevant section.
 - 5.18 Fire detection & protection system in buildings and fire extinguishers.

- 5.19 One Solar resource monitoring center including testing facilities. The Solar Observatory with associated systems shall include but not be limited to the following:
 - Pyranometers
 - Ultrasonic Anemometer
 - Temperature Sensor – Ambient and module surface
 - Power source to the all sensors
 - SCADA systems
 - Desktop and Printer
- 5.20 Construction of suitable infrastructure for evacuation of power from Inverter points to interface substation.
- 5.21 In addition to above, the Bidder is required to measure the Solar Radiation and other climatic conditions relevant to measure the plant performance. The satellite-based analysis is to be combined with direct ground-based measurement equipment in order to achieve the necessary accuracy and level of detail in the assessment of solar levels and climatic conditions.
- 5.22 Estimation and determination of the plant generation on daily basis in form of look ahead scheduling power output and submit the forecasting report to relevant authority as on when required.
- 5.23 Any other equipment / material required to complete the 12.0MWac (16.80MWp DC) Solar Power Plant.
- 5.24 Scrap disposal and waste management including removal of debris and other non-usable material.
6. During the CMC period, the Contractor shall keep the measured daily data at regular interval and provide the same to BAMUL in electronic form compatible in pdf format. The right to use the data shall remain with BAMUL.
7. Materials and accessories, which are necessary or required for satisfactory and trouble-free operation and maintenance of the plant.
8. The Contractor is free to use materials or equipment's having standards exceeding, the specification mentioned under the Technical Specification.
9. The items of civil construction work shall include all works required for solar PV project and should be performed specifically with respect to following but not limited to:
 - 9.1 Conducting contour survey of the Solar Photovoltaic Power Plant for the total area identified for project & complete soil investigation with 4 nos. of bore wells at site for construction water and maintenance requirement.
 - 9.2 Earthwork for Site grading, cutting, filling, leveling & compacting of land.
 - 9.3 Construction and erection of perimeter fence and security gate(s).
 - 9.4 Construction of foundation & mounting structures for SPV panels, with proper spacing between rows of module structure.
 - 9.5 Construction of internal roads with compacted shoulders on each side to carry safe and easy transportation of equipment and material at the project site during and after construction.
 - 9.6 Construction of Inverter control room with necessary illumination system, fire-fighting equipment and finishing as required.

- 9.7 Construction of office building with provision for stores, control room, operator room, pantry, wash room, conference room, guest house, employee quarters etc. along with requisite furniture, workstations, air conditioning, internal and external illumination, other equipment as per the specifications with minimum carpet area.
- 9.8 Construction of Security room at main entrance (exact location shall be decided after project site location finalization) of the plant with minimum floor area of 75sq. ft.
- 9.9 Water required for construction shall be in the scope of Bidder. Bidder shall make suitable permanent arrangement of water (4 nos. of Bore wells & water harvesting) with RO facilities (inside Civil room with PCC roof) to cater the day-to-day requirement of drinking water and permanent water storage for module cleaning with 25MT outlet arrangement with proper water pressure and other needs of SPV power Plant during entire CMC period.
- 9.10 Construction of Storm water drainage & sewage network as described. Rain water harvesting system should also be provided.
- 9.11 Perimeter lighting and Internal lighting at strategic points shall be through Solar Street Lights. Locations shall be finalized by BAMUL after the layout finalization. Solar Lights shall be standalone GI pole mounted LED lighting with 2 days battery autonomy.
- 9.12 Suitable conduits and their accessories and Hume pipes for crossings.
- 9.13 Supply of ferrules, lugs, glands, terminal blocks, galvanized sheet steel junction boxes with powder coating paint for internal fixtures, cable fixing clamps, nuts and bolts etc. of appropriate sizes as required in the plant.
- 9.14 Laying of Power Cables underground / over ground with proper cable trench/tray arrangements.
10. Contractor shall obtain statutory approvals / clearances from Government Departments as applicable for the Project and not limited to, the following:
 - 10.1 All approvals for the Captive Solar Project related to Land, Plant & Project.
 - 10.2 Legal opinion on the documents related to land title, including but not limited to encumbrance certificate, from advocate / legal firm empanelled with BAMUL.
 - 10.3 Conversion of land use, if required, for the Project Site.
 - 10.4 Long term open access approval in the name of BAMUL for the Wheeling and Banking arrangement.
 - 10.5 Evacuation approvals from KPTCL/DISCOM authority.
 - 10.6 Airport authority clearance if required.
 - 10.7 Pollution control board clearance, if required.
 - 10.8 All applicable approval, as necessary for setting up of a solar power plant including CEIG/CEA, connectivity, power evacuation, PTCC etc. as per the suggested guidelines prevailing during the project execution including any amendments issued from time to time.
 - 10.9 All other statutory approvals and permissions not mentioned specifically but are required to carry out hassle free construction and operation of the plant.
11. The Bidder shall arrange deployment of qualified and suitable manpower and required necessary consumables during entire construction period.

12. Comprehensive maintenance contract of Solar Photovoltaic Power Plant for the 5-year period from date of commissioning including deployment of engineering personnel, technicians.
13. All equipment's, items and works which are not specifically mentioned in this document but are required for completion of work including construction, commissioning, operation & maintenance of Solar Photovoltaic Power Plant in every respect and for safe and efficient construction & erection, operation and guaranteed performance are included in the scope of this bid.
14. Furnishing of project related documents, drawings, data design, and engineering information to BAMUL for review and approval in hard copy and soft copy from time to time as per project schedule.
 - 14.1 Contour plan and soil investigation data for the area
 - 14.2 GA drawings of the entire project including roads, drains, storm water drainage, sewage networks, equipment rooms, office cum control room, security gate, fire protection system etc.
 - 14.3 Design basis criteria along with relevant standards and site-specific condition.
 - 14.4 Solar insolation data and basis for generation data.
 - 14.5 Design calculations and sheets.
 - 14.6 Detailed technical specifications of all the equipment.
 - 14.7 General arrangement and assembly drawings.
 - 14.8 Schematic diagram for entire electric system.
 - 14.9 GTP & G.A. drawings for all types of structures/ components, Transformer, substation, related switchgears & other interfacing panels.
 - 14.10 Relay setting charts along with safety interlocks and relay co-ordination
 - 14.11 Quality assurance plans including manufacturing quality plan and field quality plans.
 - 14.12 Detailed site EHS plan, fire safety & evacuation plan and disaster management plan.
 - 14.13 Detailed risk assessment and mitigation plan.
 - 14.14 Test reports (for type, acceptance, and routine tests).
 - 14.15 CMC Instruction's manuals and its drawings. Erection & commissioning manuals, Technical Break Down drill documentation and manuals.
 - 14.16 CMC plans, schedules and operational manuals for all equipment etc.
15. All drawings shall be fully corrected to agree with the actual **"as built"** site conditions and submitted to BAMUL after commissioning of the project for record purpose. All as-built drawings must include the Good for Construction deviation list.
16. The contractor shall attend the Kick off Meeting on very next day of receiving the LoA issuance with the detailed project Schedule for various activities in the form of PERT Chart/Bar chart.
 - 16.1 Weekly site work progress report with catch-up plan(s), as necessary to monitor actual timelines of the project during construction period along with the real time snap shots during the time of construction.
 - 16.2 Daily/ Monthly CMC reports after commissioning of the project.

17. Providing a detailed training plan for all operation, maintenance procedures, which shall after approval by BAMUL form the basis of the training program. The contractor, shall also provide training to BAMUL's nominated staff.
18. Employ and co-ordinate the training of Contractors personnel who will be qualified and experienced to operate and monitor the facility and to coordinate operations of the facility.
19. Establishing a system to maintain an inventory of spare parts, tools, equipment, consumables and other supplies required for the facility's hassle free operation.
20. Adequate insurance coverage during construction and CMC period to cater all risks related to construction and CMC of plant to indemnify the BAMUL.
21. Maintain at the facility accurate and up-to-date operating logs, records and monthly reports regarding the comprehensive maintenance contract of facility.
22. Perform or contract for and oversee the performance of periodic overhauls or maintenance required for the facility in accordance with the recommendations of the original equipment manufacturer (OEM). List of OEM is set out in the **Section E - Technical Specifications** section.
23. Procurement for spares parts, overhaul parts, tools, equipment, consumables, etc. required to operate and maintain the project in accordance with the prudent utility practices and having regarded to warranty recommendations.
24. Handover the facility along with inventory of spare parts, tools, equipment, consumables and supplies, particularly proprietary items, if any, for the facility's operation along-with required inventory to maintain the facility for two year on the basis of average requirement at the time of conclusion of CMC period.
25. Maintain all administrative offices, roads, tool room, stores room, equipment's control rooms in clean and workable condition. The solar field and entire plant facility shall be free from weeds and shrubs and same should be done in regular intervals of not more than two months.
26. Discharge obligations not limiting to wages/salary/contribution to welfare funds/ PF/insurance/ESI/Superannuating benefits etc. to employees of the Contractor during the agreement period in terms of applicable laws.
 - 26.1 The Selected Bidder shall be responsible for all the required activities for the successful running, committed energy generation & maintenance of the Solar Photovoltaic Power Plant covering:
 - Deputation of qualified and experienced engineers and technicians
 - Successful running of Solar Power Plant for committed energy generation.
 - Co-ordination with statutory organizations as per the requirement on behalf of BAMUL for Joint Metering Report(JMR), furnishing generations schedules as per requirement, revising schedules as necessary and complying with system requirements.
 - Monitoring, controlling, troubleshooting maintaining of logs & records, registers.

- Supply of all spares, consumables and fixing / application as required.
- Supply & use of consumables such as grease, oil etc. throughout the maintenance period as per recommendations of the equipment manufacturers.
- Conducting periodical checking, testing, overhauling and preventive action.
- General up keeping of all equipment, building, roads, Solar PV modules, Inverter etc.
- Submission of periodical reports to BAMUL on the energy generation & operating conditions of the power plant.
- Replacement of Modules, Invertors and other equipment as and when required.

26.2 The period of Comprehensive Maintenance will be deemed to commence from the date of commissioning of the Project and completion of performance demonstration followed by final acceptance. The Contract shall further be extended on the mutually agreed terms and conditions after completion of agreement period.

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

27. Operation and Performance Monitoring

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

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

28. Maintenance

28.1 The contractor shall carry out the periodical/plant maintenance as given in the manufacturer's service manual and perform operations to achieve committed generation. Apart from the manufacturer recommendation, Bidder shall carry out the plant performance maintenance quarterly, half yearly and annual.

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

28.3 Maintenance of other major equipment involved in Solar Photovoltaic Power Plant such as step up transformers, associated switchgears, other fixtures & components and metering panel. Particular care shall be taken for outdoor

equipment to prevent corrosion. Cleaning of the insulators and applying Vaseline on insulators shall also be carried out at regular intervals. Earth resistivity of Plant as well as individual earth pit is to be measured and recorded every month. If the earth resistance is high suitable action is to be taken to bring down the same.

- 28.4 According to the recommendations stock of special tools and tackles shall be maintained for PV Modules, Inverter's, switchgears and other major electrical equipment.
- 28.5 A maintenance record is to be maintained by the operator to record the regular maintenance work carried out as well as any breakdown maintenance along with the date of maintenance, reasons for the breakdowns, steps taken to attend the breakdown duration of the breakdown etc.
- 28.6 The Schedules will be drawn such that some of the jobs other than breakdown, which may require comparatively long stoppage of the Power Plant, shall be carried out preferably during the non-sunny days. The information shall be provided to Engineer-in-charge for such operation prior to start.
- 28.7 The Contractor shall deploy enough manpower at Solar Photovoltaic Power Plant site to carryout work instructions and preventive maintenance schedules as specified. The contractor shall keep at least one skilled and experienced supervisor at site on permanent basis to supervise the jobs that are being carried out at site.
- 28.8 The Contractor will attend to any breakdown jobs immediately for repair/replacement /adjustments and complete at the earliest working round the clock. During breakdowns (not attributable to normal wear and tear) at CMC period, the Contractor shall immediately report the accidents, if any, to the Engineer In-charge showing the circumstances under which it happened and the extent of damage and or injury caused.
- 28.9 The Contractor shall comply with the provision of all relevant acts of Central or State Governments including payment of Wages Act 1936, Minimum Wages Act 1948, Employer's Liability Act 1938, Workmen's Compensation Act 1923, Industrial Dispute Act 1947, Maturity Benefit Act 1961, Mines Act 1952, Employees State Insurance Act 1948, Contract Labour (Regulations & Abolishment) Act 1970, Electricity Act 2003, Grid Code, Metering Code, MNRE guidelines or any modification thereof or any other law relating thereto and rules made there under from time to time.
- 28.10 The Contractor shall at his own expense provide all amenities to his workmen as per applicable laws and rules.
- 28.11 The Contractor shall ensure that all safety measures are taken at the site to avoid accidents to his or his sub-contractor or BAMUL's Workmen during construction and CMC period.
- 28.12 If any jobs covered in CMC Scope as per CMC Plan are not carried out by the contractor during the CMC period, the Engineer-In-Charge can issue a notice to the Contractor. Repetition of such instances may lead to the Termination of the Contract by the BAMUL and forfeiture of Bank Guarantees.

29. Quality Spares & Consumables

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

30. Testing Equipment, Tools and Tackles

The Contractor shall arrange for all the necessary testing equipment, tools and tackles for carrying out all the construction, operation and maintenance work covered under this contract. These test equipment's shall have the periodic calibration.

31. Security services

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

Scope of work in brief

1. The scope involves purchase of land (60 Acres) and registering in name of BAMUL (However payment will be made directly to the owner by BAMUL which includes stamp duty and registration fees)
2. Putting up the solar plant by design, supply , installation and commissioning of 12 MW AC-16.8 MWp DC
3. The project involves power evacuation to the nearest substation at 33KV(Single circuit)/ 11KV(double circuit) with suitable cable as specified and suitable energy meters
4. The scope involves construction of compound wall and fencing as specified with heavy duty gate with lock and key facility , CCTV arrangements and illumination.
5. Construction of room for scada operation with requires facilities.
6. Operation and maintenance for initial 5 years.
7. Temporary power for construction and temporary arrangement for storage of materials during construction.

Note: Since it's a turnkey project anything required for performance of the project to be considered while quoting tender commercial bid.

ii. TECHNICAL SPECIFICATION

1. DESIGN AND ENGINEERING

1.1 Specifications and Drawings

1.1.1 The Contractor shall execute the basic and detailed design and engineering work in compliance with the provisions of the Contract, or where not so specified, in accordance with good and sound engineering practice not lesser than established current standard industry practice.

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

1.2 Codes and Standards

Technical Specifications set out in the Bid document shall form part of this Contract. The Contract shall be executed in compliance of the codes and standards set out in Technical Specifications, the new edition or the revised version of such codes and standards current at the date of Bid submission shall apply unless otherwise specified. However, the Contractor may use equipment's/materials exceeding the standard mentioned.

1.3 Approval / Review of Technical Documents by BAMUL

The Contractor shall submit the Basic, Detailed Vendor Engineering documents as per BAMUL requirements for approval of the same and Review of work schedule.

Any part of the Facilities covered by or related to the documents to be approved by the Engineer-In-Charge shall be executed only after the Engineer-In-Charge approval thereof.

1.3.1 Within ten (7) days after receipt of any document requiring the Engineer-In-Charge approval, the Engineer-In-Charge shall either return one copy thereof to the Contractor with its approval endorsed thereon or shall notify the Contractor in writing of its dis-approval thereof and the reasons therefor and the modifications that the Engineer-In-Charge proposes.

1.3.2 The Engineer-In-Charge shall not disapprove any document, except on the grounds that the document does not comply with some specified provision of the Contract or that it is contrary to good engineering practice.

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

1.3.4 The procedure for submission of the documents by the Contractor and their approval by the Engineer-In-Charge shall be as per the Contract Co-ordination procedure.

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

1.3.6 The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Engineer-In-Charge an amended document and obtained the Engineer-In-Charge's approval thereof.

- 1.3.7 If the Engineer-In-Charge requests any change in any already approved document and/or in any document based thereon, generally shall be taken care by the Contractor if the change is not causing any major financial impact.

2. PROCUREMENT

2.1 Plant and Equipment

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

2.2 Transportation

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

2.3 Packing and Marking

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

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

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

2.4 Procurement of Land

Contractor shall procure minimum 60 acres (+/- 5%) of encumbrances and freehold land in the name of BAMUL. The land shall be close by the evacuation substation to avoid transmission loss and also for easy maintenance.

3. MATERIALS AND WORKMANSHIP

- 3.1 All materials shall be of the best quality and workmanship capable of satisfactory operation under the operating and climatic conditions as may be specified. Unless otherwise specified, they shall conform in all respect to the latest edition of the relevant IS codes specification wherever Indian specifications apply or IEC codes or equivalent internationally accepted standard.
- 3.2 The Contractor shall supply & deliver all equipment and materials for installation at Site. The Contractor shall arrange for transportation, loading & unloading and safe storage of materials at Project Site at his own cost & risk.
- 3.3 If the Contractor offers equipment manufactured in accordance with other international well recognized standards (mentioned above), he shall, in that case, supply a copy in English of the Standard Specification adopted and shall clearly mention in what respect such standard specification differs from Indian Standard Specifications. The Plant, equipment, and materials offered by the Contractor should comply with one consistent set of Standards only to make the system compatible and work in harmony as far as possible.

4. INSTALLATION

4.1 Tools & Tackles

The Contractor shall provide technically suitable tools and tackles for installation & erection of Plant & Machineries conforming to relevant BIS safety and technical standards for proper execution of work. BAMUL, in no way, shall be responsible for supply of any tools and tackles for implementation of the work and also to carry out CMC activities.

4.2 Setting up/Supervision/Labor

4.2.1 Bench Mark

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

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

4.2.2 Contractor's Supervision:

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

4.2.3 Labour:

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

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

The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the entry of all labour and personnel to be employed by Contractor on the Site. The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous or disorderly conduct or behavior by or amongst its employees and the labour of its Sub-contractors.

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

4.3 Contractor's Equipment

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

4.3.2 Unless otherwise specified in the Contract, upon Completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor to the Site.

4.4 Site Regulations and Safety

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

4.5 Site Clearance

4.5.1 Site Clearance in Course of Performance

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

4.5.2 Site Clearance after Completion

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

4.5.3 Disposal of Scrap

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

The ownership of such Scrap shall vest with the Contractor except in cases where the items have been issued by the BAMUL from its stores for their installation only without any adjustment to the Contract Value or any excess quantity lying at the Site after completion of the Project for which payment has been made by the BAMUL and is the property of the BAMUL. The removal of scrap shall be subject to the Contractor producing the necessary clearance from the relevant authorities (Custom, Excise etc.), if required by the law, in respect of disposal of the scrap. The liability for the payment of the applicable taxes/duties shall be that of the Contractor.

The Contractor shall also indemnify to keep the BAMUL harmless from any act of omission or negligence on the part of the Contractor in following the statutory requirements with regard to removal/disposal of scrap. The Indemnity Bond shall be furnished by the

Further, in case the laws require BAMUL to take prior permission of the relevant Authorities before handing over the scrap to the Contractor, the same shall be obtained by the Contractor on behalf of BAMUL.

4.5.4 Watching and Lighting

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

5. INSPECTION & TESTING

- 5.1 BAMUL or its Authorized Representative shall have, at all time, access to the Project Site/Contractor's premises and also shall have the power, at all times, to inspect and examine the materials and workmanship of project work during its manufacture, shop assembly and testing. If part of the plant is required to be manufactured in the premises other than the Contractor's, the necessary permission for inspection shall be obtained by the Contractor for BAMUL or his duly Authorized Representative.
- 5.2 BAMUL shall have the right to serve notice in writing to the Contractor on any grounds of objections, which he may have in respect of the work. The Contractor has to satisfy the objection, otherwise, BAMUL at its liberty may reject all or any component of Plant or workmanship connected with such work.
- 5.3 The Contractor shall issue request letter to BAMUL or its Authorized Representative for testing of any component of the Plant, which is ready for testing at least 07 days in advance from the date of actual date of testing at the premises of the Contractor or elsewhere. However, BAMUL at its own

discretion may waive the inspection and testing in writing under very special circumstances. In such case, the Contractor may proceed with the tests which shall be deemed to have been made in BAMUL presence, and it shall forthwith forward two sets of duly certified copies of test results and certificates to BAMUL for approval. The Contractor, on receipt of written acceptance from the BAMUL, may dispatch the equipment for erection & installation. Any dispatch without with BAMUL clearance will not qualify for payment.

- 5.4 For all tests to be carried out, whether in the premises of the Contractor or any Sub- Contractor, the Contractor, shall provide labour, materials, electricity, fuel, water, stores, apparatus and instruments etc. free of charge as may reasonably be demanded to carry out such tests of the plant in accordance with the Contract. The Contractor shall provide all facilities to BAMUL or its Authorized Representative to accomplish such testing.
- 5.5 BAMUL or his Authorized Representative shall have the right to carry out inward inspection of the items on delivery at Site and if the items have been found to be not in line with the approved Specifications, shall have the liberty to reject the same.
- 5.6 If BAMUL desires, testing of any component(s) of the plant be carried out by an independent agency. The inspection fee, if any, shall be paid by BAMUL. However, the Contractor shall render all necessary help to BAMUL whenever required free of charge.
- 5.7 The Contractor has to provide the necessary testing reports to BAMUL as and when required.
- 5.8 Neither the waiving of inspection nor acceptance after inspection by BAMUL shall, in anyway, absolve the Contractor of the responsibility of supplying the plant and equipment strictly in accordance with specification and drawings etc.
- 5.9 BAMUL reserve the rights for rejecting the items which is manufactured and received in site in good condition, however not installed as per industrial practice or as per contract. For those items bidder may not be eligible for payment.

6. AUTHORIZED TEST CENTERS FOR TEST CERTIFICATES

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

7. COMMISSIONING AND COMPLETION OF THE FACILITIES

- 7.1 As soon as installation of the Facilities has, in the opinion of the Contractor, been completed as specified in the Technical Specifications, excluding minor items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify BAMUL (Engineer-In-Charge) in writing for conducting Pre-Commissioning Test of the Facility in co-ordination with BAMUL representative.
- 7.2 As soon as all works in respect of Pre-Commissioning are completed and, in the opinion of the Contractor, the Facilities are ready for Commissioning, the Contractor shall so notify the Engineer-In-Charge in writing.

- 7.3 Commissioning of the Facilities shall be completed by the Contractor as per procedures detailed in the Technical Specifications and in the presence of the Engineer-In-Charge or the representatives of BAMUL.
- 7.4 If the Engineer-In-Charge notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies, and shall repeat the procedure described in 7.2.
- 7.5 If the Engineer-In-Charge is satisfied that the Facilities have reached Completion, the Engineer-In-Charge shall, within seven (7) days after receipt of the Contractor's notice, issue a Completion Certificate stating that the Facilities have reached Completion as at the date of the Contractor's notice.
- 7.6 If the Engineer-In-Charge is not so satisfied, then it shall notify the Contractor in writing of any defects and/or deficiencies within seven (7) days after receipt of the Contractor's repeated notice, and the above procedure shall be repeated.
- 7.7 If the Engineer-In-Charge fails to issue the Completion Certificate and fails to inform the Contractor of any defects and/or deficiencies within fourteen (14) days after receipt of the Contractor's notice under Sub-Clause 7.2, or if BAMUL makes use of the Facilities, then the Facilities shall be deemed to have reached Completion as of the date of the Contractor's notice or repeated notice, or as of BAMUL's use of the Facilities, as the case may be.
- 7.8 As soon as possible after Completion, the Contractor shall complete all outstanding minor items so that the Facilities are fully in accordance with the requirements of the Contract, failing which BAMUL will undertake such completion and deduct the costs thereof from any monies owing to the Contractor.
- 7.9 **Upon Completion and successful demonstration of the PR test**, the Contractor shall be responsible for the care and custody of the Facilities, together with the risk of loss or damage thereto, and shall thereafter take over the Facilities or the relevant part thereof for the agreed duration of CMC as stipulated and mutually agreed terms and conditions.

8. GUARANTEE TEST AND OPERATIONAL ACCEPTANCE

8.1 Functional Guarantees

- 8.1.1 The Contractor guarantees that during the Guarantee Test, the Facilities and all parts thereof shall attain the Functional Guarantees specified under Technical Specifications, subject to and upon the conditions therein specified.
- 8.1.2 If, for reasons attributable to the Contractor, the guaranteed level of the Functional Guarantees specified under Technical Specifications are not met either in whole or in part, the Contractor shall, within a mutually agreed time, at its cost and expense make such changes, modifications and/ or additions to the Plant or any part thereof as may be necessary to meet such Guarantees. The Contractor shall notify BAMUL upon completion of the necessary changes, modifications and/or additions, and shall seek BAMUL's consent to repeat the Guarantee Test. If the level of the specified Functional Guarantee parameters, as demonstrated even during repeat of the Guarantee Test(s), are outside the acceptable shortfall limit, BAMUL may at its option, either

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

8.2 Plant Performance Guarantee Test

The Plant Performance Guarantee Test shall be conducted by the Contractor after Commissioning of the Facilities to ascertain whether the Facilities or the relevant part(s) can attain the Functional Guarantees specified in the Contract Documents. The Contractor's and Engineer-In-Charge's advisory personnel shall attend the Guarantee Test. The Contractor shall promptly provide BAMUL with such information as BAMUL may reasonably require in relation to ascertain the performance guarantee based on the test results. The detailed procedure for Plant Performance Guarantee Test shall be carried out as per procedure laid down in **Section E – Technical Specifications** of this Contract.

8.3 Operational Acceptance and Acceptance

- 8.3.1 Operational Acceptance shall occur in respect of the Facilities when the Plant Performance Guarantee Test in accordance with the procedure specified in **Section E – Technical Specifications** of this Contract has been successfully completed and the Functional Guarantees are met
- 8.3.2 At any time after any of the events set out in Sub- Clause 8.3.1 have occurred, the Contractor may give a notice to the Engineer-In-Charge requesting the issue of an Operational Acceptance Certificate in the form provided in the Bidding Documents or in another form acceptable to BAMUL in respect of the Facilities or the part thereof specified in such notice as at the date of such notice.
- 8.3.3 The Engineer-In-Charge shall, after consultation with PMC, and within thirty (30) days after receipt of the Contractor's notice, issue an Operational Acceptance Certificate.
- 8.3.4 If within thirty (30) days after receipt of the Contractor's notice, the Engineer-In-Charge fails to issue the Operational Acceptance Certificate or fails to inform the Contractor in writing of the justifiable reasons why the Engineer-In-Charge has not issued the Operational Acceptance Certificate, the Facilities shall be deemed to have been accepted as at the date of the Contractor's said notice.

iii. INSPECTION:

- It is the obligation of the Bidder to discover defects latent or otherwise, and this shall be the sole responsibility of the successful Bidder to rectify the same immediately. Inspection and clearance for shipment by the Engineer-in-Charge of BAMUL shall relieve or absolve the contractor of any of his obligations under this contract.
- Bidder shall submit their work shop inspection report for all the items and materials.
- BAMUL shall have the right to reject the equipment, materials, spares and / or supplies on arrival of the same at the site if it is found that the equipment, materials, spares and

/ or supplies delivered and /or work carried out by the contractor is not in conformity with the terms and conditions of the contract in all respects.

- BAMUL will conduct joint inspection at project site on receipt of the materials consisting of BAMUL authorized officials along with the successful bidders.

iv. WARRANTY / GUARANTEE

1. PV modules used in grid connected solar power plants must be warranted performance for peak output wattage, which should not be less than 98% in first year and 90% at the end of 10 years and 80% at the end of 25 years. Module output currents in all the panels of the string shall be same.
2. **PV modules shall be MNRE – ALMM compliant List I & II type** with module wattage shall be more than 530Wp and above be warranted for at least 10 years for failures due to material defects and workmanship.
3. The mechanical structures, electrical works and overall workmanship of the solar power plant must be warranted for a minimum of 05 years.
4. The Contractor must ensure that the goods supplied under the Contract are new, unused and of most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.
5. Inverter: Inverters shall be warranted for a minimum period of 5 years or guarantee period provided by the original equipment manufacturer, whichever is higher”
6. Transformers, associated switch gear and others: Bidder must furnish in detail its warranties/ guarantees for these items.
7. During the period of Warranty / Guarantee the Contractor shall remain liable to replace any defective parts, that becomes defective in the plant, of its own manufacture or that of its sub-Contractors, under the conditions provided for by the Contract under and arising solely from faulty design, materials or workmanship, provided such defective parts are not repairable at Site. After replacement, the defective parts shall be returned to the Contractors works at the expense of the Contractor unless otherwise arranged.
8. At the end of guarantee period, the Contractor 's liability shall cease. In respect of goods not covered by the first paragraph of this clause, the BAMUL shall be entitled to the benefit of such guarantee given to the Contractor by the original Contractor or manufacturer of such goods.

v. DELIVERY TIME SCHEDULE:

Sr. No.	Milestone	Days	Total Days from LOA
1.	Issuance of LoA	--	0
2.	SALE DEED (Zero Date- D)	LOA + 60 Days	60 Days
3.	Application submission for Non-Agricultural conversion (D1)	D + 30 Days	90 Days
4.	Design and Engineering (D2)	D + 60 Days	120 Days

Sr. No.	Milestone	Days	Total Days from LOA
5.	Completion of Civil Works (D3)	D2 +90 Days	210 Days
6.	Procurement & Receipts of Materials at Site	D2 + 90 Days	210 Days
7.	Transmission Line, ROW, Bay Extension at GSS	D2 + 120 Days	240 Days
8.	Installation of MMS, Modules, Cables, DC and AC System (D4)	D3 + 120 Days	330 Days
9.	Installation, Testing and Commissioning (D5)	D4 + 35 Days	365 Days

vi. PAYMENT SCHEDULE:

All the payments will be released after receipt of Running Bills to BAMUL and production of PO's and certificate from BAMUL / BAMUL's representative.

Work Order	Sub comp	Details	% in Contract Value	Remarks		Invoicing	Payment
1	Land Procurement:						
	1	Sale Deed		On Sale Deed Execution		-	Will be borne by BAMUL
2	Module & Inverter:						
	1	Module & Inverter		Against Supply	100%	Basic 80% Including 100% GST	
				Against Installation		Basic 10%	
				On achieving COD		Basic 10%	
3	Balance of Project:						
	1	DC Side Works		Against Supply	100%	Basic 80% Including 100% GST	
				Against Installation		Basic 10%	
				On achieving COD		Basic 10%	
	2	AC Side Works		Against Supply	100%	Basic 80% Including 100% GST	
				Against Installation		Basic 10%	
				On achieving COD		Basic 10%	
	3	Power Evacuation System (Transmission Line + Terminal Bay at GSS)		Against Supply	100%	Basic 80% Including 100% GST	
				Against Installation		Basic 10%	
				On achieving COD		Basic 10%	
4	1	Comprehensive Operation and Maintenance			monthly	O&M shall be paid every month by 1/12	

Work Order	Sub comp	Details	% in Contract Value	Remarks	Invoicing	Payment
		Contract for initial 5 Years				one twelfth of the yearly O&M fees. (5 years total amount to be quoted)

Successful contractor shall submit detailed Billing breakup within 10 days of LoA issuance and the same shall form the part of the Work order.

1. On achievement of CoD, successful PR test clearance and completion of project in all aspect, handing over of the project to client.
2. Contractor is allowed to raise Supply and erection bills in pro-rata basis, however BAMUL, will accept the supply bills & Running Account (RA) bills for erection fortnightly. Payment shall be made within 07 days from the date of invoicing.

vii.

GST & TAXES:

- i. BAMUL GST Number is: 29AAAAB0974H1ZS
- ii. All Financial and Commercial transactions for this Project shall take place between BAMUL and the Sole Entity (in case of Sole entity Bidder).
- iii. The Contractor shall submit the GST number in all their invoice.
- iv. Contractor shall indicate the applicable GST rate in the bills, i.e., CGST, SGST or IGST along with Service Account Code.
- v. Statutory deduction towards all applicable taxes shall be made as per rules.

viii.

INSURANCE

1. During the Contract period all insurance related expenses shall be borne by the Contractor.

The goods supplied under the Contract shall be fully insured against the loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in such a manner that BAMUL shall not incur any financial loss, as long as the plant continues to remain under the custody of the Contractor.

2. In case of any loss or damage or pilferage or theft or fire accident or combination of the said incidents etc. under the coverage of insurance, the Contractor shall lodge the claim as per rules of insurance. Any FIR required to be lodged to local Police Station shall be the responsibility of the Contractor.
3. The Contractor shall arrange to supply/ rectify/ recover the materials even if the claim is unsettled for timely Completion of the Project. The final financial settlement with the insurer shall be rested upon the Contractor.
4. In case of any delay of the project attributable to the Contractor, the Contractor himself in consultation with BAMUL should take the extension of insurance. Any financial implications shall, however, be borne by the Contractor.
5. The Contractor should arrange for providing insurance coverage to its workmen under Workmen's Compensation Act or similar Rules and Acts as applicable during execution of work for covering risk against any mishap to its workmen. The Contractor shall also

undertake a Third Party Insurance. The BAMUL will not be responsible for any such loss or mishap.

6. All other insurance like, Contractor All Risk, Erection All Risk, insurance against theft and acts of GOD, as required for the construction and CMC of the plant and to indemnify the BAMUL/ equipment/ material and resources shall be borne by the contractor. Fire insurance is to be arranged by the Contractor up to the years of CMC of the Facility.
7. The insurance are suitably taken for the activity/ act which is required to cover all the risk associated to the activity / act. The Contractor shall be responsible to take suitable insurance till the completion of the CMC and indemnify the BAMUL from all associated risks.
8. During the CMC period, the insurance coverage against theft, fire, burglary, act of GOD, terrorist activities, etc. shall be taken in the name of BAMUL and policy document shall be handed over to the BAMUL. The insurance premium shall be borne by the Contractor for the term of this Contract.

ix. **NEGLIGENCE**

1. If the Contractor neglects to supply Equipment or construct the Plant with necessary infrastructure, with due diligence and expeditiousness or refuses or neglects to comply with any reasonable order given to it in writing by BAMUL or contravenes any provisions of the Contract, BAMUL may give (7) seven days' notice in writing to the Contractor, to make good the failure, neglect or contravention complained of. If the Contractor fails to comply with the notice within reasonable time depending on the nature of affected work, which is evaluated by the Engineer-In-Charge from the date of serving thereof, in the event of failure, neglect or contravention capable of being made good within that time, then in such case, if BAMUL thinks fit, it shall be lawful for it to take the Plant and Equipment wholly or in part, out of the Contractor's hand and give it to another person on Contract at current market price and BAMUL shall be entitled to retain any balance which may be otherwise due on the Contract by it to the Contractor or such part thereof as may be necessary, to the payment of the cost with respect to such acquisition as aforesaid.
2. If the cost of executing the work as aforesaid shall exceed the balance due to the Contractor and the Contractor fails to make good such deficiency, BAMUL shall have the right to appropriate the Security Deposit in addition to take action in the manner it may consider deem fit in terms of the Contract including black-listing the Contractor.

x. **STATUTORY RESPONSIBILITY**

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

xi. **INSOLVENCY AND BREACH OF CONTRACT**

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

If the Contractor shall at any time, be adjudged insolvent or shall have a receiving order or order from administration of its state made against it or shall take any proceeding for compensation under any Insolvency Act for the time being in force or

make any conveyance or assignment with its creditors or suspend payment or a Receiver, Liquidator or manager on behalf of the Debenture holder is appointed or circumstances have arisen which entitle the Court or debenture holder to appoint a Receiver, Liquidator or Manager.

xii. DELAY IN EXECUTION OR FAILURE TO SUPPLY

Any delay in Completion of the work, shall attract Penalty, for late Completion as per Penalty Clause.

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

xiii. LIQUIDATED DAMAGES TOWARDS DELAY IN COMMISSIONING:

If Commercial Operation or Commissioning of the Project does not occur on or before the Scheduled Completion Date for the Facilities. The BAMUL will enforce liquidated damages and levy a penalty, an amount equivalent to **0.1 percent (0.1%) of Contract Price for every fortnight with maximum of 2% of Contract Price.** ("Liquidated Damages towards Delay in Commissioning").

xiv. PERFORMANCE BANK GUARANTEE (PBG) / SECURITY DEPOSIT:

work shall be submitted in the form of Bank Guarantee towards Security Deposit / PBG amount as follows:

- i. The successful bidder has to furnish **Security Deposit / PBG** as specified by way of Bank Guarantee from Indian Nationalized Banks / Scheduled Banks registered in India in favour of BAMUL within 15 days from the receipt of order. The Bank Guarantee shall be strictly as per BAMUL format. Bank Guarantee should be valid for the specific period. Bank Guarantee issued by Co-operative Banks and Gramin Banks will not be accepted.
- ii. Bank Guarantee from Indian Nationalized Banks / Scheduled Banks registered in India in favour of BAMUL within 15 days from the receipt of LOA. The Bank Guarantee shall be strictly as per BAMUL format. Bank Guarantee should be valid for the specific period. Bank Guarantee issued by Co-operative Banks and Gramin Banks will not be accepted. On receipt of the BG, BAMUL will issue the Work Order.
- iii. The Security Deposit / PBG shall bear no interest and will be refunded within 2 months from the successful commissioning of the Solar PV Power Plant in all aspects.

xv. FINAL BILL

- i. The final bill relating to the EPC Contract shall be prepared only after the **Guaranteed Performance / Performance Ratio ("PR")** of the plant has been observed. It will include the adjustments of all claims against the Contractor by BAMUL and awarded in its favour by the judiciary, up to the date of preparation of the final bill.

- ii. The CMC shall be comprehensive. The maintenance service provided shall ensure project functioning of the Solar PV system as a whole and Power Evacuation System to the extent covered in the Contract. All preventive / routine maintenance and breakdown / corrective maintenance required for ensuring maximum uptime shall have to be provided. Accordingly, the Comprehensive CMC shall have two distinct components as described below:

2.1 Preventive / Routine Maintenance:

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

2.2 Breakdown / Corrective maintenance:

Whenever a fault has occurred, the Contractor has to attend to rectify the fault & the fault must be rectified within 48 hours' time from the time of occurrence of fault, failing which the Contractor will be liable for additional Penalties as per terms & conditions under Plant Performance Guarantee and Warranty.

- iii. **The date of comprehensive period shall begin on the date of demonstration of guaranteed PR.** However, operation of the Power Plant means operation of system as per Bid and workmanship in order to keep the project trouble free covering the guarantee period.

xvi. RISK PURCHASE

If the Contractor fails, on signing of the Contract, to take up the work within a reasonable period or leave the work Site after partial execution of the work, fails to achieve the milestone within the extended period specified in Section-C, Special Condition of Contract, V.C, BAMUL shall have the liberty to get the work done through other agency at the Contractor's own risk and additional cost if any has to be borne by the Contractor. If the situation, so warrants, to compel BAMUL to cancel the Contract, it shall be liable to compensate the loss or damage, which BAMUL may sustain due to reasons of failure on Contractor's part to execute the work in time.

- xvii. No deviation is accepted pursuant to the technical specifications upon the acceptance of BAMUL during the final detailed engineering.**

GENERAL CONDITIONS OF CONTRACT (GCC)

1.0 DEFINITIONS

As used herein and any Contract documents, the following words shall have the following meanings.

- 1.1 “OWNER/PURCHASER” shall mean BAMUL, a Government of Karnataka Enterprise having its registered Office at Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029.
- 1.2 “SUPPLIER/CONTRACTOR” shall mean the person, firm or body corporate contracting with OWNER/PURCHASER for the supply to the OWNER/PURCHASER of any equipment, materials, spares/ and / or supplies as per the Contract, and shall be deemed to include Suppliers successors (approved by OWNER) representatives, heirs, executors and administrators, unless otherwise excluded by the Contract.
- 1.3 “SUB-CONTRACTOR” shall mean any individual, firm or body corporate contracting directly with the supplier and not OWNER to furnish Supplier with any portion of the work, other than the purchase of “off the shelf” items or pre-fabricated machinery or supplies. Supplier shall remain fully liable and responsible to the owner for the work so sub-contracted as well as for all acts and / or commissions of SUB-CONTRACTORS.
- 1.4 “CONTRACT” shall mean and include the invitation to Bidder, Instruction to Bidders, the Bidder, The General Conditions, the specifications, special Conditions, if any, and the acceptance of Bid/ Purchase Order Issued by OWNER all in respect of supply and delivery of the equipment, materials, spares and / or supplies called for by the SPECIFICATIONS and may also include any agreement if and when signed by and between OWNER and SUPPLIER and includes subsequent changes / amendments, if any.
- 1.5 “WORK” shall mean and include any and all labour, supervision, service, material, machinery equipment, tools, supplies and facilities required for the supply and delivery by Supplier of the equipment, materials, spares and / or supplies called for by the CONTRACT.
- 1.6 “BIDDER” shall mean the person, firm or body corporate submitting a Bid against the invitation to Bid and shall include his/its/their executors, administrators, legal representative’s successors and permitted assignees.
- 1.7 “INVITATION TO BIDDER”, shall include the specifications instructions to Bidders, the general conditions etc.
- 1.8 “BID” shall mean the formal quotation submitted by a BIDDER proposing to perform the work requested in the invitation to Bid issued by OWNER.
- 1.9 “PARTICULARS” shall mean and include.
- 1.9.1 Specifications:

1.9.2 Drawings: and

1.9.3 Proprietary mark or designated pattern denoting the product of an individual, firm or body corporate.

1.10 "SPECIFICATIONS" shall mean and include the schedules, detailed designs, statements of technical data', performance and characteristics etc., relating to the work.

1.11 "INSPECTOR" shall mean any person nominated by owner and the said person nominated shall also ascertain the position of deliveries and expedite the same under the contract and periodically and finally inspect the work.

1.12 Words denoting "PERSON" shall include firms, companies, corporations, associations or bodies of individuals whether incorporated or not. Words denoting masculine gender or singular number shall also include the feminine gender and plural number and vice-versa where the CONTRACT so requires or permits. The words 'including' and include(s) as used herein are not to be construed as words of limitation unless the context otherwise requires or unless as contrary intention otherwise appears in the matter.

2.0 AUTHORITY OF PERSON SIGNING DOCUMENT

2.1 A person signing the Bid or any other documents forming a part of the Contract on behalf of another shall be deemed to warrant that he has authority to bind such other and if, on enquiry, it appears that the person so signing had no authority to do so, OWNER may without prejudice to other civil and criminal remedies, cancel the contract and hold the signatory liable for all costs and damages. Any person so signing shall give satisfactory evidence of his authority.

3.0 RESPONSIBILITY FOR PERFORMANCE OF CONTRACT:

3.1 GENERAL

The SUPPLIER shall be entirely responsible for the due performance of the CONTRACT in all respects according to the terms and conditions of the CONTRACT.

3.1.1 Supplies/items supplies shall strictly adhere to the specification stipulated and shall effectively perform its functions for which purpose it is ordered.

3.1.2 Any approval which OWNER and / or INSPECTOR may give in respect of the work or workmanship involved in the CONTRACT (whether with or without tests carried out by the SUPPLIER / INSPECTOR) shall not absolve the SUPPLIER of this contractual responsibilities and obligations.

3.1.3 Notwithstanding any approval or acceptance given by INSPECTOR, it shall be lawful for OWNER to reject the equipment, materials, spares and / or supplies if it is found that the equipment, materials, spares and / or supplies delivered and / or work carried out by SUPPLIER is not in conformity with the terms and conditions of the CONTRACT in all respects.

3.2 CO-OPERATION WITH OTHER CONTRACTORS / SUPPLIERS

SUPPLIER shall co-operate with OWNER, other SUPPLIERS and CONTRACTORS including SUB-CONTRACTORS, if any, for any associated plant and shall freely exchange all particulars and technical information with them to obtain the most efficient and economical design and to avoid unnecessary duplication of equipment, materials, spares and / or supplies. No remuneration shall be claimed by SUPPLIER from OWNER for such technical co-operation.

3.3 SUB-LETTING OF CONTRACT

SUPPLIER shall not sub-let, transfer or assign the CONTRACT or any part thereof without the express prior written approval of OWNER, other than the purchase of bought out items normally purchased from outside sources. In the event of SUPPLIER contravening this condition, OWNER shall be entitled to terminate the CONTRACT and to place the work elsewhere at SUPPLIER'S risk and expenses and SUPPLIER shall be liable for any loss or damage which OWNER may sustain in consequence or arising out of such replacing of the work.

4.0 RESPONSIBILITY FOR COMPLETENESS

Any equipment, fitting, materials or supplies which may not be specifically mentioned in the SPECIFICATION or drawings but which are usual or necessary for carrying out the works under the CONTRACT within the Scope of the Supply / Work to be executed are to provide for and rendered by the SUPPLIER / CONTRACTOR without extra charge and the equipment / supplies must be complete in all respects.

5.0 QUALITY OF MATERIALS AND WORKMANSHIP

5.1 BIDDER / SUPPLIER shall be deemed to have carefully examined and to have knowledge of these General Conditions, the PARTICULARS, special conditions, Instructions to Bidders and other Documents forming the Invitation to Bid / Contract and also to have satisfied himself as to the nature of the work to be executed and other relevant matters and details.

5.1.1 Any information thus had or obtained from OWNER shall not, in any way, relieve SUPPLIER of his responsibilities under Clause 5.0 above.

5.1.2 If SUPPLIER / BIDDER shall have any doubt as to the meaning of any portion of the Invitation to Bid, SUPPLIER / BIDDER shall, before signing Bid set forth the PARTICULARS thereof and submit them to OWNER in writing, in order that such doubt may be removed.

6.2 The work shall be of the best quality and workmanship according to the latest engineering practices existing at the time of acceptance of the bid and shall be manufactured from materials of the best quality and highest class for the purpose.

6.2.1 Appropriate factors for safety shall be used throughout the design and especially in the design of all parts subject to varied stresses.

6.2.2 All work shall be performed and completed in a thorough workman like manner and shall follow the best practice in the light of modern

developments in the manufacture of high-grade equipment's notwithstanding any omission in the SPECIFICATION.

- 6.2.3 SUPPLIER shall provide the equipment's, materials, spares and / or supplies with proper safety devices for protection of workman and shall provide suitable removable safety guards for all exposed moving parts such as Gears, Rollers, Chains, Bells, Brake Wheels, Couplings and the like. SUPPLIER warrants that such work will meet the requirements of and be in conformity with, all applicable laws, rules, regulations and ordinances of the Government of India or any sub-division thereof.

6.0 DRAWINGS

- 6.1 Drawings required to be furnished by SUPPLIER shall be supplied free of cost to OWNER. All drawings shall be submitted in soft copy and hard copies in five (5) sets unless otherwise specified.
- 6.2 SUPPLIER shall furnish to OWNER, at the earliest for approval by Engineer, general arrangement drawings, erection drawings, electrical diagrams, bill of materials, equipment lists, and any other drawings and diagrams required for a complete and serviceable job, showing work to be completed by SUPPLIER and work to be completed by SUB-CONTRACTOR.
- 6.3 SUPPLIER shall also furnish to OWNER those specific drawings and any other details / information as requested by OWNER.
- 6.4 Drawings submitted under 7.2 and 7.3 above will be reviewed by OWNER and returned to SUPPLIER signed and stamped either "**APPROVED**" Approved as noted; or "not approved Resubmit, "**Approved** and "**Approved as noted**", drawings (following corrections); may then be issued for fabrication / manufacture. "**Not Approved Resubmit**" drawings shall be corrected and resubmitted for OWNER's approval.
- 6.5 After approval by OWNER or his authorized representative, Supplier shall forward one (1) approved reproducible (sepia) and six (6) copies of approved drawing to OWNER. The approval shall be in the form of duly authenticated stamps with signature on the drawing.
- 6.6 Approval of SUPPLIER'S drawings by OWNER shall not relieve SUPPLIER from any responsibility covered by the requirements of the CONTRACT.

7.0 MANUALS

- 7.1 The SUPPLIER shall deliver free of cost, the following manuals in 6 (6) copies along with the consignment for all equipment's / supplies.
- 7.1.1 Operating manuals, covering general description, operating principles and operating procedures.
- 7.1.2 Maintenance manuals covering preventive and corrective maintenance.
- 7.1.3 Calibration manuals, if applicable.
- 7.1.4 Spare parts catalogue for mechanical, electrical and instrumentation portion of equipment.

7.1.5 Any other documentation as required in the specification.

7.2 Manuals shall be printed in English good quality paper and shall be contained in suitable durable bindings.

7.3 Manuals provided by SUPPLIERS or his SUB-CONTRACTOR/S shall be completed and shall cover all equipment's, materials, spares and / or supplies.

8.0 PROGRESS REPORTS

8.1 Progress reports wherever specified shall be submitted to OWNER once in a month or at frequent intervals in five (5) copies in a form acceptable to OWNER.

8.2 Such progress reports shall indicate, in suitable details, the progress of the procurements of raw materials manufactured both in SUPPLIER'S shops and SUB-CONTRACTOR'S shops, and any other work to be performed by SUPPLIER. Photographs wherever possible shall be submitted.

8.3 The progress reports shall further compare actual versus projected completion dates and describe current and anticipated problems and delay factors, if any. Report shall also include corrective action taken or proposed to be taken without in any way relieving or affecting the SUPPLIER'S responsibility to deliver the equipment's within the stipulated delivery date(s) / (period)(s).

9.0 CHANGES

9.1 OWNER shall have the right to make such changes and / or variation in the SPECIFICATIONS as may be necessary or desirable from time to time during the subsistence of the CONTRACT till the stage of testing and commissioning.

9.2 Prior to commencement of any additional work based on a change in SPECIFICATION as above involving compensating / reduction on the Contract price, SUPPLIER shall submit to OWNER a detailed estimate in writing of the price for such additional / reduced works.

9.3 Upon approval by OWNER, OWNER shall issue to SUPPLIER a written order covering the changes in work and price, which shall then form part of the CONTRACT. SUPPLIER shall not proceed with any additional work prior to receipt of OWNER'S said written order.

10.0 PRICE:

10.1 **The prices shall be firm and fixed during the period of CONTRACT. The BIDDER** shall quote on the basis as specified in the Invitation to Bid.

10.2 The validity of the Proposal / Bid should be Three (3) months from the Bid Due Date.

10.3 STATUTORY LEVIES

10.3.1 **Price indicated shall be inclusive of all the applicable taxes and duties.** Any change in tax rate due to change in law shall be paid at actuals on submission of documentary evidence. Any change/addition (anti-dumping /safeguard duty) in duties shall not be considered as change in law and hence will not be

compensated for the variation of rates. Bidder shall ensure the customer take credit of GST input for all the invoiced material.

- 10.3.2 Any claim in respect of any increase in price on account of any statutory increase or fresh imposition of Taxes & duties to be levied in respect of the equipment's/ materials / spares and / or supplies specified in the CONTRACT which takes place after the expiry of original delivery period stipulated in the CONTRACT shall not be admissible on such of the equipment's / materials / spares and / or supplies as are delivered after said original delivery period.
- 10.3.3 Notwithstanding any stipulation in the CONTRACT for increase in price on any other ground no such increase which takes place after the date of delivery stipulated in the CONTRACT, shall be admissible on such of the said equipment's / materials / spares and / or supplies, as are delivered after the expiry of the date of delivery stipulated in the CONTRACT.

11.0 SPARES PARTS

SUPPLIER shall include in his BID a firm priced, itemized list of recommended spare parts necessary for the proper operation and maintenance of the equipment's for a period of Five (5) years during Comprehensive Operation and Maintenance (O&M) period.

It shall be obligatory on the part of SUPPLIER to ensure uninterrupted supply of spare parts for the proper maintenance of the equipment's.

12.0 TIME SCHEDULE

- 12.1 The time and date(s) of delivery of the equipment's, materials, spare and / or supplies as agreed to between SUPPLIER- OWNER shall be deemed to be the essence of the CONTRACT, and delivery must be completed not later than the date (s) / so specified.
- 12.2 Within fifteen (5) days, acceptance of Bid, SUPPLIER shall submit for OWNER'S approval a progress schedule covering all phase of the work including design, procurement, fabrication / manufacture and transportation.
- 12.3 SUPPLIER shall allow all reasonable facilities to INSPECTORS and OWNER'S representative(s) including free and full access to SUPPLIER'S facilities and to all records having a bearing on the progress and quality of the work and deliveries under the CONTRACT.

13.0 INSPECTION

- 13.1 INSPECTOR shall have the right to inspect and test the work or any part thereof and to observe any test carried out by SUPPLIER at any time and SUPPLIER, on demand from INSPECTOR shall at no additional charges to OWNER, carry out such tests, in an appropriate manner in the presence of INSPECTOR.
- 13.2 SUPPLIER shall afford at his own expense full, free and safe access and facilities at his works and / or his SUB-CONTRACTOR'S works for INSPECTOR to carry out and / or observe such inspections and / or tests.

- 13.3 Any such inspection, examination or testing carried out by INSPECTOR or observed by him shall not relieve Supplier from any of his obligations under the CONTRACT to be otherwise successfully performed by the SUPPLIER.
- 13.4 SUPPLIER shall give INSPECTOR not less than one week's notice in writing regarding any tests to be carried out by SUPPLIER or SUB-CONTRACTOR and the period likely to be required for such testing. INSPECTOR shall give the SUPPLIER written notice within five (5) days of receipt of such notice as to whether, INSPECTOR intended to witness the said tests and indicating the dates normally not more than fifteen (15) days from the date of receipt of SUPPLIER'S notice on which Inspector will be available at SUPPLIER'S or his SUB-CONTRACTOR'S facilities for such tests failing which SUPPLIER OR SUB-CONTRACTOR may proceed with the test.
- 13.5 If INSPECTOR is not present, SUPPLIER shall immediately notify Inspector in writing as to the Test results.
- 13.6 When the test and / or inspections have been complete to INSPECTOR'S satisfaction, INSPECTOR shall issue a certificate to that effect. No equipment's, materials, spares or supplies for which tests and / or inspections are performed shall be dispatched by SUPPLIER before such certificates are issued.
- 13.7 INSPECTOR may reject the whole or any part of the work at any time after testing / inspection, if the INSPECTOR at his sole discretion determines the work to be unsatisfactory or does not fulfil the requirements of the CONTRACT. INSPECTOR shall advise SUPPLIER and OWNER in writing as to the grounds for rejection. INSPECTOR'S decision regarding rejection shall be final and binding on the SUPPLIER.
- 13.8 In the event of any rejection as aforesaid, then without prejudice to the following provision, OWNER shall be at liberty to.
- 13.8.1 Allow SUPPLIER to offer once again, within a time specified by INSPECTOR, the equipment's, materials, spares and / or supplies is replacement of those which have been rejected, the SUPPLIER bearing all costs for such replacement.

OR

- 13.8.2 Buy the quantity of equipment's, materials, spares and / or supplies so rejected of the same or equivalent or the nearest specification from elsewhere at SUPPLIER'S risk and cost without affecting SUPPLIER'S liability as regards the supply of any consignments due under the CONTRACT in accordance thereto.

14.0 PACKING, MARKING AND SHIPPING SPECIFICATIONS FOR MATERIALS

14.1 GENERAL

This specification covers packing, making and transports / shipments materials by Road / rails / sea / Air.

- 14.2 This specification forms an integral part of the CONTRACT in addition to SPECIFICATIONS drawings and instructions explicitly listed in the purchase order.

- 14.3 SUPPLIER shall comply with all applicable descriptions in this SPECIFICATION depending upon the nature of material. Lack of relevant information and / or documents shall not relieve the SUPPLIER of his responsibility

14.4 PACKING:

14.4.1 GENERAL:

Workmanship shall be of the highest standards throughout all operations of packing. Materials used shall be in accordance with the best commercial practices and packing shall be withstanding all possible transit hazard for minimum period raging from 4 to 6 months.It shall be capable of withstanding multiple handling and to perform all its functions without any detrimental effect / pitting to the contents of the package / create, bundle etc. Methods used shall be such as to ensure safe delivery of the commodity to its ultimate destination. All packages shall be done in such a manner as to reduce volume as much as possible. Suitable reapers shall be provided on the bottom of the case /crates for easier handling by Fork lift Trucks (2" square reapers per less than 1 Tonne and 3 for more than 1 Tonne)

- 14.4.1.1 Heavy machinery which includes tables, rollers, counter-weights, machines heads or other movable parts will be blocked and braced to prevent movement, items packed in bundles must be securely tied with steel wire or strapping. Steel reinforcing rods, bars, pipes structural members etc., shall be bundled in uniform length and the weight shall be within breaking strength of the securing wire or strapping.
- 14.4.1.2 Packages containing fragile articles must be packed with special precautions against risk of breakages.
- 14.4.1.3 All equipment's attachments, accessories, steel structures pipes and fittings shall be painted / greased and or provided with suitable protective compound / oil to prevent rust, corrosion or damage due to bad weather.
- 14.4.1.4 All mechanical and electrical equipment's and attachments shall be packed in wooden cases with adequate protection inside the case and wherever possible should be sent along with the major equipment's. Each item shall be suitably tagged with identification of main equipment, item denomination and reference number to respective assembly drawing. Each item of steel structure shall be identified with erection markings with lettering height of minimum 15 mm. Such marking will be followed by the connection numbers / erection marking, with indelible paint.
- 14.4.1.5 A copy of the packing list shall accompany the material enclosed in a waterproof envelope fastened to each package.

14.4.2 MECHANICAL EQUIPMENT

Pumps, compressors, etc., shall be packed individually in wooden cases.

- 14.4.2.1 Before packing, each assembly and / or each compartment shall be enveloped in polythene bags containing silica gel or similar dehydrating compound.
- 14.4.2.2 Motors and generators shall be packed (individually wherever necessary) in wooden cases. Vents shall be waterproof sealed. Protective paper strip shall be slipped under brushes.
- 14.4.2.3 Switchgear assemblies shall be packed in wooden cases.

- 14.4.2.4 General items of electrical material shall be packed in wooden cases, each item moisture proofed. Cable reels shall be wrapped with tar paper. Wooden strips shall be provided to protect reel edges. Ends of H.T. Cables shall be plumbed and sealed with a load-end and when finally planked the cable shall be strapped over with steel bands or hoops.

14.4.3 INSTRUMENTS:

All instruments shall be packed in wooden cases with dial upward and embedded in shock absorbing material. Each instrument shall be enveloped in polythene bag containing silica gel or similar dehydrating compound and with a tag specifying the unit it belongs to. When instruments are packed in several layers in the same case horizontal wooden partitions shall be provided suitably spaced and secured to case frame. Mercury and other chemicals to be supplied with instruments shall be packed separately in suitable containers.

14.4.4 FITTINGS:

Packing shall be wooden cases or coated and valve flanges protected with plastic caps and tags should contain the type and specification of gland packings used.

14.4.5 MARKING:

- 14.4.5.1 Marking should be for the project, consignee, consignor, Purchase Order No., gross and net weight dimensions etc., as per enclosed BAMUL Standard Format.
- 14.4.5.2 Cases and crates should be marked with indelible waterproof ink in clear legible characters at least on three sides.
- 14.4.5.3 A distinct color splash in say / red - black around each package / crate / bundle shall be given for identification
- 14.4.5.4 Additional marking such as "Handle With Care", "This Side Up" to be indicated by Arrow, 'Fragile' or any other Additional indications for protection and safe handling shall be added depending on the type of material.
- 14.4.5.5 In case of bundles the shipping marks shall be embossed on metal or similar tag wired securely on each end.
- 14.4.5.6 All cases will bear warning signs on the outside denoting the center of gravity and sling marks. Specific marking for slinging should be provided for all heavy lifts weighing 5 tonnes and above. Top heavy containers will be so marked as either Top Heavy or Heavy ends.
- 14.4.5.7 For bulk and uniform material when packed in several cases, progressive serial number shall be indicated in each case.
- 14.4.5.8 When packaging material is clean and light colored, a dark black stencil paint shall be used, However, where packing material is soiled or dark, a coat of flat Zinc white paint shall be applied and allowed to dry before applying the specific markings
- 14.4.5.9 In case of large equipment's like vessels, heat exchangers, etc., documents contained in the envelopes shall be fastened inside a shell connection with and identifying arrow sign "Documents" applied with indelible paint.

14.4.5.10 The Railway Receipts (RR) / Lorry Receipts (LR) Airway Bills (AWB) should be made out in favour of the OWNER at Bengaluru / Mangaluru / Kudremukh as the case may be.

14.5 DESPATCH DOCUMENTS:

14.5.1 All documents viz., RR/LR/AWB, Invoice, Packing List, Test Certificate, Drawings and Catalogues should be in English Language.

14.5.2 In addition to the RR/LR/ AWB/ Invoices, packing lists, test certificate, shall be made out against each dispatch in as many number or copies as shown below at 15.6.5. The invoice and packing list specifically must show uniformly the marks and numbers, contents case wise consignees' name, destination and all other particulars as per OWNER'S Standards Format enclosed (Annexure-II).

14.5.3 The invoice must show the unit rates and net total price. Items packed separately should also be invoiced and the value shown accordingly, packing list must show, apart from other particulars actual contents in each case net and gross weight and dimensions and the total number of packages. All documents should be duly signed by the SUPPLIER.

14.6 DESPATCH INFORMATION:

As soon as any dispatch is made, the SUPPLIER shall send immediate information by way of telex / fax message to OWNER, and Insurance Company as specified in the Purchase Order giving particulars of the dispatches, Zonal code and Wagon numbers / Name of Lorry Service and Lorry Registration numbers, (as the case may be) Destination, Railway Receipt, LR. No, (as the case may be) Date, total freight amount with confirmation copies by post.

14.6.1 TRANSMISSION OF DESPATCH DOCUMENTS:

SUPPLIER shall obtain the DESPATCH documents in complete sets as quickly as possible after the dispatch is made and mailed as shown below so that they are received as early as possible. SUPPLIER shall be fully responsible for any delay and / or demurrage / wharfage etc., in clearance of the consignment at destination due to delay in presentation of the dispatch documents or submission of documents.

14.6.2 In terms of CONTRACT or otherwise, the complete original set of documents are required to be sent to OWNER through bank, or as specified in the order.

14.6.3 Documents consisting of one copy of Lorry receipt / Railway receipt / Airway bill, Invoice, Packing List, Test Certificate, Catalogue / Drawing, if applicable, shall be sent to the following.

- a) In-Charge (Stores),
BAMUL(details shall be shared after site finalization)
- b) In-Charge Materials, (I & P)
BAMUL, Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029
- c) In-Charge (Finance & Accounts)
BAMUL, Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029

d) In-Charge (Inspection & Progress)
BAMUL, Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College
Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029

15.0 RECONSERVATION

- 15.1 The SUPPLIER should ensure prior to dispatch, reconsevation of equipment and material for storage for a minimum period 6 months.
- 15.2 The SUPPLIER should give his recommendation on reconsevation procedure to be followed in case the equipment's are stored beyond six months period.
- 15.3 The packages should be marked with the date of preservation of such equipment's, which are liable to be damaged, if not reconseved within the specific period.

16.0 TEST ON COMPLETION

- 16.1 Wherever possible, all tests shall be carried out before dispatch
- 16.2 The test certificates for all components / materials / equipment's as required under the technical specification shall be submitted.
- 16.3 Should however, it becomes necessary for the final tests as to performance and guarantee (if any) to be held until the equipment's materials or supplies to be erected. Such final tests shall be carried out by the OWNER in the presence of SUPPLIER or his designated representative within one (1) month (or such other time as the parties may reasonably agree to from the date of completion of erection or from the date on which the equipment's materials and / or supplies are put into operation whichever is later. The cost of these tests shall be to SUPPLIERS account.
- 16.4 Should the results of these tests not come within the tolerance (if any) specified, the tests shall at OWNER's option be repeated within one (1) month from the date of equipment's, materials and / or supplie's are ready for retesting.
- 16.5 The cost of such retesting shall be to supplier's account.

17.0 FAILURE OF DELIVERY:

Should SUPPLIER fail to make dispatch within the time period (s) specified in accordance with Clause 13.0 above, OWNER shall be entitled immediately on such failure or at any time thereafter at the entire option of owner to either.

- 17.1 Purchase elsewhere, without notice to SUPPLIER at the risk and cost of the SUPPLIER, the equipment's, materials, spares and / or suppliers not delivered, of a similar or the nearest specification without cancelling the CONTRACT in respect of equipment, materials, spares and / or supplies not yet due for shipment / delivery

Or

- 17.2 Cancel the CONTRACT in full or the portion thereof in default, and if so desired to purchase elsewhere the full or defaulted equipment, material, spare and / or supplies or items of similar, or the nearest specification at the risk and cost of SUPPLIER.

18.0 FAILURE TO MEET TEST STANDARDS

- 18.1 If the erected equipment's, materials and / or supplies fail to meet the test standards under Clause 17.0 shall be found to be defective or otherwise fail to fulfil the terms of CONTRACT. OWNER shall give SUPPLIER written notice setting forth the details of such defects or failure.
- 18.2 SUPPLIER shall immediately correct / remedy such defects and failures or alter the equipment's, materials and / or supplies to bring them into compliance with the CONTRACT terms.
- 18.3 If SUPPLIER fails to do so within a reasonable time, as may be stipulated by the OWNER, OWNER may reject and replace, at SUPPLIER'S sole expense, the whole or any portion of the equipment's, materials, supplies which are defective or fail to meet CONTRACT terms. Such replacement shall be carried out by OWNER within a reasonable time and price and, where reasonable possible the same SPECIFICATION or the nearest specification.
- 18.4 SUPPLIER'S liability under this clause shall be satisfied by the payment to OWNER of the assessed difference, if any, between the replacement price of the rejected / non-conforming items including transportation cost, taxes, duties, other incidental expenses and any amount previously paid to supplier.
- 18.5 If OWNER is unable to replace the rejected items within, a reasonable time, SUPPLIER'S liability under this clause will be satisfied by repayment of all money paid by OWNER to SUPPLIER in respect of such items.
- 18.6 In the event of rejection by OWNER under this clause, OWNER shall be entitled to use the rejected items in a reasonable and proper manner for time sufficient to enable OWNER to obtain replacement items. Thereafter supplier at his own cost shall immediately remove the rejected / non-conforming items from OWNER'S Premises. Such items shall be at Supplier's risk from the time of discontinuance of use and if not promptly removed thereafter, OWNER may at his option, with regard to said rejected / non-conforming items return them to SUPPLIER, on 'Freight collect' basis or dispose of / or segregate the item as OWNER deems fit but in any event at SUPPLIER'S risk.

19.0 DOCUMENTATION

- 19.1 All drawings, SPECIFICATIONS, data, notices and other writings required under the CONTRACT shall be in English language and dimensions, weight and volumes shall be in metric system.
- 19.2 All drawings, SPECIFICATIONS and other data shall be delivered to:
Manager(Engg)
BAMUL, Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post,
Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029
- 19.3 All Notices, claims, etc., shall be delivered to:
If to Supplier: at the address set out in the purchase order. If to Owner.
Manager(Engg)
BAMUL, Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post,
Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029

19.4 All invoices and other claims for payment by SUPPLIER shall be raised in favour of Managing Director BAMUL, Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029

20.0 INSOLVENCY AND BREACH OF CONTRACT:

20.1 OWNER may, at any time, by notice, in writing, summarily terminate the CONTRACT without additional compensation to SUPPLIER on the happening of any of the following events that is to say;

20.1.1 If the SUPPLIER shall at any time, before final dispatch, be adjudged insolvent or to enter into any arrangement or composition with his creditors, or suspend payment or if the firm be dissolved under the partnership Act,

or

20.1.2 If SUPPLIER, being a Company shall pass a resolution or court shall make an order for the liquidation of its affairs or

20.1.3 If SUPPLIER commits any act of breach of Contract not herein specifically provided for, provided always that such termination shall prejudice any right or action or remedy which, shall have accrued or shall accrue thereafter to OWNER and provided also that SUPPLIER shall be liable to pay OWNER for any extra expenditure OWNER is thereby put to, but SUPPLIER shall not be entitled to any gain on repurchase.

21.0 GOVERNING LAW

21.1 This CONTRACT and all rights' hereunder shall be governed by the laws of the Union of India for the time being in force and shall be subjected to the jurisdiction of the Courts situated at Bengaluru, India.

22.0 FORCE MAJEURE

22.1 Any delay in or failure of performance of CONTRACT by either party hereto shall not constitute defaults by such party or give rise to any claim for damages against it if and to the extent such delay or failure of performance is caused by acts of God, acts of war, hostilities, acts of commission or omissions of Government or Government agencies, any change in law attributing in commissioning of the project, any software/server issues of government entity, invasion, revolution, civil commotion, strikes, lockout, blockade, Embargo, sabotage, fire, flood, severe earthquake, typhoon, cyclone, lightning, plague, epidemic or others etc. or omission or circumstance, which are beyond the reasonable control of the party affected, which they could not have reasonably foreseen and guarded against (hereinafter referred to as Force Majeure)

22.2 The party so affected by an event of Force Majeure shall notify the other parties of the occurrence thereof within ten (10) days of its commencement.

22.3 The Force Majeure referred to above shall not be extended to the SUPPLIER'S SUB-CONTRACTORS works. The SUPPLIER shall be wholly responsible for timely off-loading in cases strikes, lockout, etc., in the SUB-CONTRACTOR'S works.

22.4 Except as provided below neither party shall be by reason of any event of Force Majeure be entitled to terminate this CONTRACT, nor shall either party have any claim for damages against the other in respect of such non-performance or delay in performance.

- 22.5 Performances and deliveries under this contract shall be resumed as soon as practicable after the event of Force Majeure has ended or ceased to exist with appropriate extension to the time for completion equal to the period of the delay, and the decision of OWNER as to whether deliveries have been so resumed shall be final and conclusive.
- 22.6 Notwithstanding anything to the contrary stated herein OWNER shall have the right prior to the end of the event of Force Majeure to terminate the CONTRACT without compensation to SUPPLIER if the CONTRACT is suspended by the occurrence of the event of Force Majeure for a period of more than forty-five (45) days. In case of such termination of the CONTRACT SUPPLIER shall repay to the OWNER all advances paid to him in respect of subject CONTRACT.

23.0 RISK OF LOSS

- 23.1 SUPPLIER guarantees the due return of all OWNER's property including particulars issued to him and will be responsible for the full value thereof, to be assessed by OWNER, for all loss thereof or damage thereto from whatever cause happening while in possession or control of SUPPLIER, his servants, workman or agents.

SECTION – E

SPECIFICATIONS & TECHNICAL DETAILS

DISCLAIMER:

1. ThoughadequatecarehasbeentakenwhilepreparingtheBid document,the Biddersshall satisfythemselves thatthedocumentiscompleteinall respects.Intimationofanydiscrepancyshallbegin tothisofficeimmediately.If nointimationisreceivedfromanyBidderwithinten(10)daysfromthedateof notificationofBid and IssueoftheBiddocuments,itshallbeconsideredthattheBid document is completein allrespects andhasbeen received bythe Bidder.
2. BAMUL,reservestherightto modify,amendorsupplementthisBiddocumentincludingallformatsand Annexures.
3. WhilethisBidhasbeenprepared ingoodfaith,neitherBAMULnortheiremployees oradvisorsmakeanyrepresentationorwarranty,expressorimplied,oracceptany responsibilityorliability,whatsoever,inrespectofanystatementsoromissions herein,ortheaccuracy,completenessorreliabilityofinformation,andshallincur noliabilityunderanylaw,statute,rulesorregulationsastotheaccuracy,reliability orcompletenessofthisBid,evenifanylossordamageiscausedbyanyactor omissionontheirpart.
4. Thespecificationmentionedfor theequipment'sviz.,Solar modules,inverter, combinerboxes,DCcables,modulemountingstructures,transformers,CT,PT,LT/ HTcables,interfacingpanels,switchgears, Civil worksandotherassociatedequipmentto completethe solar power project including the land and evacuation of power (including RoW) from the solar power planttothedesignatedsubstation,the presentBiddocumentis forthereferenceonly.It may besubjectedtochanges/alterations asperthedesign/planningfromthe successful Bidder.Itisadvisedthatthe Biddermust satisfyhimselfwiththeprevailingsiteconditionsbefore submission of his Bid with respect to design proposed.Thedesign mustbeoptimizedforthesiteconditionsanddirectedtoachievethe maximum outputfromtheinstalledcapacityatalltimes.Moreover,the componentsnot mentioned,butarerequired to completetheplantforoperationisalsoincluded in the scopeof bidder and shallbe vetted byBAMUL.

Place:

(Signature)

Date:

Nameand Designationof Bidder

I. TECHNICAL DETAILS

A. SITE DATA

DESCRIPTION:

- a. Successful Bidder shall identify the feasible land near by any KPTCL/DISCOM substation within Karnataka revenue boundary, minimum of 60 acres (+/-5%) (as a single parcel, close to substation) and shall propose for the solar project. Contractor shall submit the technical feasibility report, all land related documents, legal opinion from the law firm on the title to BAMUL for review. BAMUL upon review and shall issue the clearance for registering on BAMUL name.

LAND DETAILS:

Particulars	Description
Plantcapacity	12.0 MWAC (16.80 MWp)SPV plant
State	Karnataka
Estimated life ofPVPowerplant	25 years
Gross CUF	19%
Borewells and Construction WaterandTemporary PowerConnection	Bidder Scope
RoW for Transmission line	Bidder Scope
Auxiliary Power Supply for plant during the Maintenance period	Via Aux transformer – Bidder Scope
Water during Maintenance period	Bidder shall make necessary permanent arrangement through Borewells (4 nos.)
Land for Labour camp during Construction & CMC period	Shall be in the Scope of Bidder
Security during the construction and CMC period	BAMUL will have security personal only for monitoring purpose. However,Contractor is responsible for security of all the equipment's supplied and installed till CMC completion.

B. DESIGN PHILOSOPHY

- 2.1 The main objective of the design philosophy is to procure land near by KPTCL/DISCOM substation and get it registered in the name of BAMUL and to construct the complete Solar PV Power Plant with in-built Quality and appropriate redundancy to achieve high availability and reliability with minimum maintenance efforts. In order to achieve this, the following principles shall be adopted while designing system.
- 2.2 **Technology: As per latest MNRE compliant to ALMM List I (Modules) & List II (Cells) from time to time.**
- 2.3 Adequate capacity of SPV modules, Inverters, Cables of appropriate rating (DC and AC) etc. to ensure generation of power as per design estimates. This is to be done by applying liberal de-rating factors for the PV array and recognizing the component,

system efficiency parameters of Inverters, transformers, conductor loss etc.

- 2.4 Use of equipment and systems with proven design and performance that have a high availability track record under similar service conditions.
- 2.5 Selection of the equipment and adoption of a plant layout to ensure ease of maintenance as well as to enhance the solar plant performance.
- 2.6 Strict compliance with the approved and proven quality assurance norms and procedures during the different phases of the project, and always use the manuals and specifications issued by the manufacturer.
- 2.7 Proper arrangements with respect to synchronizations to ensure evacuation of power (dedicated transmission line; shared Transmission line shall not be acceptable) to the grid.
- 2.8 The plant instrumentation and control system should be designed to ensure high availability and reliability of the plant to assist the operators in the safe and efficient operation of the plant with minimum effort.
- 2.9 It should also provide for the analysis, study and evaluation of the historical data and help in the plant maintenance people to take up the plant and equipment on preventive maintenance.
- 2.10 Provide String level monitoring for all the Solar PV modules. The Power generated shall be connected to Inverter through the required number of String Monitoring.
- 2.11 Solar Tables/Arrays shall be provided with fixed tilt arrangement only. The tilt angle shall be based on the land latitude & longitude.
- 2.12 Appropriate generation voltage of 600-800V AC at Inverter level has to be stepped up to interface Voltage level of the nearby KPTCL/DISCOM substation in which evacuation approval is obtained. The Contractor is free to select appropriate DC voltage at Inverter input level based on SPV cluster leading to Inverter considering least I^2R loss in DC side.
- 2.13 The power plant has to operate in parallel with the grid system which is infinite electrical system. Any faults not taken care will result in damage of only SPV power plant without affecting STUs infinite system. Thus the Solar Power Plant has to protect its equipment against any of possible fault or other disturbances from the grid.
- 2.14 Very fast responsive microprocessor based Directional protection should be provided to ensure isolation of the solar power plant from the grid at the time of faults during back charging and any additional protections from grid.
- 2.15 Contractor shall arrange the auxiliary power requirement of the plant, consumption of the Control Room (CR), Admin office and area lighting in the scope of Contractor within the project site. Necessary Step down transformer, distribution panels and related components required for drawing the power shall also be in the scope of contractor installation shall be done as per relevant IS standards.

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

- i. Plant layout to ensure optimum availability for generation during the day time without any shading.
- ii. High DC system voltage and low current handling requirements.
- iii. Selection of inverters with proven performance and ready availability of requisite spares.
- iv. On Conservative approach, the Contractor shall consider the minimum solar radiation data base amongst the databases from NASA, Meteonorm, SolarGIS, NREL. Accordingly, the EPC Contractor shall design the plant for best performance of the plant to achieve higher PR and CUF. Contractor will be responsible to meet the contracted PR and CUF requirement with the above finalized data base as STC.
- v. Careful logging of operational data / historical information from the Data Monitoring Systems, and periodically processing it to determine abnormal or slowly deteriorating conditions.
- vi. Solar PV Power Plant should be designed to operate satisfactorily in parallel with the grid within permissible limits of high voltage and frequency fluctuation conditions, so as to export the maximum possible units generated to the grid. It is also extremely important to safeguard the system during major disturbances, like tripping / pulling out of big generating stations and sudden overloading during falling of portion of the grid loads on the power plant unit in island mode, under fault / feeder tripping conditions.
- vii. The specifications provided with this bid document are a functional ones; any specifications provided in this document is only meant for ensuring optimum standards and there is no bar to use the equipment's of standards exceeding the standards mentioned. The Bidder must submit a proposal based upon their own design. Bidder must optimize their own design for Solar Photovoltaic (SPV) system with proven technology so that it shall best meet to guarantee the performance factors as it is a part of the acceptance criteria given in this bid document. The bidders are advised to visit the site before designing the plant. The BIDDER is free to study the actual condition of the existing location, and required to design proposed step-up substation at Inverter level and pooling sub-station of 11kV or 33kV level, which shall include the switchgear, communication equipment's and systems as required by STU.

2.17 The minimum array capacity at STC (Standard Test Conditions) shall be determined to have 12.0 MW (AC) output at the time of installation and after stabilized operation of first year this capacity will be measured and the capacity of plant shall be minimum 12.0 MW (AC). If the Contractor anticipates any degradation of the modules during the first year, it shall be taken care of to provide additional capacity to achieve minimum 12.0 MW (AC) of array at the end of first year to meet guaranteed generation to avoid Penalty/ compensation on account of Performance Guaranteed Generation. **(Note:** This is a critical point of the entire Solar PV plant, The Contractor must take the note of all the critical parameters, considerations of technical aspects, product, site, climatic conditions, etc.). However, minimum DC capacity shall be 140% of the plant AC rating. After PR verification, if there is any shortfall in contracted values Penalty will be applicable. However during the CMC

period, in case of shortfall, the Contractor is allowed to add/replace modules along with necessary components to meet the CUF requirement.

- 2.18 This Bid document specifically cover the rest of the electrical engineering requirements including transmission infrastructure along with Grid Interface Substation (as per KPTCL/DISCOM standard) for the proposed Grid Connected 12.0 MW (AC) Solar Power Plant along with their associated equipment.
- 2.19 Selected Contractor shall prepare the detailed BOQ (Bill of Quantities) and submit a copy to BAMUL for approval within 15 days from the date signing of the Contract.
- 2.20 Each component offered by the Bidder shall be of established reliability. The minimum target reliability of each equipment shall be established by the Bidder considering its failure, mean time between failures and mean time to restore, such that the availability of complete system is assured. The guaranteed annual system availability shall not be less than 99.9%. Bidder recommendation of the mandatory spares shall be on the basis of established reliability.
- 2.21 Bidder shall design the plant in order to have sustained life of 25 years with minimum maintenance requirements.
- 2.22 The supply, erection, commissioning and all other allied works for 12.0 MW (AC) SPV Power Plant shall be commissioned within 12 months from the date of registration of the land and obtaining Government Order along with Land NA conversion, whichever is later.
- 2.23 Any other equipment/specifications, not specifically insisted through this Bid document, however required for the project, and also for the ease of maintenance & standard safety requirement shall form the part of the contractual requirement.

C. TECHNICAL SPECIFICATION

a) LAND

The land for the solar PV Power Project shall nearby KPTCL/DISCOM substation having clear absolute and marketable title shall be free from all charges, encumbrances and freehold land. Land identified for developing solar power projects should not be marshy / hilly lands, low lying lands and in cyclone/flood prone areas. The minimum land requirement for this project shall be 60 acres ($\pm 5\%$). Further the land shall be contiguous Contractor shall also ensure the selected land is suitable for 16.80 MWp DC and also for any additional module installation required in future for the purpose of meeting the contractual CUF. If any Karab lands/Government lands such as public road, water bodies are intervening, then suitable Compound wall and arrangements are to be made to isolate from project area so that no hindrances are caused to the project activities, including the easy access to the property and Right of Way.

Contractor shall make necessary travel and accommodation arrangements for the BAMUL official for all the site visit to understand the feasibility of the proposed sites. Contractor must obtain the Legal opinion on the documents related to land title,

including but not limited to encumbrance certificate, advocate / legal firm empaneled with BAMUL at their own cost before submission of Bid.

The Land shall be free from Litigations, not falling under the notification for Government Acquisition and also the contractor shall be responsible against future land title disputes (if any)

b) PHOTOVOLTAIC MODULES

The Solar PV Module shall be Crystalline / Thin Film with latest MNRE Compliant to ALMM List I (Modules) & List II (Cells). The PV Module shall have Certifications of Standard Testing Conditions (STC: defined as Standard Testing Condition with air mass AM1.5, irradiance 1000W/m², and cell temperature 25°C) as per the latest edition of IEC 61215 and IEC 61730-2nd Edition and as tested by IEC / MNRE recognized test laboratory.

- The PV modules to be employed shall be of minimum 144 cell configuration / Thin film technology with rated power of module ≥ 530 Wp as certified for solar PV module power performance test as prescribe by latest edition of IEC 61215 and IEC 61730 and as tested by IEC / MNRE recognized test laboratory. No negative tolerance in the rated capacity of solar PV module is allowed.
- All modules shall be certified IEC 61215 2nd Ed. (Design qualification and type approval for Crystalline Si modules), IEC 61730 (PV module safety qualification testing @1500 V DC or higher). IEC 62804 Certified PV modules should be PID free, documents for the same should be submitted with conditions of the PID test should be for a humidity of 85% and a cell temperature of 85°C at 1000V or higher IEC 62716, IEC 61701.
- The certified Bill of Material (BOM) to be used in the PV Modules should be the same as used during the IEC certification of reference PV Module certified by renowned agency like TUV, UL, etc.
- Minimum certified module efficiency shall be 19% for crystalline with minimum fill factor of 0.75. The temperature co-efficient of power for the modules shall not be more than 0.45%/ °C.
- The glass used to make the crystalline silicon modules shall be toughened low iron glass with minimum thickness not less than can be 2 mm (with support bars) for 144 cell module / Thin film Technology Module. The glass used shall have transmittance of above 90% and with bending less than 0.3% to meet the specifications.
- The EVA used for the modules should be of UV resistant in nature. No yellowing of the back sheet with prolonged exposure shall occur.
- The sealant used for edge sealing of PV modules shall have excellent moisture ingress protection with good electrical insulation (Break down voltage >15 kV/mm) and with good adhesion strength.
- The junction box used in the modules shall have protective bypass diodes to prevent hot spots in case of cell mismatch or shading. The material used for junction box shall

be made with UV resistant material to avoid degradation during module life and the Junction sealing shall comply IP67 degree of protection.

- Modules should have rugged design to withstand tough environmental conditions and should withstand at maximum wind load of 2400 pascal defined as per IEC standard.
- PV modules must be warranted for their output peak watt capacity, Firstyear maximum allowable degradation shall be 2.5% of the rated capacity. YoY the maximum allowable degradation is 0.55% only. Additionally, each solar PV module used in solar power plant /system must provide a linear power output peak watt rated capacity. Actual power output of the product may reach at least 98% of the nameplate power output specified on the product during the first year. For the second year, the actual power output will decline annually by no more than 0.55% for a period of 24 years, so that by the end of 25th year, an actual output of at least 80% of the nameplate power output specified on the product will be achieved.
- SPV module shall have module safety class-II and should be highly reliable, light weight and must have a service life of more than 25 years.
- The modules shall be warranted for minimum of 10 years against all material / manufacturing defects and workmanship and 25 Years for the Performance (with reference to COD date)
- The flash data of all modules to be supplied are required to be submitted at the time of supply and the sample IV curve of the rated watt class to be provided.
- Each module used in the Project shall use a RFID tag bearing the following details: The RFID must be placed outside the lamination of the PV module.
 - Name of manufacturer, name of manufacturer of solar cells symbol;
 - Country of Origin (separately for cells and modules)
 - Unique model number
 - Unique Serial number
 - Month and Year of manufacture (separately for cells and module).
 - Date and Year of obtaining IEC PV module qualification certificate.
 - Name of Test Lab issuing IEC certificate.
 - Other relevant information on traceability of solar cells and module as per ISO 9000.
 - i. Polarity of terminals or leads (colour coding is permissible).
 - ii. Maximum system voltage for which the module is suitable.
 - iii. Date & place of manufacture.
 - iv. I-V Curve for the module at standard test condition (1000W/sqm, AM1.5, 25 °C).
 - v. Wattage, Wp, Pmax, Imp, Vmp, Isc& FF for the module.
- The accessibility to the list of module IDs along with the above parametric data for each module shall be provided.
- The module's power mismatch of the modules connected to an Inverter should be less than 2%.

- The module frame shall be made of corrosion resistant material, which shall be electrically compatible with the structural material used for mounting the modules. In case of metal frames for modules, it is required to have provision for earthing.
- The module frame should have been made of Aluminium or corrosion resistant material, which shall be electrolytically compatible with the structural material used for mounting the modules with sufficient no. of grounding/installation.
- The sampling test shall be carried out on random basis on the PV MODULE at accreted labs.
- ALMM List I (Modules) & List II (Cells) Specifications and amendments shall be complied.
- The Solar Panels proposed for the project to be DCR compliant from MNRE only with above specifications.

c) INVERTER

- i. Inverter shall confirm to the following standards and appropriately certified by the labs:

a)	Efficiency measurement:	IEC 61683
b)	Environmental Testing:	IEC 60068-2 or IEC 62093
c)	EMC, harmonics, etc.:	IEC 61000 series, 6-2, 6-4 and other relevant Standards.
d)	Electrical safety:	IEC 62109(1&2), EN 50178 or equivalent

- ii. Recommended practice for PV – Utility interconnections: IEEE standard 929 – 2000 or equivalent
- 1) Protection against islanding of grid: IEEE 1547/ UL1741/ IEC 62116 or equivalent
 - 2) Grid Connectivity: Relevant CEIG/ CEA/ CERC regulation and grid code (Latest version)
 - 3) Reliability test standard: IEC 62093 or equivalent
- iii. Inverter shall consist of an electronic Inverter along with associated control, protection and data logging devices.
- iv. The rated power/name plate capacity of the Inverters shall be the AC output of the Inverter at 50°C. Any Inverters with AC output at 50°C, below the name plate/rated power of the Inverter shall not be allowed.
- v. The Inverter supplied shall be suitable for 40% additional DC input Capacity. (E.g. if Inverter is supplied with rated capacity of 300 kW (AC) shall accept at least 420 kW of DC power for fixed system). Rated AC capacity of the individual inverter shall not exceed 350 kW.
- vi. All Inverters should consist of associated control, protection and data logging devices and remote monitoring hardware and compatible with software used for string level monitoring.

- vii. Dimension and weight of the Inverter shall be indicated by the Bidder in the offer.
- viii. **Only those Inverters which are commissioned solar PV projects till date for more than 50 MW capacity with proven record of supplying solar inverters shall be considered for this project.** Bidder has to provide sufficient information to the satisfaction of the BAMUL before placing the final order for Inverters.
- ix. The minimum European efficiency of the Inverter shall be 98% load as per IEC 61683 standard for measuring efficiency. The Bidder shall specify the conversion efficiency of different loads i.e. 25%, 50%, 75% and 100% in its offer. The Bidder should specify the overload capacity in the bid.
- x. The Inverter shall be tropicalized and design shall be compatible with conditions prevailing at site. Provision of exhaust fan with proper ducting for cooling of Inverter's should be incorporated in the Inverter's, keeping in mind the extreme climatic condition of the site as per the recommendations of OEM to achieve desired performance and life expectancy.
- xi. The Inverters shall be of outdoor Type (String / Central Inverter acceptable) and with protection to minimum of IP 55 along with canopy to be provided.
- xii. Nuts & bolts and the Inverter enclosure shall have to be adequately protected taking into consideration the atmosphere and weather prevailing in the area.
- xiii. Grid Connectivity: Relevant CERC regulations and grid code as amended and revised from time to time shall be complied. The system shall incorporate a uni-directional Inverter and should be designed to supply the AC power to the grid at load end. The inverter shall adjust the voltage & frequency levels to suit the Grid.
- xiv. All three phases shall be supervised with respect to rise/fall in programmable threshold values of frequency.
- xv. The Inverter output shall always follow the grid in terms of voltage and frequency. This shall be achieved by sensing the grid voltage and phase and feeding this information to the feedback loop of the Inverter. Thus control variable then controls the output voltage and frequency of the Inverter, so that Inverter is always synchronized with the grid. The Inverter shall be self-commutated with Pulse width modulation (PWM) technology. This should be capable of synchronize maximum within 1 Minute.

OPERATIONAL REQUIREMENTS FOR INVERTER

- i. The Inverter must have the feature to work in tandem with other similar Inverter's and be able to be successively switched "ON" and "OFF" automatically based on solar radiation variations during the day.
- ii. The Inverter shall be capable of controlling power factor dynamically.
- iii. Maximum power point tracker (MPPT) shall be integrated in the inverter to maximize energy drawn from the Solar PV array. The MPPT should be microprocessor based to minimize power losses. The details of working mechanism of MPPT shall be mentioned

by the Bidder in its offer. The MPPT unit shall confirm to IEC 62093 for design qualification.

- iv. The system shall automatically “wake up” in the morning and begin to export power provided there is sufficient solar energy and the grid voltage and frequency is in range.
- v. Sleep Mode: Automatic sleep mode shall be provided so that unnecessary losses are minimized at night. The inverter must also automatically re-enter standby mode when threshold of standby mode reached.
- vi. Stand – By Mode: The control system shall continuously monitor the output of the solar power plant until pre-set value is exceeded & that value to be indicated.
- vii. Basic System Operation (Full Auto Mode): The control system shall continuously monitor the output of the solar power plant until pre-set value is exceeded & that value to be indicated.
- viii. Inverter shall have provisions/features to allow interfacing with monitoring software and hardware devices.
- ix. Inverter should have Display in the front.
- x. Inverter should have master slave configuration.

PROTECTION AGAINST FAULTS FOR INVERTER:

- i. The inverter shall include appropriate self-protective and self-diagnostic feature to protect itself and the PV array from damage in the event of inverter component failure or from parameters beyond the inverter’s safe operating range due to internal or external causes. The self-protective features shall not allow signals from the inverter front panel to cause the inverter to be operated in a manner which may be unsafe or damaging.
- ii. Faults due to malfunctioning within the inverter, including commutation failure, shall be cleared by the Inverter protective devices. In addition, it shall have following minimum protection against various possible faults.
- iii. Grounding Leakage Faults: The inverter shall have the required protection arrangements against grounding leakage faults.
- iv. Over Voltage & Current: In addition, over voltage protection shall be provided between positive and negative conductor and earth ground such as Surge Protection Devices (SPD).
- v. Inverter shall have arrangement for adjusting DC input current and should trip against sustainable fault downstream and shall not start till the fault is rectified.
- vi. Galvanic Isolation shall be achieved through Inverter duty transformer.
- vii. Each solid state electronic device shall have to be protected to ensure long life of the Inverter as well as smooth functioning of the Inverter.

- viii. Anti-islanding (Protection against Islanding of grid): The inverter shall have anti islanding protection. (IEEE 1547/UL 1741/ equivalent BIS standard)
- ix. Unequal Phases: The system shall tend to balance unequal phase voltage (with 3-phase systems).
- x. Reactive Power: The output power factor of the inverter should be of suitable range to supply or sink reactive power. The inverter shall have internal protection arrangement against any sustained fault in the feeder line and against lightning in the feeder line.
- xi. Isolation: The inverter shall have provision for input & output isolation. Each solid-state electronic device shall have to be protected to ensure long life as well as smooth functioning of the inverter.
- xii. All Inverters shall be three phase using static solid state components. DC lines shall have suitably rated isolators to allow safe start up and shut down of the system. Fuses & Circuit breakers used in the DC lines must be rated suitably.

The Bidder is free to opt for String Inverter / Central Inverter for the project. However, the Contractor shall submit the detailed specification and get the approval from BAMUL before procurement.

- i. Desired Technical Specifications of Inverter.
 - 1. Sinusoidal current modulation with excellent dynamic response.
 - 2. Compact and weather proof housing (indoor/outdoor)
 - 3. Comprehensive network management functions (including the LV RT and capability to inject reactive power to the grid)
 - 4. No load loss < 1% of rated power and maximum loss in sleep mode shall be less than 0.05%
 - 5. Optional VAR control
 - 6. Unit wise & integrated data logging
 - 7. Dedicated Prefabs/Ethernet for networking
- ii. Inverter must provide protection against:
 - 1. Over current
 - 2. Sync loss
 - 3. Over temperature
 - 4. DC bus over voltage
 - 5. Cooling Fan failure (If provided)
 - 6. Short circuit
 - 7. Lightning
 - 8. Earth fault
 - 9. Surge voltage induced at output due to external source
 - 10. Power regulation in the event of thermal overloading
 - 11. Set point pre-selection for VAR control
 - 12. Bus communication via -interface for integration
 - 13. Remote control via telephone modem or mini web server
 - 14. Integrated protection in the DC and three phase system
 - 15. Insulation monitoring of the PV array with sequential fault location

- iii. Ground fault detector which is essential for large PV generators in view of appreciable discharge current with respect to ground.
- iv. Over voltage protection against atmospheric lightning discharge to the PV array is required.
- v. The inverter must be entirely self-managing and stable in operation.
- vi. A self-diagnostic system check should occur on startup. Functions should include a test of key parameters on startup.

vii. Detailed Specifications of INVERTER (Typical for String Inverter):

Sr. No.	Particulars	Details
1.	Nominal AC Output Power	300 kW to 350 kW (For String Inverters only)
2.	Nominal AC Output Voltage	(300-1000)V \pm 10%
3.	Maximum Input Voltage	(600V-1500)VDC
4.	Wave Form	Pure Sinewave
5.	DC voltage range, MPPT	As per design
6.	Minimum Efficiency at 100% load. The rated European efficiency (Euro Eta Efficiency) and peak Efficiency.	>98%, measured as per IEC 61683 standard for measuring efficiency * Inverter No Load / Full Load Loss Calculation must be submitted by the Bidder.
7.	Output frequency	50Hz \pm 3% to \pm 5% Hz
8.	Power Factor	0.85 lag-0.85 lead
9.	Max. THD at rated power	Less than 3%
10.	Ambient dry bulb temperature range	0 to 50 $^{\circ}$ degC
11.	Humidity	15% to 95 % non-condensing
12.	Enclosure	IP21 / IP54 (Indoor / Outdoor rated) IEC-60068-2 (environmental)
13.	Protection rating (as per IEC-60721-3-3)	Classification of chemically active substances: 3C2 Classification of chemically active substances: 3S2
14.	Grid Specifications	IEC 61727, VDE 0126
15.	Nominal Voltage & Frequency	(300-1000)V \pm 10%
16.	Voltage Tolerance	+10% and -10% or better than that
17.	DC Overloading	Suitable for 135% of DC overloading
18.	Communication to PLC	Ethernet

to IEC 60068-2 standards for Environmental Testing.

- 2. All inverters shall be IEC 61000 compliant for electromagnetic compatibility, harmonics, etc.
- 3. All inverters shall be safety rated as per IEC 62109 (1 & 2), EN 50178 or equivalent DIN or UL standard.

4. Each PCU shall be compliant with IEEE standard 929 – 200 or equivalent. The Bidder should select the Central inverter as per its own system design so as to optimize the power output.

d) TRANSFORMER

- i. AC converted by the inverter is transmitted through the appropriate LT Cables from the Inverter Panel to appropriately sized Inverter transformer Each individual block shall be connected to HT panel through HT cable.

Relevant national & international codes to be follows:-

Sr. No.	Particulars	Relevant IS	Relevant IEC
1.	Inverter Duty transformer	IS 2026	IEC 76
2.	Fittings & Accessories	IS 3639	
3.	Climate Proofing	IS 3202	IEC 354
4.	Loading of Transformer	IS 6600	IEC 296
5.	Oil	IS 335	IEC 137
6.	Bushings	IS 2099	IEC 144
7.	Degree of Protection	IS 2147	IEC 76
8.	Testing, Tolerances on guaranteed Particulars	IS 2026	IEC 76
9.	Buchholz Relay	IS 3637	
10.	Electrical Insulation	IS 1271	IEC 85
11.	Current transformer	IS: 2705 Part 1 to 4	IEC: 185
12.	Voltage Transformer	IS: 3156 Part 1 to 4	
13.	Lightning arrestors	IS: 3070 part 1 to 3	
14.	Porcelain insulators for system above 1000 V	IS: 2544	
15.	Alternating current dis-connectors (isolators) and earthing switches rating, design, construction, tests etc.	IS: 9921 Part 1 to 5	
16.	Part III – post insulator units for systems greater than 1000V	IS: 5350	
17.	Hollow Insulators for use in electrical equipment	IS: 5621	
18.	Serrated lock washers – specification	IS: 5556	

- ii. Outdoor inverter panel with IP55 or above are acceptable. Inverter station should be properly provided with canopy structure and working platform.
- iii. Bus-bars shall be of high conductivity **Copper conductors of adequate size**. The bus-bars shall be adequately supported by non-hygroscopic, non-combustible track resistant and high strength type polyester fibre glass moulded insulators. Separate supports shall be provided for each phase and neutral busbar. The bus-bars joints shall be provided with high tensile steel bolts, Belleville washers and nuts, so as to ensure good contacts at the joints. The bus-bars shall be colour coded as per IS 375.

- iv. Removable gland plates with gaskets shall be provided in the cable alleys for glanding the power and control cables. The distance between the gland plate and the incomer terminals shall not be less than 450 mm.
- v. The inverter transformer shall be of copper-wound construction. Valid CPRI test certificates for a similar inverter transformer shall be submitted to BAMUL/PMC for review and approval prior to procurement.
- vi. Inverter transformer shall be sized by keeping 10% design margin. Inverter transformer shall of 3winding type only (maximum 2 winding on the LV side).
- vii. The Contractor should submit theoretical design calculations and detailed explanations along with drawings shall be provided and approved by the BAMUL.

1. INVERTER DUTY TRANSFORMER:

- i. The Contractor shall provide the complete turnkey design, supply, erection, testing and commissioning of transformers and transformer substation to first step-up the output of the inverter to HV at the location of the inverter. Inverter Transformer must be protected with HV VCB Panel Capacity.
- ii. 3 phase, Oil Filled, 11kV or 33 kV, 50 Hz, Inverter Transformers of the selected inverter rating and associated Switchgear of approved make should be utilized as per IS 6600. Inverter transformers can be off-load tap change type. The transformers shall be suitable for outdoor installation in which the neutral can be kept floated and they should be suitable for service under fluctuations in supply voltage up to plus 5% to minus 10% in step of 2.5% for inverter transformer
- iii. Depending on the grid interface voltage, if required, **IDT transformer of rating 6 MVA x 2 Nos. for 11 kV or 12 MVA x 1 Nos for 33 kV system (or above)** shall be supplied. IDT Transformer shall be of ONAF cooling for temperature rise of 55°C / 65°C as a temperature rise units.
- iv. Cumulative loss shall be as per IGBC / CBIP guidelines. All electrical equipment and installation shall confirm to the latest Indian Electricity Rules as regards safety, earthing and other essential provisions specified for installation and operation of electrical plants.
- v. All items of equipment and materials shall be thoroughly cleaned and painted in accordance with relevant Indian Standards. The finish paint shall be done with two coats of epoxy based final paint of colour Shade RAL 7032 of IS:5 for indoor equipment
- vi. Any fitting or accessories which may not have been specifically mentioned in the specification but which are usual or necessary in the equipment of similar plant or for efficient working of the plant shall be deemed to be included in the contract and shall be provided by the Contractor without extra charges. All plant and apparatus shall be complete in all details whether such details are mentioned in the specifications or not.
- vii. All equipment shall be designed for operation in tropical humid climate at the required capacity in an ambient air temperature of 50°C. Equipment shall be suitable for an ambient temperature of 50°C. Maximum relative humidity of 100% shall also be taken into consideration for design of equipment.
- viii. The reference ambient temperatures for which the transformers are to be designed are as site data provided in Site Data section.
- ix. All working parts, insofar as possible, are to be arranged for convenience of operation, inspection, lubrication and ease of replacement with minimum downtime. All parts of equipment or of duplicate equipment offered shall be interchangeable.

- x. The quality of materials of construction and the workmanship of the finished products/ components shall be in accordance with the highest standard and practices adopted for the equipment covered by the specification.
- xi. The rating and electrical characteristics of the outdoor type INVERTER DUTY TRANSFORMER (typical) shall be as under:

Sr. No.	Particulars	Description
1.	Continuous kVA ratings	As per design
2.	Type	Oil immersed
3.	Frequency	50Hz
4.	Type of cooling	Oil Natural Air Natural (ONAN)
5.	No of Phases	Three
6.	Rating voltage H.V. side	11kV or 33kV
7.	Highest System voltage on H.V. side	12 kV or 36 KV
8.	Rated voltage on L.V. side	Output of solar inverter
9.	Vector Group	As per design
10.	Connections a) H.V. Winding b) L.V. winding	Delta/Star Delta/Star
11.	On load taps on H.V. Side (for H.V. Variation)	+ 5% to – 10.0% (in steps of 2.5%)
12.	Impedance voltage (%)	As per IS2026
13.	Minimum Creepage distance	31mm/ kV
14.	Transformer connections	LV side – Bus Duct HV Side –Bushing with enclosure

2. AUXILIARY TRANSFORMER:

- i. Aux transformer 100 kVA in 11kV/415 V or 33 kV/415 V; however during detailed engineering, load calculations for auxiliary power requirements is more than 100 kVA, then capacity shall be increased accordingly) .The winding of the transformer shall be of copper winding.
- ii. Contractor shall provide necessary taping arrangement and infrastructure till the Auxiliary transformer which is to be installed near the Switchgear room.
- iii. Necessary cabling shall be done for connecting Auxiliary transformer output to PMCC panel.
- iv. The rating and electrical characteristics of the outdoor type AUXILIARY TRANSFORMER (typical) shall be as under:

Sr. No.	Particulars	Description
1.	Continuous kVA ratings	As per design (with 20% for future load)
2.	Type	Oil immersed
3.	Frequency	50HZ
4.	Type of cooling	Oil Natural Air Natural
5.	No of Phases	Three
6.	Rating voltage H.V. side	11 kV

Sr. No.	Particulars	Description
7.	Highest System voltage on H.V. side	12 kV
8.	Rated voltage on L.V. side	415V
9.	Vector Group	Dyn11
10.	Connections a) H.V. Winding b) L.V. winding	Delta Star
11.	OFF load taps on H.V. Side (for H.V. Variation)	+ 10% to -10% (in steps of 2.5%)
12.	Impedance voltage (%)	As per IS2026
13.	Minimum Creepage distance	31mm/ kV

3. POTENTIAL TRANSFORMER (SWITCHYARD)

- i. The instrument transformers i.e. current and voltage transformers shall be single phase transformer units and shall be supplied with a common marshalling box for a set of three single phase units. The tank as well as top metallic shall be hot dip galvanized.
- ii. The instrument transformers shall be oil filled hermetically sealed units. The instrument transformers shall be provided with filling and drain plugs.
- iii. Polarity marks shall indelibly be marked on each instrument transformer and at the lead terminals at the associated terminal block. The insulators shall have cantilever strength of more than 500 kg.
- iv. Current Transformer, Voltage Transformer, Circuit Breaker and Relays in the Switchyard shall match requirements of the KPTCL/DISCOM norms defined from time to time.

Sr. No.	Particulars	Description of PT
1.	Highest System Voltage (Um)	Suitable for Evacuation voltage
2.	System Neutral Earthing	Effectively earthed
3.	Installation	Outdoor (IP 65)
4.	System fault level	Appropriate
5.	Rated min power frequency withstand voltage (rms value)	As per relevant Standard
6.	Rated lightning impulse withstand voltage (peak value)	As per relevant Standard
7.	Standard reference range of frequencies for which the accuracy are valid	96% to 102% for protection and 99% to 101% for measurement
8.	Rated voltage factor	1.2 continuous & 1.9 for 30 sec
9.	Class of Accuracy	0.5 / 3P, IS3156/1992
10.	Minimum Creepage distance	31mm/kV
11.	Temperature rise	As per -IS 2705/1992
12.	Stray capacitance and stray conductance of LV terminal over entire carrier frequency range	As per IEC:358
13.	One Minute Power frequency Withstand voltage for secondary winding	3 kV rms

Sr. No.	Particulars	Description of PT
14.	Temp. rise over an ambient temp. of 50 deg. C	As per IS 3156/1992
15.	Number of terminals in control spare	All terminals of control circuits wired Cabinet up to marshalling box plus 10 terminals
16.	Rated total thermal burden	300 VA min.
17.	Number of cores	2 (two) - 1 for protection and one for metering with 0.5 class accuracy.
18.	Rated Output, insulation level, transformation ratio, rated voltage factor	Should be provided by the Contractor.

4. CURRENT TRANSFORMER (SWITCHYARD)

- i. Current transformers may be either of the bushing type or wound type. The bushing types are normally accommodated within the transformer bushings and the wound types are invariably separately mounted. The location of the current transformer with respect to associated circuit breaker has an important bearing upon the protection scheme as well as layout of, substation. Current transformer class and ratio is determined by electrical protection, metering consideration.
- ii. **Technical specifications:** Current ratings, design, Temperature rise and testing etc. should be in accordance with IS: 2705 (part I to IV).
- iii. **Type and Rating:**
 1. The current transformer should be of outdoor/ indoor type, single phase, oil immersed, self-cooled and suitable for operation in 3 phase solidly grounded system.
 2. Each current transformer should have the following particulars under the site conditions for the system under design
 3. Each current transformer should have the following particulars under the site conditions for the system under design

Sr. No.	Particulars	Description of CT
1.	Highest system Voltage (Um)	Suitable for Evacuation voltage
2.	Rated frequency	50 Hz
3.	Installation	Outdoor type
4.	Rated short time thermal current	Min 25 kA for 3 sec or appropriate thermalcurrent as per design calculations
5.	Rated dynamic current	63 kA (Peak) appropriate dynamic current as per design calculations
6.	Rated min power frequency withstand voltage (rms value)	As per relevant Standard
7.	Rated lightning impulse withstand voltage (peak value)	As per relevant Standard
8.	Accuracy Class	0.2 S metering, 5P20 for protection
9.	Minimum Creepage distance	31mm/kV
10.	Temperature rise	As per -IS 2705/1992
11.	Type of insulation	Class A

Sr. No.	Particulars	Description of CT
12.	Number of cores	For Transformer : Three (3) with One (1) protection core and One (1) metering core (1) Diff. Protection of Transformer For ABT Meter Line Side : Three (3) with One (1) protection core and One (2) ABT metering core Main & Check
13.	CT secondary current	Protection cores – 1 Amp. Metering Core – 1 Amp (With Highest Accuracy Class)
14.	Number of terminals in marshalling box	All terminals of control circuits wired up to marshalling box plus 20 terminals spare
15.	CT ratio & Rated VA Burden, short time thermal rating, class of accuracy	Minimum burden required 1. Metering core – 15VA min. 2. Protection core – 15VA min.

5. METERING SYSTEM

- i. One No. energy meter of 0.2s accuracy class suitable for ABT-TOD requirement shall be provided at export feeder. The instrument transformers used for this measurement shall be outdoor type and Meter shall be placed in metering panel to be placed inside the individual pooling switchgear rooms.
- ii. For measurement of Auxiliary power consumption, MFM in ACDB incomer shall be provided by the bidder.
- iii. Meter shall be suitable for interfacing for synchronizing the built-in clock of the meter by GPS time synchronization equipment. Bidders shall synchronize the meter using GPS time synchronization equipment. All the hardware required for synchronization shall be in scope of bidder.
- iv. The ABT meters supplied under this contract shall also meet the requirement of respective RLDC/State power Utilities.

This metering system shall have following features:

- i. Meters shall be microprocessor-based MWH meters having an accuracy class of 0.2S or better. MVARH meters shall have accuracy class of 0.5 or better.
- ii. These meters shall have provision for downloading of data through an optical port and for through RS 485 port.
- iii. Even under absence of VT input, energy meter display shall be available and it shall be possible to download data from the energy meters.
- iv. Dummy panels shall be supplied for mounting of energy meters supplied by respective RLDC/ State power Utilities. Terminal blocks (disconnecting type) shall also be provided with these panels
- v. Quantity and dimension of these panels shall be decided during detailed engineering.

TECHNICAL REQUIREMENTS OF ENERGY METERS FOR ABT REQUIREMENTS:

- i. Contractor shall supply energy meters along with metering station, 4 Nos. machine Clients, 20 nos web client license. MRI or lap top (as applicable) as per the technical specification given below and further it should meet the utility guidelines.

- ii. Shall be microprocessor-based conforming to IEC 62052-11, IEC 62053-22, IS-14697
- iii. Shall carry out measurement of active energy (both import and export) and reactive energy (both import and export) by 3-phase, 4 wire principle suitable for balanced/unbalanced 3 phase load.
- iv. Shall have an accuracy of energy measurement of at least Class 0.2S for active energy and at least Class 0.5 for reactive energy.
- v. The active and reactive energy shall be directly computed in CT & VT primary ratings.
- vi. Separate CTs and VTs shall be provided for main/check and standby meters.
- vii. The reactive energy shall be recorded for each metering interval in four different registers as MVARh (lag) when active export, MVARh (Lag) when active import, MVARh (lead) when active export, MVARh (Lead) when active import.
- viii. Two separate registers shall be provided to record MVARH when system voltage is >103% and when system voltage is <97%.
- ix. Shall compute the net MWh and MVARh during each successive 15 minute block metering interval along with a plus/minus sign, instantaneous MWh, instantaneous MVARh, average frequency of each 15 minutes, net active energy at midnight, net reactive energy for voltage low and high conditions at each midnight.
- x. Each energy meter shall have a display unit. It shall display the net MWh and MVARh with a plus/minus sign and average frequency during the previous metering interval; peak MWh demand since the last demand reset; accumulated total (instantaneous) MWh and MVARh with a plus/minus sign, date and time; and instantaneous current and voltage on each phases.
- xi. All the registers shall be stored in a non-volatile memory. Meter registers for each metering interval, as well as accumulated totals, shall be downloadable. All the net active/reactive energy values displayed or stored shall be with a plus /minus sign for export/import.
- xii. At least the following data shall be stored before being overwritten for the following parameters.

Sr. No.	Parameters	Details	Min No of days
1.	Net MWH	15 min block	40 days in meter
2.	Average Frequency	15 min block	40 days in meter
3.	Net MVARH for V > 103%	15 min block	40 days in meter
4.	Net MVARH for V < 97%	15 min block	40 days in meter
5.	Cumulative Net MWH at every midnight		10 days in meter/ 40 days in PC
6.	Cumulative Net MVARH for V > 103% at every midnight		10 days in meter/ 40 days in PC
7.	Cumulative Net MVARH for V < 97% At every midnight		10 days in meter/ 40 days in PC
8.	Date and time blocks of VT failure on any phase.		

- xiii. Shall have a built in clock and calendar with an accuracy of less than 15 seconds per month drift without assistance of external time synchronizing pulse.
- xiv. Date/time shall be displayed on demand. The clock shall be synchronized by GPS time synchronization equipment being supplied by the contractor.

- xv. The voltage monitoring of shall be inbuilt feature provided to signal failures to the Substation Automation System, The meter shall be suitable to operate with power drawn from the VT supplies. The burden of the meters shall be less than 2 VA.
- xvi. The power supply to the meter shall be healthy even with a single-phase VT supply. An automatic backup, in the event of non-availability of voltage in all the phases, shall be provided by a built in long life battery and shall not need replacement for at least 10 years with a continuous VT interruption of at least 2 years. Even under absence of VT input, energy meter display shall be available and it shall be possible to download data from the energy meter. In case data downloading is not possible in absence of VT supply, meter with provision of 220V DC auxiliary power shall be provided. Date and time of VT interruption and restoration shall be automatically stored in a non-volatile memory.
- xvii. Shall have an optical port on the front of the meter for data collection from either a hand held meter reading instrument (MRI) having a display for energy readings or from a notebook computer with suitable software . The contractor shall supply the MRI and/or notebook complete with all optical interface unit required.
- xviii. The meter shall have means to test MWh and MVARh accuracy and calibration at site in-situ and test terminal blocks shall be provided for the same.
- xix. Each meter shall have a unique identification code provided by the Owner and shall be permanently marked on the front of the meter and stored in the non-volatile memory of the meter.
- xx. The above specifications is the minimum requirement of BAMUL. However the Metering system shall also meet the technical and quantity requirements prescribed by KPTCL/DISCOM/SLDC and any other regulatory bodies' defined from time to time.

6. HT SWITCHGEAR

i. CODE AND STANDARDS

IEC: 62271, IS:13118 and IS:3427

ii. Type of Switchgear

Free standing, Floor mounted, metal clad, fully compartmentalized draw-out type

iii. Circuit Breaker

Vacuum type, restrike free, trip free, stored energy operated and with electrical anti-pumping features.

iv. OPERATIONAL REQUIREMENT

Each breaker panel shall be provided with the following devices for control, indication and inter locking:

1. Spring return to neutral type control switch (with NAC/NAT position)
2. Stay – put type selector switches. Voltmeter with selector switch shall be provided with each bus-section.
3. 'On', 'Off', 'Auto trip' 'Spring charged and "Control Supply healthy" indicating lamps. The lamps shall be high intensity cluster type LED Service & test position indication shall be provided on all panels through additional lamps.
4. Thermostatically controlled space heater with switch, illumination and power plug point.
5. All meters/instruments shall be flush mounted on front panel, atleast 96 sq.mm size with 90 deg. scales and accuracy class of 1.0. All feeders shall have an ammeter and ammeter selector switch, voltmeter with voltmeter selector switch for each bus.

The circuit breaker shall meet the following requirements:

- i. The breaker shall be controlled locally and remotely. Facilities shall be provided for mechanical tripping of breaker and manual charging of closing spring to cater to emergency condition.
- ii. Surge arrestor shall be provided for all feeder.
- iii. Shall have an Operation duty O-0.3Sec -CO - 3min. - CO.
- iv. Closing and tripping coils operating under extreme conditions of control voltage variation.
- v. Supervision relays provided for trip coil monitoring.
- vi. Suitable mechanical inter lock shall be provided to prevent inadvertent earthing of any live part.
- vii. Testing of circuit breaker shall be possible in isolated position by keeping the control plug connected.
- viii. Only motor wound closing spring charging arrangement is acceptable.
- ix. Core balance CTs shall be provided for transformer feeders having CT ratios greater than 50/1A.
- x. Each breaker truck shall have Service - Isolated - Withdrawn Position.
- xi. Primary fuse replacement shall be possible with VT in isolated position.
- xii. Each feeder shall have local/remote selector switch. Closing from local shall be possible only in test position whereas closing from remote shall be possible in either service or test position. Tripping from local shall be possible only when local/remote selector switch is in local position. Tripping from remote shall be possible either with breaker in service position or selector switch being in remote position.
- xiii. Surge Arrestor:
- xiv. The surge arrestors shall be provided for all feeders and shall be metal oxide, gapless type generally in accordance with IEC 60099-4 and suitable for indoor duty. These shall be mounted within the switchgear cubicle between line and earth, preferably in the cable compartment. Surge arrestor selected shall be suitable for non-effectively earthed system and rating shall be in such a way that the value of steep fronted switching over voltage generated at the switchgear terminals shall be limited to the requirements of switchgear.
- xv. Protection, Control and Metering
- xvi. The switchgears shall have Communicable Numerical relays for Protection, scheme, Metering and Status monitoring. Employer shall network the Numerical relays through Data Concentrators of the main plant to HMI and further integrated to DCS/DDCMIS system for diagnostics and status monitoring. All the feeders shall be remote controlled from SCADA and from the local console of the numerical relays.
- xvii. General requirements of Numerical Relays
 - 1. All numerical relays, auxiliary relays and devices shall be of types, proven for the application; satisfying requirements specified elsewhere and shall be subject to Owner's approval. Numerical Relays shall have appropriate setting ranges, accuracy, resetting ratio, transient overreach and other characteristics to provide required sensitivity to the satisfaction of the Owner. All the numerical relays shall have communications on two ports, local front port communication to laptop and a second port on Rs485 port.
 - 2. All relays and timers shall be rated for control supply voltage as mentioned elsewhere under parameters and shall be capable of satisfactory continuous operation between 80-120% of the rated voltage. Making, carrying and breaking current ratings of their contacts shall be adequate for the circuits in which

they are used. Interrogation voltage for the binary inputs shall be suitably selected to ensure avoidance of mal operation due to stray voltages.

3. The protective relays shall have at least 8 Nos potential free contacts (Programmable) Auxiliary relays shall have contacts as required. Relay output contacts shall be suitable for directly wiring in the breaker closing and trip circuit operating from 110 V DC control voltage.
4. Failure of a control or auxiliary supply and deenergisation of a relay shall not initiate any circuit breaker /contactor operation. All relays shall withstand a minimum test voltage of 2 KV AC Rms for one minute.
5. All the numerical relays shall have communications on two ports; local front port communication to laptop and a second port on Rs 485.
6. Relays shall be suitable for electrical measurement including voltage, current, power (active/reactive) and energy parameters
7. Mapping details of all the details shall be submitted in IEC format.
8. Relays shall have separate output for individual functionality and the master trip shall be software configurable in case of multi output relays. Relays shall have event recording feature, recording of abnormalities and operating parameters with time stamping
9. Preferably comprehensive single numerical relay shall have provision of both current and voltage inputs. The current operated relay shall have provision for 4 sets of CT inputs, 3 nos. for phase fault & 1 CT input for earth fault. Relay shall be suitable for both residually connected CT input as well as CBCT input. The voltage-operated relay shall have provision for 3 PT inputs. Relays shall be suitable for CT secondary current of 1A/5A selectable at site. Relays used in incomers and bus couplers shall have provision of two sets of voltage signal inputs for the purpose of synchronization
10. All CT & PT terminals shall be provided as fixed type terminals on the relay to avoid any hazard due to loose connection leading to CT opening or any other loose connection. In no circumstances Plug In type connectors shall be used for CT / PT connections. Vendor to ensure the same for all protective relay models offered.
11. All numerical relay shall have key pad / keys to allow relay settings from relay front. All hand reset relays shall have reset button on the relay front. Relay to be self or hand reset shall be software selectable. Manual resetting shall be possible from remote.
12. Relays shall have suitable output contact for breaker failure protection.
13. Relays shall have self-diagnostic feature with self-check for power failure, programmable routines, memory and main CPU failures.
14. Relays shall have at least two sets or groups of two different sets of adaptable settings. Relays shall have multiple IEC/ ANSI programmable characteristics.
15. Design of the relay must be immune to any kind of electromagnetic interference. Vendor to submit all related type test reports for the offered model along with the offer.

xviii. Transformer Feeder Protections:

1. Three Phase Over current and Earth Fault protection (50 & 50 N1/50 N2)) (The earth fault element should be suitable for both residually connected CT input as well as CBCT input.)
2. Restricted Earth Fault protection (64 R)
3. Transformer Differential protection (87 T) for Transformers with rating more than 5 MW

4. Stand by earth fault protection (51 N)
 5. Transformer buchholz and WTI/OTI high trips
 6. Energy Metering
- xix. Protections for Incomers, Bus couplers and Tie feeders.
1. Over current and earth fault protection.
 2. Synchronizing check relay as a part of fast change over scheme.
 3. Energy Metering

Design and Construction Features:

All HT switchgear panels and circuit breakers shall have the following features

- i. Conductor:
High conductivity aluminum alloy or copper for the horizontal busbars, vertical droppers and connectors to the fixed end of isolating contacts
- ii. Height of the Switchgear Panel:
Not to exceed 2600 mm.
- iii. Insulators:
Shall be track-resistant, high strength, non-hygroscopic, non-combustible type and suitable withstand stresses due to over-voltages and short circuit current.
Interlope barrier of inflammable material like hylam not acceptable
- iv. Sealing:
Bushing or other sealing arrangement shall be provided between breaker and busbar / cable compartments to avoid air communication around isolating contacts in the safety shutter area with truck in service position.
- v. Construction:
 1. The switchgear assembly shall be rodent and vermin proof.
 2. In switchgear design where the breaker front itself serves as a door suitable blanking covers one for each size of panel per switch board shall be included.
 3. The switchgear enclosure shall be constructed with rolled steel section of rolled sheet steel of at least 2.0 mm thickness.
 4. Pressure relief device shall be provided in each high voltage compartment to vent out safely the gases produced in case of a fault.
 5. Contractor shall furnish calculation during detailed- engineering stage to establish the adequacy of support insulator and busbar sizes for the declared continuous & short time current ratings.
 6. Breaker trucks shall have a secure locking in SERVICE position so that they are not displaced during a short circuit.
 7. Current ratings of all switchgears, circuit breakers, CT's etc. shall be sufficient for carrying the connected load currents without exceeding the permissible temperature limits or reduction in service life. Use of two breakers in parallel to meet the required rating shall not be acceptable.
 8. Standalone ICOG panel are also accepted.
 9. Suitable trolley arrangement, if required, shall be provided. One trolley per switchgear room shall be provided suitable for each type of rating of breakers
- vi. Earthing Arrangement:
 1. Internal earthbus shall be provided which has a capacity to withstand short circuit currents for one second and all enclosures shall be connected to this bus.
 2. Earthing arrangement through and integral earth switch or through separate earthing truck shall be provided. Suitable mechanical interlocks shall be provided to prevent the closing of earth switch circuit on live circuit. In case of later

arrangement one set of different types of earthing trucks per switch board shall be provided.

3. Earthing switch/Earthing truck shall be short time (One second) current withstand capability equal to the breaker.
4. A clearly visible warning label "ISOLATE ELSEWHERE BEFORE EARTHING" shall be provided on shutters of incoming and other connections which could be energized from other end.

vii. Cable Entry:

Switchgear panel shall be suitable for bottom entry and provided with removable gland plates

viii. Instrument transformer:

CTs and VTs shall be provided for protection and metering and shall be cast resin encapsulated type. Insulation class 'E' or better. VTs shall have suitable HRC current limiting fuses to both primary and secondary sides, under voltage relays, timers, etc. for remote annunciation on supply failure. Accuracy class of CTs and VTs shall be as follows:

	CTs	VTs	Core balance CTS
Protection	5P 20	3P	PS
Metering	1.0	1.0	
Differential/REF	PS	-	-

CTs/VTs shall have accuracy class of 0.2 wherever MFM of 0.2 class are connected to these CTs.

- ix. MFM shall be provided in all the verticals including spare feeders. MFM shall have RS 485 data communication.

7. CABLES AND WIRES

- i. All cables and connectors for use for installation of solar field must be of solar grade which can withstand harsh environment conditions for 25 years and voltages as per latest IEC standards. (Note: IEC standards for DC cables for PV systems is under development, the cables of 600- 2600 volts DC for outdoor installations should comply with the draft EN 50618 for service life expectancy of 25 years). DC Cable of Positive & Negative must be colour coded as per draft EN50618.
- ii. Wires with sufficient ampacity and parameters shall be designed and used so that average voltage-drop at full power from the PV modules to inverter should be maximum 1.5% (including diode voltage drop). PV Modules should be connected with USE-2/RHW-2 cables array to MPPT with photovoltaic disconnect with the THHN/THWN-2 sunlight resistant with 90°C wet rated insulation cable. Due consideration shall be made for the de-rating of the cables with respect to the laying pattern in buried trenches / on cable trays, while sizing the cables. The Contractor shall provide voltage drop calculations in excel sheet to BAMUL/PMC for approval during execution.
- iii. All cables shall be supplied in the single largest length to restrict the straight-through joints to the minimum number. Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted. All wires used on the LT side shall conform to IS and should be of appropriate voltage grade. Copper conductor wires of

- reputed make shall be used. Armoured Aluminium cable connecting from Inverter to LT Panel to IDT LV are allowed.
- iv. All cables shall be armoured except Solar Cables. Solar cable shall be laid through MMS / DWC Conduits.
 - v. OFC cable shall be laid in DWC conduits.
 - vi. Ethernet cables shall be CAT-6.
 - vii. All wires used for connecting the modules and array should conform to the NEC standards. Modules should be connected with USE-2/RHW-2 cables array to junction box conductors and junction box to photovoltaic disconnecter with the THHN/THWN-2 sunlight resistant with 90°C wet rated insulation cable
 - viii. All high voltage cables connecting the inverters to the transformers should be XLPE insulated grade conforming to IS 7098-land cables shall also conform to IEC 60189 for test and measuring the methods.
 - ix. Irrespective of utilization voltage and current rating all type of power cables shall be minimum of 1900 V/3300V grade XLPE insulated conforming to IS 7098& IS 1554/ IS 694 for working voltage less than 150 V control cable shall be of minimum 600 V grade, the control and power cable has to be laid separately. All LT XLPE cables shall confirm to IS: 7098 Part I & II. All HT XLPE Cables (up to 33kV) Shall confirm IS: 7098 PART-3 & IEC-60287, IEC-60332 and the Contractor to submit technical data sheet, Voltage drop calculation, Power Loss Calculation and type test report for the approval of PMC.
 - x. The cables shall be adequately insulated for the voltage required and shall be suitably colour coded for the required service. Bending radius for cables shall be as per manufacturer's recommendations and IS: 1255

Sr. No.	Item	IS	IEC
1.	Conductors of Insulated Cables	IS: 8130 - 1984	IEC: 228
2.	Impulse tests on cables and their accessories		IEC: 230
3.	Extruded solid dielectric-insulated power cables for rated voltage from 1 kV upto 30 kV		IEC: 502
4.	Test methods for insulations and sheaths of electric cables and chords		IEC: 540
5.	Test on cable over a sheath which has special protective functions and are applied by extrusion		IEC: 229
6.	Calculations of continuous current rating of cables (100% load factor		IEC: 287
7.	Cross-linked polyethylene insulated PVC sheathed cable for voltage from 3.3 KV upto 33 KV	IS: 7098 (Part II& III)	
8.	PVC insulation & sheath of electrical cables	IS: 5831 - 1984	
9.	Mild steel wires, formed wires and tapes for armouring of cables.	IS: 3975	

Sr. No.	Item	IS	IEC
10.	Electrical test methods for electric cables partial discharge test.		IEC: 885(2) - 1987 (Part II)
11.	Methods of test for cables.	IS: 10810	
12.	Common test methods for insulating and sheathing materials of electric cables.		IEC: 811
13.	Impulse test on cables & other accessories		IEC: 230
14.	Cable termination for gas insulated switchgear		IEC: 859

xi. TECHNICAL SPECIFICATION OF CABLES:

SOLAR CABLE UPTO INVERTER:

1. All cables and connectors for use for installation of solar field must be of solar grade which can withstand harsh environment conditions including High temperatures, UV radiation, rain, humidity, dirt, burial and attack by moss and microbes for 25 years and voltages as per latest IEC standards. (Note: IEC standards for DC cables for PV systems is under development, the cables of 600 – 2600 volts DC for outdoor installations should comply with the draft EN 50618/ TUV 2PfG 1169/09.07 for service life expectancy of 25 years, SMU to Inverter cables shall be run through DWC/UPVC Pipes (with filling factor of 40%) from SMU to ground level. Between SMU and Inverter, underground armoured XLPE Cables directly buried as per relevant IS standard of latest edition. Cables shall not be directly exposed to atmosphere.
2. Insulation: Outer sheath of cables shall be electron beam cross-linked XLPO type and black in colour. In addition, Cable drum no. / Batch no. to be embossed/ printed at every one meter. Cable Jacket should also be electron beam cross-linked XLPO, Flame Retardant, UV resistant and black in colour.
3. Wires with sufficient ampere capacity and parameters shall be used so that maximum voltage-drop at full power from the PV modules to Inverter should be less than 1.5% (including diode voltage drop). Selected Bidder shall provide voltage drop calculations in excel sheet.
4. Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted. All wires used on the LT side shall conform to IS and should be of appropriate voltage grade. Only copper conductor wires compliant with IEC 60228, Class 5 of reputed make shall be used.

OTHER LT CABLES:

1. General Constructional Features: The medium voltage cables shall be supplied, laid, connected, tested and commissioned in accordance with the drawings, specifications, relevant Indian Standards specifications, manufacturer's instructions. The cables shall be delivered at site in original drums with manufacturer's name, size, and type, clearly written on the drums.

2. Material: All LT cable shall be XLPE insulated, PVC sheathed with FRLS, aluminium or copper conductor, armoured conforming to IS: 7098 Part I.
 3. Type: The cables shall be circular, multi core, annealed copper or aluminium conductor, XLPE insulated and PVC sheathed, armoured.
 4. Conductor: Uncoated, annealed copper, of high conductivity upto 4 mm² size, the conductor shall be solid and above 4 mm², conductors shall be concentrically stranded as per IEC: 228.
 5. Insulation: XLPE rated 90° C. extruded insulation
 6. Core Identification:
 - Two core: Red and Black
 - Three core: Red, Yellow and Blue
 - Four core: Red, Yellow, Blue and Black
 - Single core: Green cable with Yellow strips for earthing
 - Black shall always be used for neutral
1. Assembly: Two, three or four insulated conductors shall be laid up, filled with non-hygroscopic material and covered with an additional layer of thermoplastic material
 2. Armour: Galvanised steel flat strip / round wires applied helically in single layers complete with covering the assembly of cores
 - For cable size upto 25 Sq. mm. : Armour of 1.4 mm dia G.I. round wire
 - For cable size above 25 Sq. mm. Armour of 4 mm wide 0.8 mm thick G.I strip
 3. Sheath: The cable shall be rated extruded for XLPE 90 deg.c. Inner sheath shall be extruded type and shall be compatible with the insulation provided for the cables. Outer sheath shall be of an extruded type layer of suitable PVC material compatible with the specified ambient temp 50 deg. C and operating temperature of cables. The sheath shall be resistant to water, ultraviolet radiation, fungus, termite and rodent attacks. The colour of outer sheath shall be black. Sequential length marking required at every 1.0 meter interval on outer sheath shall be available. The contractor has to furnish resistance / reactance / capacitances of the cable in the technical datasheet.
 4. Rating: 1900 Volts or higher.

xii. TECHNICAL SPECIFICATION OF HT (UE) CABLES

General Constructional Features:

1. Conductors: The conductor shall be of circular stranded XLPE Aluminium confirming to IS: 8130 & IEC: 228. It shall be clean, reasonably uniform in size & shape smooth & free from harmful defects. Any other form of conductor may also be accepted if in line with modern trends.
2. Semi-Conductor Barrier Tape/Tapes: The semi-conducting barrier tape/tapes shall be provided over the conductors
3. Conductor Screen: The conductor screen shall consist of an extruded layer of thermosetting semi-conducting compound which shall be extruded simultaneously with the core insulation.

4. Insulation: The insulation shall be super clean XLPE FRLS compound applied by extrusion and vulcanized to form a compact homogenous body.
5. Insulation Screen:
 - Each insulation have an insulation screen in two parts consisting of:
 - A water barrier tape/Non-metallic semi-conducting swellable tape part and a metallic screen part.
 - The non-metallic part shall be directly applied upon the insulation of each core and may consist of an impregnated but nylon/PVC tape or a similar approved material or, an extruded semi-conducting material extruded simultaneously with the conductor screen and insulation (triple extrusion).
 - The semi-conductor shall be readily strippable and must not be bonded in such a manner that it has to be shaved or scraped to remove.
 - The metallic part shall consist of a copper tape helical applied with a 30% overlap over the water barrier tape/blocking tape. A binder tape of copper shall be applied over the copper wire metallic screen.
6. Laying Up:
 - The cores shall be identified on the non-metallic part of the insulation screen by legible printing on the length of each conductor or, by the inclusion of a marker tape.
 - The cores shall be laid up with a right hand direction of lay.
 - Binder tape/Moisture barrier:
 - During layup, a suitable open spiral binder may be applied, at the manufacturer's discretion, before the application of an extruded inner covering.
7. Fillers: Fillers shall be polypropylene.
8. Inner Covering/Sheath: The inner covering shall be extruded over the laid up cores to form compact and circular bedding for the metallic layer.
9. Metallic Layer: The metallic layer shall be galvanised steel wire.
10. Outer Sheath: The tough outer sheath, black coloured best resisting PVC polyethylene compound type ST-2 as per IS: 5831 for the operating temperature of the cable shall be provided over the armour as specified in relevant standards by extrusion process
11. Cable Marking:
 - Embossing on outer sheath:

The following particulars shall be properly legible embossed on the cable sheath at the intervals of not exceeding one meter throughout the length of the cable. The cables with poor and illegible embossing shall be liable for rejection

- Voltage grade
- Year of manufacture
- Manufactures name
- Successive Length
- Size of cable
- ISI mark

- xiii. Packing and marking shall be as per clause No. 18 of IS 7098 (part I)/1988 amended up to date.

- xiv. Cables inside the control room and in the switchyard shall be laid in Galvanized Cable Trays mounted on mild steel supports duly painted, in constructed trenches with RCC raft and brick sidewalls and provided with removable RCC covers.
- xv. Cable terminations shall be made with suitable cable lugs & sockets etc, crimped properly and passed through brass compression type cable glands at the entry & exit point of the cubicles.
- xvi. All cable/wires shall be provided with Punched Aluminium tags only. The marking on tags shall be done with good quality letter and number ferrules of proper sizes so that the cables can be identified easily.
- xvii. The wiring for modules interconnection shall be in the GI pipe /HDPE/ DWC Pipe of approved make.
- xviii. Data sheets of individual cable sizes (HT & LT) shall be submitted for approval by the Owner. Drum numbers and drum length details shall be submitted with each consignment.
- xix. Cable end terminations and joint kits shall comply with the latest version of the relevant IS standard.
- xx. The cable ends shall be terminated with adequate size copper/ Aluminium/ Bimetallic lugs and sockets etc, single/double compression cable glands. Cable glands shall be of robust construction capable of clamping cable and cable armour (for armoured cables) firmly without injury to insulation. The metallic glands shall be earthed at min one location. Suitable lock type crimping lugs shall be used for cable end terminations. Where cables are raising from ground, suitable PVC pipe guarding shall be provided for cable raising with sealing of the guarding PVC pipe including a suitable clamp.
- xxi. HT cable termination kits and straight through joints shall be selected as per the cable specifications. Installation shall be as per the instructions given in the manufacturer's manual. Heat shrinkable type kits only shall be used for HT and LT cables.
- xxii. During Execution Contractor shall submit the Data sheets of the joints and kits to PMC for approval.

8. CLAMPS AND CONNECTORS

- i. The bus-support clamps, spacers, T-connectors and various equipment connectors shall be supplied as per the enclosed drawings. The material to be used for these items shall be generally as per the below
- ii. The materials shall be of the best workmanship, and all the sharp edges and corners shall be rounded off. The thickness of tinning, wherever applicable, shall be not less than 10 microns. The minimum thickness of pads made of copper shall be 10 mm and those made out of Aluminium/Aluminium Alloy, shall be 12 mm, unless otherwise indicated in the specifications.
- iii. All the clamps and connectors shall be designed to carry a continuous current not less than 125% of the rated current of the conductor (twin/single as the case may be)/equipment terminal to which these are to be connected. Temperature rise of the connector under the above condition shall not be more than 50% of the temperature of the main conductor/equipment terminal.

Sr. No.	Application	Material
1.	Bolted type connection	
2.	For connection to ACSR/AAAC/ Aluminium terminal	Aluminium Alloy conforming to designate A6 as per IS 617

Sr. No.	Application	Material
3.	For connection to copper terminals, with crimping facility to connect ACSR/AAAC jumper	Electrolytic grade copper, forged and tinned
4.	Crimping type connection	
5.	For connection to ACSR/AAAC jumper	Electrolytic grade aluminium

- iv. All the fasteners (i.e. nut-bolts, washers, check-nuts, etc.) used in the clamps and connectors shall be of non-magnetic stainless steel. The straight bolts shall be fully threaded, and the U-bolts shall be threaded up to 30 mm from the ends. For connectors made out of Aluminium/Aluminium Alloy, the bolts shall be of 12 mm diameter, and for copper connectors the bolts shall be of 10 mm diameter.
- v. The clamps and connectors meant for ACSR and AAAC shall have the same crimping dimensions. It shall be possible to use the same clamp/connector for ACSR or AAAC, as would be required, without any modification/change at site
- vi. The length of bolt shall be chosen such that after fully tightening the nut and check-nut, minimum 5 (five) threads of the bolt shall project outside the nut/check-nut.
- vii. As an alternative to the various types of clamps and connectors detailed under 2.0 above, the Contractors may offer connectors of Power Fired Wedge Pressure Technology (PFWPT).

Connectors of PFWPT type shall meet the general requirements for various connections/joints as indicated in the relevant drawings.

- viii. PFWPT type connectors shall comprise of:
 1. Tapered 'C' - shaped spring member
 2. Wedge for connecting solid/stranded conductor along with handle, suitable for connection between:
 - Aluminium & Aluminium
 - Copper & Copper
 - Aluminium & Copper
 - Aluminium & Al. Alloy
 - Copper & Al. Alloy
 - Al. Alloy & Al. Alloy
- ix. Components of the PFWPT type connectors shall be made of Aluminium Alloy suitably heat-treated to ensure that the required Mechanical & Electrical parameters are in line with ANS 1 specification no. C 119.4-1991. The connectors shall have 'self-cleaning' capability during application. The connector shall ensure stable and low contact resistance under varying load conditions and the thermal cycling effects
- x. The special tools and tackles required for installation of the PFWPT type connectors shall be identified in the offer. One set of these bolts and tackles shall be included in the scope of supply.

9. ISOLATORS CUM EARTHING SWITCHES

- i. This specification covers design, manufacture, testing and supply of. Manually operated HT 630 Amps Upright mounting type with manually operated with earth switch Isolators. The Isolators and Isolator-cum-Earthling Switched shall comply with the requirements of the IS: 9921 and IEC: 129 (latest edition) except specified herein. The Insulators shall comply with the requirements of IS : 2544 and IEC : 168-1988 (latest

edition) for HT pole mounted structure wherever required. HT pole mounted structure would be supplied, installed and commissioned by the Contractor wherever required.

- ii. The isolator shall be of the manual operated type with earthing switches and shall complete with all parts and accessories including insulator operating rods, mounting attachments, necessary for their efficient operation. The equipment shall conform in all respect to high standards of engineering. Equipment shall be capable of performing in continuous commercial operation up to the suppliers guarantee in a manner acceptable to the client. The equipment offered shall be complete with all components necessary for its effective and trouble free operation along with associated equipments, interlock, protection schemes, etc. Such components shall be deemed to be within the scope of the Contractor's supply irrespective of whether those are specifically brought out in this specification or not. All similar parts particularly removable ones shall be interchangeable.
- iii. Each pole shall have three Pedestal type of Insulator's stacks. Necessary arrangements shall be provided for proper alignment of the contacts. Ganged operated links shall be so designed that all phases shall make and break simultaneously. The design of Isolators and Isolator cum- Earthing Switches shall be provided for positive control of blades in all positions with minimum mechanical stress on the Insulators. Fixed guides shall be so provided that proper setting of contacts shall be obtained, when a blade is out of alignment even by 25mm in either direction. All movable parts which may be in current path shall be shunted by flexible copper conductor of adequate cross-section and capacity.
- iv. Service Condition: The HT triple pole air break isolators are intended to be used primarily for sectionalizing HT portion in the switchyard for the overhead portion of the line.
- v. Isolator shall conform IS: 9921(Part 1 to 4) & IEC 600 - 129 "alternating current disconnects (Isolators) and earthing switches", and IS 9921 (Part-I to IV) "Specification for alternating current disconnects (isolators) and earthing switches for voltages above 1000V".
 - 1. The moving & fixed contacts shall be made of hard drawn electrolytic grade copper strips and shall be heavy duty self-aligning & high pressure type preferably which applies pressure to the contact surfaces after the blades are fully closed and release the pressure before they start to open. High pressure type contacts shall wipe the contact surfaces, while opening and closing. The contacts shall be so designed that wiping action shall not cause securing or abrasion on the contact surfaces. The wiping action shall be sufficient to remove oxide film, formed during the operation of the switches. The pressure shall be developed by rotation of the entire blade.
 - 2. The temperature rise of contacts due to the flow of rated short circuit current for a period of 3 seconds shall not cause any annealing or welding of contacts.
 - 3. The moving contacts, if provided, shall close first and open last so that no damage is caused due to arcing whatever to the main contacts. The Successful Bidder during execution shall give full details of such contacts with necessary drawings for approval from Owner/BAMUL.
 - 4. The female contact and its tensioning by spring shall be such that there will, always, be a positive contact with adequate pressure to give enough contact surface for the passing of current. The springs provided should not go out of alignment or get entangled with the male contact during operation. During

Execution details of springs shall be furnished on the G.A. drawing for PMC approval.

10. INSULATORS:

The isolator shall be provided with solid core insulators.

- i. These shall be of stacking type to be used. The dimensions and other parameters unless otherwise specified shall generally conform to IS - 5350-Part-11 & IEC 273.
- ii. The cylindrical type post insulators shall be of solid core type. Insulators of similar type shall be interchangeable. The mechanical strength class for outdoor cylindrical post insulators shall be of strength class 6, corresponding mechanical strength in tension, compression and torsional shall be as per IS: 5350 Part - II. When operated at maximum system voltage, there shall be no electrical discharge. Shielding rings, if necessary shall be provided.
- iii. The parameters of the insulators required shall conform to IS: 0350 - Part - II - 1973 or IEC 273.
- iv. The cylindrical post insulators shall consist of single unit only.
- v. The insulator shall be provided with a completely galvanized steel base designed for mounting on the support. The base and mounting arrangement shall be such that the insulator shall be rigid and self-supporting and no guying or cross bracing between phases shall be necessary.

11. PORCELAIN OF THE INSULATOR:

- i. The porcelain used for the manufacture of the insulators shall be homogenous, free from laminations and other flaws or imperfections that might effect the mechanical or dielectric quality and shall be thorough vitrified, tough and impervious to moisture. The glazing of the porcelain shall be uniform brown colour, with a smooth surface arranged to shade away rain water and free from blisters, burns and other similar defects. Insulators shall be interchangeable.
- ii. The porcelain and metal parts shall be assembled in such a manner and with such materials that any differential thermal expansion between the metal and porcelain parts throughout the operating temperature range will not loosen the parts or electrical strength or rigidity. The assembly shall not have excessive concentration of electrical stress in any section or across leakage surfaces. The cement used shall not give rise to chemical reaction with metal fittings. The insulator shall be suitable for water washing by rains or artificial means in service conditions. Further the insulators to be supplied shall be of high- quality and should not result in mismatch and misalignment of stacks during erection and operation
- iii. Each cap shall be of a high grade cast iron or malleable steel casting or steel forging. Cap and base insulators shall be interchangeable with each other. The insulator shall conform to the requirement of the latest edition of IS: 2544, or any other equivalent standard.

12. BUSBARS

- i. The outdoor bus-bars and equipment connections shall be with ACSR conductor (Suitable size as per design; minimum shall be KPTCL standard).
- ii. The bus-bars and the connection jumpers shall be supported on post insulators wherever required.

- iii. The ACSR bus bars shall have necessary support provided with strain type insulators. The stringing tension may be limited to 500-900 kg. depending upon the size of the conductor used. These types of bus bars are suitable for earthquake prone areas.
- iv. Bus bar Material – The materials in common use for bus bars and connections of the strain type are ACSR conductor.
- v. Since aluminium oxides rapidly great care is necessary in making connections. In the case of long spans expansion joints should be provided to avoid strain on the supporting insulators due to thermal expansion or contraction of pipe.
- vi. The bus bar sizes should meet the electrical and mechanical requirements of the specific application for which they are chosen.
- vii. The isolator shall be provided with padlocking device to permit locking of the isolator in both fully open and fully closed positions.

13. POWER EVACUATION

- i. The Energy generated from the Solar power plant shall be evacuated to suitable voltage level of KPTCL/DISCOM from the proposed project site. Contractor shall construct dedicated transmission line for this project. Common evacuation facility along with any other party shall not be acceptable.
- ii. Contractor shall do the necessary survey for the finalizing the transmission line route and length.
- iii. All the necessary infrastructure in the KPTCL/DISCOM Substation for evacuating the generated power shall be provided as per KPTCL standards.
- iv. Contractor shall obtain necessary Evacuation approval and other related approval in the name of BAMUL at his own cost.
- v. The Transmission tower shall be designed for maximum pending moment arising due to wind load on tower, conductors, insulators, cross arms and conductor deviation loads with all conductor intact.
- vi. Conductor shall be selected based on the power evacuated and as per KPTCL standards.
- vii. Voltage drop in the transmission line shall be within the KPTCL permissible limits.

14. LOW VOLTAGE SWITCHGEAR

- i. Power Motor Control Centre (PMCC) shall be 415V TP&N, free standing Fixed type, with Aluminium bus bars, IP54
- ii. The PMCC shall be rated for the maximum output of the supply transformer feeding the system.
- iii. The short circuit withstand rating (1 sec) at rated voltage of the switchgear shall be minimum of 20 kA (rms) and corresponding dynamic rating shall be 50 kA (peak).
- iv. The configuration of the PMCCs shall be as per the system requirement. With 10% spare feeder (min 1 no of feeder in each type & rating). PMCC shall be fuse less type. Incomer shall be ACB/MCCB, outgoing feeder shall be MCCB and Motor feeder shall be OLR and contactor in addition. Incomer rating shall be designed with 20% design margin. MFM with RS 485 .

Following equipment's shall be powered from PMCC:

- 1. UPS
- 2. Battery Charger
- 3. MLDB

4. AC system
5. Raw power sockets & other requirement
6. Welding sockets
7. Module Cleaning system
8. RO Plant
9. Bore well pump
10. Sump pumps
11. Others
- v. Single front / compartmentalized, modular design with provision of extension on both sides.
- vi. The colour finish shade of switchgear enclosure for interior shall be glossy white & for exterior it shall be light grey, semi glossy shade 631 of IS: 5. If a different exterior shade is desired by the PMC, the same shall be intimated to the supplier.
- vii. The PMCC shall be fabricated out of CRGO sheet steel with 2 mm thickness for the enclosure
- viii. The internal walls and separators shall be of 1.6 mm thick CRGO sheet steel.
- ix. The gland plates shall be 3 mm thick.
- x. Control Circuit:
 1. Control supply for breaker closing / tripping - 110V DC
 2. Air Circuit Breaker spring charge motor – 110V DC
 3. Moulded Case Circuit Breakers – 110V DC
 4. Indications, annunciation – 110V DC
 5. Space heater, sockets, etc. – 240 V AC
- xi. Bus Bar:
 1. The material for main bus bars and tap off bus bars shall be electrolytic grade aluminium with HR PVC sleeved insulation.
 2. Bus bars shall be suitable for short circuit rating and current suitable for all connected load.
 3. Bottom cable entry for incoming and outgoing cables.
 4. A suitable gland plate shall be supplied for termination of power, control and instrumentation cables.
 5. Whenever feeders are housed in multi-tier configuration, these tiers shall be segregated by sheet metal barriers.
 6. Earthing: Earthing bus bar shall be terminated at both ends of the switchgear to suit the connections to outside earthing conductor. All components inside the module are required to be earthed individually and are to be looped and connected to the horizontal earth bus.
- xii. Terminals
 1. CT circuit - Isolating link type terminals with shorting facility.
 2. PT circuit – clip on type terminals.
 3. Spare contacts shall be wired up to terminal block. 10% spare terminals shall be provided for each module
- xiii. Specific Requirement
 1. Incomer ACB/MCCBs shall be 4 pole, electrically operated, with closing coil, spring charge motor, trip coil, TNC switch for close and trip, manual closing and tripping push buttons, door I/L, test and service position micro switches, emergency P.B., safety shutters, etc. The circuit breaker shall be provided with anti-pumping feature.

2. Incomer shall be with microprocessor release and shall be provided with over current, short circuit and earth fault protections.
3. All current transformers shall have 5/1A secondary and all meters shall be suitable for 5/1A operation.
4. All indicating lamps shall be of LED cluster type. Incomer feeder shall be provided with ON, OFF, AUTOTRIP, SPRING CHARGED, TEST, SERVICE, TRIP CIRCUIT HEALTHY indications. Colour code shall be followed as applicable.
5. All indicating instruments shall be flush mounting, Digital, 96 sq.m size.
6. MFM shall be provided in incomer and shall be able to communicate through RS485.
7. Necessary auxiliary relays for contact multiplication shall be provided in the panel. The maximum temperature of the bus bars, droppers and contacts at continuous current rating under site reference ambient temperature of 50° C shall not exceed 105° C.
8. All the necessary (defined by PMC during execution) controls, feedback and monitoring signals shall be communicated to SCADA system.
9. All control cables shall be minimum of 1.5sqmm
10. For CT secondary circuits 2.5 sq.mm wire shall be used.

15. UNINTERRUPTED POWER SUPPLY (UPS) SYSTEM

- i. The Uninterrupted Power Supply (UPS) system (3phase, 415V, Industrial grade) shall be designed to meet the electrical power requirements of SCADA systems, Screens, Inverter and other requirement in Control room and inverter room. The UPS System shall be designed to give the voltage at approximate mid-level of the tolerance band of the power supply modules/packs of Control System, when the charger is feeding the load. This shall also take in consideration the voltage drop in cables from DCDB to the control panels (if required). In case the Power Supply Output of a charger exceeds the voltage band tolerated by the power supply modules/packs of Control System, provision for safe tripping of that charger is to be ensured.
- ii. Bidder shall clearly bring out in the proposal the redundancy feature along with configuration diagram, single line diagram and data sheets etc. & this shall be finalized subject to PMC's approval during detailed engineering.
- iii. UPS system shall consist of 1X 100% charger and inverter, 1X 100% Battery bank for 3 hour, Bypass Line Transformers and Voltage Stabilizer, static switch, manual bypass switch, 2X 100% ACDB, and other necessary Protective devices and accessories.
- iv. During the sizing of the UPS, the following loads shall be considered (but not limited to)
 1. Data logger / SCADA
 2. GPRS Modem / VSAT equipments
 3. HMI of SCADA
 4. Emergency Lighting
 5. CCTV
 6. Other necessary equipments
- v. Design:

The minimum capacity of the UPS at load factor of 0.8 lagging inclusive of 20% design margin at 50°C. The UPS system shall meet the following requirements as a minimum. If UPS KVA rating is applicable at a lower ambient temperature than specified 50°C, the bidder shall consider a derating factor of at least 1.5%/°C for

arriving at the specified UPS capacity at 50°C ambient. The UPS shall have an overload capacity of 125% rated capacity for 10 minutes and 150% rated capacity for 10 seconds. The inverter shall have sufficient capability to clear fault in the maximum rated branch circuit, limited to 8 percent of finally selected ups capacity. Isolation Transformer, Voltage Stabiliser, Static Inverters Static Switch and Manual Bypass Switch shall be provided. The type and other details shall be subject to PMC approval.

vi. Chargers:

The chargers shall be self-regulating, solid state silicon controlled, full-wave rectifier type designed for single and parallel operation with battery and shall have automatic voltage regulators for close voltage stability even when AC supply voltage fluctuates, effective current limiting features and filters to minimize harmonics. The charger should be capable to fully charge the required batteries as well as supply the full rated load through inverter. Furthermore the charger should be able to re-charge the fully discharged battery within 8 hours. The charger output regulation shall be $\pm 1\%$ from no load to full load with an input power supply variation of $\pm 10\%$ in voltage and $\pm 5\%$ in frequency. In addition to indications/display on charger panel, alarms along with relevant analog measurements shall also be provided by employing RS 485 Port Modbus Protocol / Ethernet TCP/IP protocol for use in solar SCADA. The list of alarm output & 4-20 mA signals shall be as approved by PMC during detailed engineering.

The charger shall be current limited for charger circuit protection and protection of battery from overcharge shall also be provided. The current limit shall be continuously adjustable. The chargers shall have a slow walk in circuit which shall prevent application of full load DC current in less than 10 seconds after AC power is energised.

The chargers shall be fed from 300V-400V AC, 50 HZ, 3 phase, 3 wire system. Charger design shall ensure that there is no component failure due to fluctuations of input supply or loss of supply and restoration.

The minimum full load efficiency at nominal input and output shall be 90% The ripple content shall be limited to $\pm 2\%$ of Charger output voltage. The UPS battery shall have sufficient amp-hour capacity to supply the steady state KVA rating of the UPS specified for 120 minute, irrespective of the actual load on UPS.

The UPS system shall be capable of operating without D.C. battery in circuit under all conditions of load and the performance of various components of UPS like inverter, charger, static switch etc. shall be guaranteed without the battery in circuit.

The UPS system design shall ensure that in case of failure of mains input power supply to one of the chargers, the other charger whose mains input power supply is healthy, shall feed to one or both the inverters as the case may be as per manufacturer's standard practice & continue to charge the

D.C. battery at all load conditions. The Bidder should note that this situation should not in any way lead to the discharge of the D.C. Battery.

vii. Batteries

Contractor has the option of supplying either Nickel Cadmium type batteries or VRLA type sealed batteries. The detailed specification for the batteries has been mentioned elsewhere in this specification. Battery with charger for DC load of Switchgear and for UPS at Main pooling Switchgear shall be Separate/ independent. However, at Inverters rooms/Sub pooling switchgears, proposal for using common battery for UPS and Switchgear DC load shall be subject to approval during detail engineering. For sizing calculation, an aging factor of 0.8 and a temperature correction factor as per manufacturer's standard at 4°C electrolyte temperature (Based on temperature characteristics curve to be submitted by the Contractor at a temperature of 4°C), Capacity factor, float correction (if applicable) shall be taken into consideration. The sizing of the battery shall be as approved by PMC during detailed engineering. The Contractor shall typically consider a voltage drop of 4V from battery room to the inverter input while sizing the battery for UPS System.

16. WEATHER MONITORING SYSTEM (WMS)

- i. As a part of weather monitoring station, Bidder shall provide following measuring instruments with all necessary software & hardware required to integrate with SCADA so as to enable availability of data in SCADA. Twice a year the output of WMS shall be calibrated for accuracy.
- ii. **PYRANOMETER**

Contractor shall provide minimum 02 numbers of pyranometer for measuring incident global solar radiation. One of them shall be placed on horizontal surface and the other on adjustable inclined plane. The specification for pyranometers shall be as follows:

Sr. No.	Details	Values
1.	Spectral Response.	0.31 to 2.8 micron
2.	Sensitivity	Min 7 micro-volt/w/m ²
3.	Time response (95%)	Max 15 s
4.	Non linearity	±0.5%
5.	Temperature Response	±2%
6.	Tilt error	< ±0.5%.
7.	Zero offset thermal radiation	±7 w/m ²
8.	Zero offset temperature change	±2 w/m ²
9.	Operating temperature range	0 deg to +80 deg.
10.	Uncertainty (95% confidence Level)	Hourly-Max-3%, Daily-Max-2%
11.	Non stability	Max ±0.8%
12.	Resolution	Min + / -1 W/m ²
13.	Input Power for Instrument & Peripherals	230 Vac
14.	Output Signal	Analogue form which is compatible with the data

Each instrument shall be supplied with necessary cables. Calibration certificate with calibration traceability to World Radiation Reference (WRR) or World Radiation Centre (WRC) shall be furnished along with the equipment. The signal cable length shall not exceed 20m. Bidder shall provide Instrument manual in hard and soft form

iii. **THERMOMETER**

Contractor shall provide minimum two thermometers (one for ambient temperature measurement with shielding case and other for module temperature measurement). The thermometers shall be RTD / semiconductor type measuring instrument. Instrument shall have a range of 0°C to 80°C. The instrument shall have valid calibration certificate.

iv. **ANEMOMETER**

Contractor shall provide minimum one no. anemometer with Ultrasonic Type

Sr. No.	Details	Values
1.	Velocity range with accuracy limit	± 0.11 m/s upto 10.1 m/s ± 1.1 % of true when more than 10.1 m/s
2.	Wind direction range with accuracy limit	0 to 360 deg with accuracy ± 5 deg

i. **Data logger:**

Data logger shall be kept inside IP65 enclosure near/on WMS pole. Necessary cooling/heat resistant arrangement provided. Should have TCP/IP communication port and FTP transfer options. It should have inbuilt storage capacity of 2 years data minimum

All the instruments shall have valid calibration certificate.

17. CCTV

- i. IP PTZ type CCTV cameras not less than 28X shall be fixed in installed in following location
 1. Focusing Main Entrance
 2. Focusing Inverter and Transformer yard
 3. Focusing Main Control & Switchgear room
 4. Inside Control room and Switchgear room (indoor type)
 5. In Plant area- minimum 10 nos to cover entire plant area.
- ii. CCTV Cameras shall be rotatable in Pan 360° continuous /controlled rotation; Tilt of 0° to 90° with stand -35°C to 60°C.
- iii. The protection grade shall be IP66, light proof, surge proof, weather proof, wave proof.

iv. **Camera Specification (Outdoor):**

1/3" CMOS HD sensor, Out Door Bullet H.264 Compression, 2 mega Pixels CMOS, 3DNR, The highest resolution can be up to 1920 × 1080 Low Lux, DWDR, Support Voice talk, 1CH Audio in/1CH Audio Out, Mobile P2P Viewing, Support Protocol: TCP, UDP, IP, HTTP, FTP, SMTP, DHCP, DNS, ARP, ICMP, POP3, NTP and RTSP, Support

ONVIF 2.0, Lens : 2.8-12mm Megapixel lens (4-9mm lens optional), IR Distance: 20-30m, POE (802.3af). Support ROI function, Built-in Micro SD/SDHC/SDXC card slot, Video Bit Rate 32 Kbps –8 Mbps, Audio Compression G.711/G.722.1/G.726/MP2L2, Dual Stream, BLC, ROI STANDARD: ONVIF, PSIA, CGI, ISAPI, Operating Conditions - 35°C to 60°C.

Camera Specification (Indoor):

1/3" CMOS HD sensor, Indoor Dome fix Lens H.264 Compression, 1.3 mega Pixels CMOS, 3DNR, The highest resolution can be up to 1280×960, Shutter Speed: 1/3 s to 1/100,000s, Min. Illumination: 0.01Lux @ (F1.2, AGC ON), 0 Lux with IR 0.028 Lux @ (F2.0, AGC ON), 0 Lux with IR, Video Bit Rate 32 Kbps – 8 Mbps, Support Protocol: TCP, UDP, IP, HTTP, FTP, SMTP, DHCP, DNS, ARP, ICMP, POP3, NTP and RTSP, Support ONVIF 2.0, Lens : 3.6mm 1.3Mega Pixel Lens SD, 3DNR, D-WDR, Motion Detection, Privacy Mask, 24pcs LED, 20m IR distance, POE(802.3af), Support Dual stream, Impact protection : IK10, operating condition, Support ROI, BLC, Standard : ONVIF, PSIA, CGI, ISAPI, Image Settings: Rotate mode, Saturation, Brightness, Contrast adjustable by client software or web browser, H.264 Type: Baseline Profile / Main Profile.

- v. CCTV shall have separate monitoring system with 35 days recording and shall be able to monitor from remote location through internet.

18. SCADA AND REMOTE MONITORING SYSTEM

- i. The plant shall be automatically operated and shall be controlled by microprocessor based control system SCADA and should be Open Platform Communications (OPC) compliant. There shall be simultaneous data logging, recording and display system for continuous monitoring of data for different parameters of different sub systems, power supply of the power plant at DC side and AC side.
- ii. An integrated SCADA shall be supplied which should be capable of communicating with all Inverters and provide information of the entire Solar PV Grid interactive power plant.
- iii. Computer-aided data acquisition unit shall be a separate & individual system comprising of different transducers to read the different variable parameters, A/D converter, multiplexer, de multiplexer, interfacing hardware & software, which will be robust & rugged suitable to operate in the control room Environment.
- iv. Reliable sensors for solar insolation, temperature, and other weather and electrical parameters are to be supplied with the data logger unit.
- v. All data shall be recorded chronologically date wise. The data file should be MS Excel compatible. The data logger shall have internal reliable battery backup and data storage capacity to record all sorts of data simultaneously round the clock. All data shall be stored in a common work sheet chronologically and representation of monitored data shall be in graphics mode or in tabulation form. All instantaneous data can be shown in the Computer Screen.
- vi. SCADA shall measure and continuously record electrical parameters of following equipments with time interval of 5-15 minute.
 - 1. Energy export to grid
 - 2. String Monitoring Unit
 - 3. Inverter level parameters
 - 4. Parameters at LV terminal (800V)
 - 5. Power characteristics of HT side

6. Ambient temperature near array field
 7. Module surface temperature
 8. Wind Speed and direction
 9. Solar irradiation/isolation
 10. UPS, Battery Charger
 11. Fire Detection & Alarm system.
 12. Any other parameter considered necessary by supplier based on current prudent practice
- vii. SCADA shall provide 15 minute daily, monthly and annual average of following parameters:
 1. Exported Energy to grid
 2. Energy, DC and AC voltage, power and pf of each Inverter
 3. Solar Radiation
 4. Temperature (ambient and module surface)
 - viii. All data shall be recorded chronologically date wise. The data file should be MS Excel compatible. The data logger shall have internal reliable battery backup and data storage capacity to record all sorts of data simultaneously round the clock. All data shall be stored in a common work sheet chronologically. Representation of monitored data should be in graphics mode or in tabulation form. All instantaneous data should be shown in the Computer Screen.
 - ix. All the HT breakers signals from numerical relay shall be communicated to SCADA through IEC 61850 communication protocol. LV switchgear MFM readings shall be configured in the SCADA system.
 - x. All the nodes connected to SCADA shall have the time synchronization through GPS clock.
 - xi. SCADA shall have feature to be integrated with the local system as well remotely using a GSM /WIFI modem. The Contractor shall provide compatible software and hardware so that data can be transmitted via modem with 100% redundancy for the communication part. If there is any limitation in GPRS communication at project site, Contractor shall provide VSAT system for communication along with necessary license.
 - xii. The COMPUTER (Engineering & Operator Station) shall be of Industrial type, rugged & robust in nature to operate in a hostile environment. The SYSTEM shall have minimum Intel Core i7 processor having 1TB SDD with 32 GB RAM. 32" LED HD Colour monitor (for engineering station), DVD Drive with Writer, USB drive, wireless optical Mouse & key board, along with necessary licensed operating software, anti-virus software and necessary applications. The computer supplied with above specification will be limited to 1 Nos of Quantity. The same shall be kept as a dedicated system for Plant Monitoring in the Control Room. The printer shall be supplied and equipped for printing, scanning, and copying in A4 size only.
 - xiii. The Contractor shall provide complete plant SCADA (Software based) with SCADA server having string level monitoring capabilities over remote server. Contractor shall lay the cable in appropriate cable trench, connect with suitable connectors and terminate to the SCADA server inside control room.
 - xiv. The Contractor shall provide necessary provision of RTU for communication with SLDC. The Contractor shall periodically submit the required Technical Data Sheet for String RTU, TCP String, Central RTU etc., in the prescribed format defined from time to time.
 - xv. All the SCADA system shall be compatible to the requirements for continuous & uninterrupted monitoring and reporting the performance-ratio and all other parameters of the power plant.

- xvi. The Contractor shall provide all administrative rights/ privileges/passwords of the SCADA system to the BAMUL.
- xvii. The contractor shall submit the data sheet with screenshots views for finalization of the SCADA screens to BAMUL/PMC for approval.

19. ILLUMINATION SYSTEM

- i. This specification covers design of Array yard and IDT Yard, street light using 18W/20W LED luminaires, tubular poles (from main gate up to the control room/switchyard gate and periphery wall of the plant) distribution pillar boxes, PVC cables, conduit steel trays etc. which shall be supplied by the contractor for installation of luminaires, their control gear and wiring on them. The bidder will also design, supply and install lighting fixtures and accessories based on LED for equipment room and control room building and entry points/ gates.
- ii. All LED luminaires shall be supplied with proper diffuser to avoid direct visibility of LED with proposer thermal management for longer life. Renowned brands available in the market need to be used.

iii. Lighting Levels:

- 1. The average LUX level of 10 lm is to be maintained in switchyard. However, a lux level of 20 lm (10+10) additional switchable on requirement only) is to be maintained in switchyard on transformer.
- 2. Lighting in other areas such as control room, office rooms and battery room & other areas(i.e. street light) shall be such that the average LUX level to be maintained shall be as under:

Area	LUX
Control Room and equipment rooms	500
Office	400
Battery & other rooms	150
Other areas including periphery wall	10
Transformer yard	20
H Pole and metering point	10
Security and Warehouse	20

iv. Emergency Light Points:

- 1. Light points using LED lamps of 15-20 W (at 240 V) shall also be provided as given below:

Control room	2 Nos.
Switchgear room	2 Nos.
Battery room	1 Nos.
Office	2 Nos.
Corridor	1 Nos.
- 2. These lights shall be powered from UPS and have atleast 3 hours backup
- 3. Separate wiring and distribution board shall be provided from these lights.
- 4. The lighting level shall take into account appropriate light output ratio of luminaires, coefficient of utilization maintenance factor (of 0.7 or less) to take into account deterioration with time and dust deposition.

v. Additional information:

- 1. The LED luminaire housing, heat sink, pole mounting bracket, individual LED reflectors and front heat resistant tempered glass should be provided.

2. The LED luminaire housing should be made of non-corrosive high pressure die cast aluminium and the housing should be power coated grey, so as to ensure good weatherability.
3. Each individual LED source should be provided with a asymmetrical distribution high reflectance aluminized reflector, which should ensure that the light distribution of the luminaire is suitable for road lighting applications (wide beam distribution) and should ensure high pole to pole spacing.
4. The luminaire should be provided with in built power unit and electronic driver. The luminaire should be so constructed to ensure that the gear and LED modules are replaceable, if required.
5. The luminaire should be suitable for both standard street light poles with a typical pole diameter of 50 mm – 60 mm and should be suitable for both side entry and bottom entry (post top).

vi. Area & Periphery Lighting:

1. Switchyard lighting shall be as per the relevant IS standards
2. Area lighting arrangement at strategic locations shall be made to illuminate the periphery, roads of site at an appropriate lux level for night hours or bad light hours
3. The area lighting shall be through standalone Solar street light with 2 days power autonomy
4. The lighting fixtures shall be of LED type of minimum 18W.
5. All the yard lighting towers and lighting fixtures shall be effectively grounded using adequate size of GI earthing wires / GI earthing strips.
6. Loop in – Loop out power cables shall be brought up to the junction box through of adequate size for cable protection.
7. The cables shall be properly glanded to the junction box gland plate.
8. XLPE / PVC insulated armoured CU/Al cables of adequate size shall be used for interconnection and supply of power to Yard lighting systems.
9. Cable terminations shall be made with suitable cable lugs & sockets etc. crimped properly and passed through brass compression type cable glands at the entry & exit point of the connector box and at the entry point to MCB distribution Box for controlling the yard lighting system.
10. The height of the area lighting poles & Periphery Lighting poles shall be atleast 3.0Mtr from ground.

20. EARTHING & LIGHTNING PROTECTION

EARTHING:

- i. Soil resistivity test shall be carried to at least in five (5) location across the project site for designing the Earthing system.
- ii. Earth Grid resistivity shall be maintained less than 1 Ohm. And for every 100mtrs minimum one number of earth pit shall be provided. Separate Earthing grid shall be provided for AC & DC system and Lightning system. For instruments separate earth pits shall be provided.
- iii. For Switchyard necessary earth mat shall be provided as per IS 3043.
- iv. Earth strips shall be galvanized with minimum thickness of 80microns.
- v. The photovoltaic modules, BOS and other components of power plant requires adequate earthing for protecting against any serious faults as guided by IEC 60364.
- vi. The earthing system shall be designed with consideration of the earth resistivity of the project area. The earth resistivity values shall be measured prior to designing the earthing system. Unless otherwise specified, earthing system shall be in accordance

with IS: 3043 and IEEE 80, Indian Electricity Rules, Codes of practice and regulations existing in the location where the system is being installed.

- vii. The permissible system fault power level at all the voltage shall be kept in consideration while designing the earthing system. Each array structure of the PV yard, LT power system, earthing grid for switchyard, all electrical equipment, control room, PCU, All junction boxes, ACDB & DCDB all motors and pumps etc. shall be grounded properly as per IS 3043 - 1987. All metal casing / shielding of the plant shall be thoroughly grounded in accordance with Indian electricity act / IE Rules.
- viii. The earthing for array and LT power system shall be made of 3 meter long 16 mm² Copper rod with chemical compound filled, double walled earthing electrodes including accessories, and providing masonry/ precast enclosure with cast iron cover plate/ Precast, chemical compound mix as required as per provisions of IS: 3043.
- ix. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.
- x. Each string/ array and MMS of the plant shall be grounded properly. The array structures are to be connected to earth pits as per IS standards. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.
- xi. The complete earthing system shall be mechanically & electrically connected to provide independent return to earth.
- xii. In compliance to Rule 11 and 61 of Indian Electricity Rules, 1956 (as amended up to date), all non-current carrying metal parts shall be earthed with two separate and distinct earth continuity conductors to an efficient earth electrode.
- xiii. The Contractor should submit the earthing system design calculations along with the system layout for the PMC approval prior to the installation of the system
- xiv. Unless otherwise specified, the earthing system primary and secondary grid conductors, equipment connections shall be constructed with galvanized iron flat. However the earthing of transformer neutrals, PLC & inverter terminals and electronic earthing shall be provided using copper earthing conductor only.

LIGHTENING PROTECTION:

- xv. The source of over voltage can be lightning or other atmospheric disturbance. Main aim of over voltage protection is to reduce the over voltage to a tolerable level before it reaches the PV or other sub-system components as per IEC 60099 / IS: 2309 – 1989 (Reaffirmed – 2005), Edition 3.1 (2006-01). Lightning Protection System required for Solar PV Plant, Inverter Room, and Substation Structure & Control Room within the EPC scope of work. The intent of specification can be conventional as per IS : 2309 or can be Early Streamer Emission Type depending upon Area, Protected Equipment & Technical feasibility. Necessary concrete foundation for holding the lightning conductor in position to be made after giving due consideration to shadow on PV array, maximum wind speed and maintenance requirement at site in future. We recommended going with Early Stream Emission Air Terminal Technology as per NFC 17-102 / IEC 62305-2. Level of Protection must be defining as per Rolling Sphere Method LPL-I, LPL-II, LPL-III & LPL-IV where the radius shall be of 20mtr, 30mtr, 45mtr & 60mtr respectively.
- xvi. $R_p(h)$: Protection radius at a given height (h) $R_p(h) = \sqrt{2rh - h^2 + \Delta(2r + \Delta)}$ (for $h \geq 5$ m) For $h < 5$ m, refer to the table below h : Height of the OPR tip above the surface(s) to be protected $r(m)$: Standardized striking distance $\Delta(m) = 106 \cdot \Delta T$ (OPR efficiency)

- xvii. The lightning conductor shall be earthed through flats and connected to the earth mats as per applicable Indian Standards with earth pits. Each lightning conductor shall be fitted with individual LA counter and earth pit as per required Standards including accessories, and providing masonry enclosure with cast iron cover plate having locking arrangement, chemical compound as per provisions of IS.
- xviii. If necessary more numbers of lightning conductors may be provided as per design calculation
- xix. The Contractor shall submit the drawings and detailed specifications of the PV array lightning protection equipment.
- xx. The design, manufacture, inspection, testing and performance of Lightning Arrester shall comply with all currently applicable statutes, safety codes, provision of latest Indian Electricity Act, Indian Electricity Rules and Regulations of Statutory Authorities.
- xxi. Contractor shall provide dedicated two earth pits for Lightning Arrestor as per relevant IS standard.

21. FIRE FIGHTING & PROTECTION SYSTEM

- i. The installation shall meet all applicable statutory requirements, safety regulations in terms of fire protection.
- ii. Liquefied CO₂ fire extinguisher shall be upright type of capacity 9 kg having IS: 2171. 7 IS: 10658 marked. The fire extinguisher shall be suitable for fighting fire of Oils, Solvents, Gases, Paints, Varnishes, Electrical Wiring, Live Machinery Fires, and All Flammable Liquid & Gas. Bidder shall provide portable fire extinguisher as per the recommendation by relevant fire safety authority.
- iii. The minimum 2 no. of fire extinguishers (CO₂ and Foam type each) shall be provided at every building. Sand bucket should be wall mounted made from at least 24 SWG sheet with bracket fixing on wall conforming to IS 2546.

22. CIVIL

- i. Detailed Contour Survey & Soil Investigation of the Site: The turnkey contractor shall be responsible for detailed soil investigation and contour survey at required locations for the purposes of foundation design and other design/planning required for the successful completion of the project. The contractor must submit the detailed soil investigation report, bore log records, ERT reports and contour survey to BAMUL/PMC.
- ii. Topographical survey: Topographical survey shall have to be done by the Selected Bidder of the proposed site at 5 m interval with the help of Total Station or any other suitable standard method of survey. All necessary Reduced Levels (RL) as entered in the Field Book have to be submitted along with pre contour layout of the total site. The formation levels of the proposed power plant have to be fixed with reference to High Flood Level of the proposed site. The ground level and plinth level of structures shall be fixed taking into consideration the highest flood level and surrounding ground profiles.
- iii. Soil Tests: The Contractor is advised to and is solely responsible to carry out detailed Geotechnical investigation to ascertain soil parameters of the proposed site for the use of planning / designing / construction / providing guarantee / warranty of all civil work including but not limited to foundations / piling for module mounting structures, HT lines, etc. The Contractor shall carry out soil investigation through any Govt. approved / certified soil consultant. These reports shall be furnished to the PMC prior to commencing work. All RCC works shall be provided of required grade of concrete

as per relevant IS specifications as well as soil data considering appropriate earthquake seismic zone, wind velocity, whether effect, soil characteristics etc.

- iv. Soil Investigations: The scope of soil investigation covers execution of complete soil exploration including boring, drilling, collection of undisturbed soil sample where possible, otherwise disturbed soil samples, conducting laboratory test of samples to find out the various parameters mainly related to load bearing capacity, ground water level, settlement, and soil condition and submission of detail reports along with recommendation regarding suitable type of foundations for each bore hole along with recommendation for soil improvement where necessary.
- v. Other investigations: Selected Bidder shall obtain and study earthquake and wind velocity data for design of module mounting structure, and considering all parameters related to the weathers conditions like Temperature, humidity, flood, rainfall, ambient air etc.
- vi. The Selected Bidder shall carry out Shadow Analysis at the site and accordingly design strings and arrays layout considering optimal use of space, material and man-power and submit all the details / design to BAMUL/PMC for its review / suggestions / approval.
- vii. Land Development for site activities: The turnkey contractor is responsible for making the site ready and easily approachable by clearing of bushes, felling of trees (if required with appropriate approval from concerned authority), levelling of ground (wherever required) etc. for commencing the project. It is to ensure that land must be graded and levelled properly for the flow of water. It is advisable to follow the natural flow of water at the ground. If the land pocket needs any filling of sand, it is to ensure that the filled earth must be well compacted as per the relevant IS standards. In case the filled earth is brought out from outside the plant, the contractor shall provide the necessary challans. On the other hand, additional earth, if any, must be disposed of properly. Bidder shall take reasonable care to ensure that the plant is aesthetically designed.
- viii. **Foundations:**
The contractor is responsible for the detailed soil investigation and subsequent foundation design of the structures in the plant. The foundation of the module mounting structures, buildings and other important structures must be approved by BAMUL/PMC prior to construction. The contractor must provide the detailed design and calculations of the foundation.
The foundations should be designed considering the weight and distribution of the structure and assembly, and a maximum wind speed of 150 km per hour. Seismic factors for the site have to be considered while making the design of the foundation. Selected Bidder shall also plan for transport and storage of materials at site.
- ix. **Switch yard civil works:**
Switchyard civil work includes step up transformer plinth, HT Switchgear kiosk plinth, 11kV Metering Panel Plinth, two pole 4 pole structure foundation, earth pits, metal spreading curb wall in and around switchyard and fencing. The transformer/ HT switchgear kiosk/11kV Metering Cubicle plinth shall be made of brickwork or Random Rubble masonry conforming to relevant standards. The height of transformer / HT Switchgear kiosk plinth shall be decided based on 11/33kV ground clearance. Earth pit construction shall be of brickwork covered with RCC (1:2:4) slabs. Switchyard/ double pole area must be surrounded by chain link fencing with pre-cast RCC post/ galvanized MS angle of suitable size with double leaf gate will be provided. Area enclosed within this perimeter must be filled with gravel.

x. **Buildings:**

Buildings are required to be constructed for housing the electrical equipment/ panel and central control room with office cum store building for the operation & maintenance of Solar Photovoltaic Power Plant. The building shall be constructed with conventional RCC framed structure with brick partition walls. Equipment room shall be designed as per the OEM recommendations to ensure desired life of equipment. Dimension of buildings in SPP shall be as per the engineering and drawings approved by BAMUL/PMC.

- a) Inverter Canopy casting shall be minimum for the 400 Mtr below the finished ground level (FGL).
- b) Control Room shall be near the Transformer Yard and facing towards the Solar Power Plant.
- c) All LT panels & HT panels shall be placed in the ground floor with cable entry in the bottom through trenches.

Contractor shall furnish the drawing of the proposed buildings to the BAMUL/PMC for approval, prior to construction.

- xi. Security rooms at main gate shall be of porta cabin type of size atleast 75sqft. Necessary lighting to considered inside and outside the cabin.
- xii. RCC Works: All RCC works shall be as per IS 456 and the materials used viz. Cement, reinforcement steel etc. shall be as per relevant standards.
- xiii. Brick Works: Brick works in cement mortar (CM) 1:6 for 9" thick and 4½" thick wall respectively. All brick works shall be using 1st class bricks of approved quality as per IS 3102.
- xiv. Doors & Windows: Control Room doors shall be solid wood type of minimum thickness 1.5 inches. Other Steel framed doors, Windows and ventilators shall conform to IS – 1081 with necessary glass panels including of all fixtures and painting etc. complete. Doors and windows shall be made of aluminium sections. All sections shall be 20 microns anodized. Sections of door frame and window frame shall be adopted as per industrial standards. Door shutters shall be made of aluminium sections and combination of compact sheet and clear float/ wired glass. The control room shall require a number of windows/ louvers to provide ventilation/ fresh air circulations. Control doors shall be of aluminium with glass partition on the top.
- xv. Plastering: Plastering in cement mortar 1:5, 1:6 and 1:3 shall be applied to all internal, external walls and ceiling of slab respectively as per IS 1542.
- xvi. Flooring: Flooring for stores shall be of cement flooring in concrete mix 1:2:4 using 10 mm aggregates as per IS 2571. Flooring for control building, equipment room and other places, if needed, shall be of vitrified tiles 8 mm. For toilet area, the floor shall be of ceramic tiles 8 mm thicknesses. The floor finishing must include skirting up to a suitable height. The wall tiles, if proposed, shall be glazed tiles of 6 mm thickness and provided up to lintel level.
- xvii. Roofing: The roof of the building shall be insulated and waterproofing shall be done as per relevant IS standard.
- xviii. Plinth Protection: Plinth protection minimum 1000mm wide shall be provided around all the buildings. PCC thickness shall be a minimum of 75mm
- xix. White washing & colour washing.

White washing and colour washing work shall be conforming to IS 6278.

- 1. Internal walls - Acrylic distempering as per IS 427.

2. External walls – Heat reflective synthetic enamel as per IS 428.
 3. For cement painting IS 5410 shall be followed.
 4. For painting of steel doors, ventilators IS 2338, IS 1477 (Part I & II) shall be followed.
- xx. Rolling Shutters: Rolling shutters made of cold rolled strips shall conforming to IS 4030 with approved gauge thickness shall be provided with all fixtures, accessories, painting all etc. complete.
 - xxi. Water supply: CPVC pipes shall be used for all water supply and plumbing works.
 - xxii. Plumbing and Sanitary: Sanitary fittings, which include water closet (EWC/IWC), wash basins, sink, urinal fitting including flushing tank, and necessary plumbing lines shall be provided for office cum stores building and Security house. All the sanitary fittings shall be Parry ware/Jaguar make only.
 - xxiii. Electrification of Building: Electrification of buildings shall be carried out as per IS 732 and other relevant standards. The lighting design of the buildings shall be carried out as per IS 3646. The building shall be provided with adequate quantity of light fittings, 5A/ 15A 1 phase sockets, fans etc., controlled by required ratings of MCBs and MCB, DBs. Supervisor room must be fitted with suitably sized HVAC system. It is encouraged that bidder shall use the latest energy efficient equipment for the electrification and illumination.
 - xxiv. Toilet: Toilet shall be designed and constructed with following finish
 1. Floor:Vitrifiedtiles/ceramic tiles
 2. Door window: made out of aluminium sections, 6mm float glass
 3. Ventilators: Mechanical exhaust facility
 4. Plumbing fixtures: Repute make
 5. Sanitary ware: Repute make
 6. EWC: 390 mm high with health facet, toilet paper roll holder and all fittings
 7. Urinal (430 x 260 x 350 mm size) with all fittings.
 8. Wash basin (550 x 400 mm) with all fittings.
 9. Bathroom mirror (600 x 450 x 6 mm thick) hard board backing
 10. CP brass towel rail (600 x 20 mm) with C.P. brass brackets
 11. Soap holder and liquid soap dispenser.
 12. Overhead water tank equivalent of 1000 litre capacity
 13. Water Heater – 1 no in each toilet of Reputed make like Venus/ Racold / Bajaj / Crompton greaves / AO Smith
 - xxv. Drainage for Toilets: Drainage pipes shall be of PVC (6 kg/cm²). Gully trap, inspection chambers, septic tank for 15 person and soak well to be constructed for abovementioned requirement.
 - xxvi. Air Conditioner: All the rooms inside the control room shall be equipped with appropriate tonnage of Air conditioners. Rest of the numbers, required nos of fans shall be provided.

Make: LG/Hitachi/Daiken/Any Reputed Make

- xxvii. Fire Extinguishers: Liquefied CO₂ fire extinguisher shall be upright type of capacity 5 kg having IS: 2171. 7, IS: 10658 marked. The fire extinguisher shall be suitable for fighting fire of Oils, Solvents, Gases, Paints, Varnishes, Electrical Wiring, Live Machinery Fires, and All Flammable Liquid & Gas.

- xxviii. Sand Bucket: Sand buckets should be wall mounted made from at least 24 SWG sheet with bracket fixing on wall conforming to IS 2546. Bucket stands with four buckets on each stand shall be provided in the Transformer Yard – 4 Nos.
- xxix. Sign Boards: The sign board containing brief description of various components of the power plant as well as the complete power plant in general shall be installed at appropriate locations of the power plant.
1. For Switchyard and Transformer Yard: The Signboards shall be made of steel plate of not less than 3 mm. Letters/Pictures on the board shall be anodised
 2. The Contractor shall provide to the Owner, detailed specifications of the sign boards.
- xxx. Danger Plates:
Size of each Danger Notice plates shall be 200 mm x 150 mm made of mild steel sheet and at least 2 mm thick, and vitreous enamelled white on both sides and with inscription in signalled colours on front side as required. The inscriptions shall be in 3 languages, Kannada, English & Hindi. Letters/Pictures on the board shall be anodised.
- xxxi. Name Boards:

Owner Name and logo board, to the width of the Gate/entrance road shall be kept over the Entrance gate. The script in the board shall be in 3 languages, Kannada, English & Hindi.

23. OTHER NON-ELECTRICAL WORK:

- i. Module Mounting Structure (MMS):
 1. The Contractor shall design, fabricate, supply and install module mounting structures with all required accessories like clamps, nuts, bolts, cable ties etc.
 2. Module inclination angle shall be decided based on the site coordinates considering the best generation angle for that location. Upon finalization of the inclination angle, Contractor shall ensure the tolerance of the Module inclination angle of the tables shall be within $\pm 1^\circ$ from the finalised angle. However within every single array table there shall not be any variation in the module inclination angle. Contractor shall ensure the inclination angle is maintained till the end of the CMC period.
 3. Contractor MMS design shall ensure that there is no shadow in the modules between 7.00am to 5.00pm throughout the year.
 4. Mounting structures shall be designed to withstand the extreme weather conditions in the area. Design wind speed factors as per IS875 Part-III and minimum consideration of wind speed shall be of 160km/hr for MMS.
 5. The frames and leg assemblies of the array structures shall be made of hot dip Galvanized steel per ASTM A123 and minimum thickness of 80microns.
 6. The design and the calculations for the MMS and the foundation system shall be submitted for prior approval of BAMUL/PMC before commencement of construction and shall be based on the soil report
 7. Structure shall be designed and analysed in accordance with finite element method using software (STAAD), with considering Dead load and wind load as per IS: 875 (Part 1 & 3) or as per Wind Tunnel study done from a reputed international facility respectively. Analysis to be done as per appropriate load combinations in IS 800
 8. All fasteners for Module mounting, Structural assembly shall be of Austenitic Stainless Steel Grade- SS304/UNS S 20430. They must have acid resistant, anti-

seize & protective corrosion resistant finish for better durability considering the adverse climate conditions on site, two numbers of anti-theft fasteners of stainless steel on two diagonally opposite corners for each solar module shall also be provided. Flange Bolt & Flange Nut system should be used for effective installation to avoid human error

9. The structure shall be designed to allow easy replacement of any module and shall be in line with the site requirements. However, two numbers of anti-theft bolts to be provided for every module.
 10. The support structure design & foundation shall be designed with reference to the existing soil conditions in order to withstand wind speed applicable for the zone (Site Location) or 160 kmph, whichever is higher, using relevant Indian wind load codes. The bidder shall furnish test certificate from the competent authority for the same. The structures and foundations shall also conform to the seismic conditions pertaining to the zone using relevant Standards and codes.
 11. The Bidder should design the structure height considering highest flood level at the site. The minimum clearance between the lower edge of the module and the ground shall be the above highest flood level at the site or 500 mm whichever is higher.
 12. Cables should run through from Pipes and Cable-ties shall be used to hold and guide the cables/wires from the modules to junction boxes. All the cables were aesthetically tied to module mounting structure.
 13. Steel shall be procured from reputed manufacturers & the test certificate for the steel materials shall be submitted to OWNER/BAMUL for approval.
- ii. Foundations: The Contractor shall design and construct appropriate civil foundations for MMS, prefabricated structures/RCC, transformers, switchyard equipment, feeder bay etc. Grade of reinforced cement concrete shall be M25 with minimum 350kg of cement. Contractor has to submit mix design for reinforced cement concrete along with admixture. Contractor has submit batch report of each concrete batch. All necessary test related to materials of concrete mix like cement, sand, aggregates etc shall be carried out regularly as per relevant IS code. Test related to concrete cubes like compressive strength, workability etc shall be carried out. If any treatment required for foundation surface for strengthening soil characteristics i.e. application epoxy for protection against soil nature shall be applied based on geo-technical investigation report. Unless otherwise specified all the backfilling i.e. in foundation, plinth, trenches after concrete shall be carried by using fine sand only.
 - iii. PEB Structures: Shall be allowed only for Security cabin at the plant main gate. Security cabin shall be minimum of 50Sqft.
 - iv. Storm Water Drainage System: The Contractor has to design, submit and take approval from the Client/Consultant for storm water of the plant. It shall be designed considering rain fall, catchment area, natural gradient of the plot, outlet of the plot and in a such way that it can be easily drain off rain water and water required for module cleaning by providing sufficient slope and also ensure there is no water stagnant during the monsoon or any season of the year. Storm water drain shall be of earthen excavated.
 - v. Water required for construction shall be in the scope of Contractor. A suitable permanent arrangement of water (Through Bore well & water harvesting) with RO facilities shall be ensured to cater the day-to-day requirement of drinking water and permanent water supply for module cleaning and other needs of SPV power Plant.

- vi. Solar PV Module Cleaning System: Cleaning frequency shall be decided by the Bidder to meet the guaranteed generation but the cleaning cycle shall not exceed more than 15 days per cycle. For this, the Contractor shall construct and operate Overhead water tank of capacity 2 X 20 Kilolitres. Water tank shall have silting chamber for filtration of the water before the inlet which will match with invert level of Storm water drain.
- vii. Compound wall: The contractor shall provide Pre Cast Compound Wall (with necessary foundation) all around the periphery of the plant. The wall height must be a minimum of 2.5m from NGL. Specification of pre-cast boundary wall shall be as per IS code. The boundary wall must be provided with a rugged main entry gate. The construction of peripheral compound wall and the main entry gate must conform to the relevant IS standards and practice.
- viii. Approach / peripheral / Internal Roads and Pathways: The Contractor shall provide Internal road from main entrance to CR and peripheral roads and internal roads shall be micro levelled and mechanically compacted type WBM road with width 4 mtr.
- ix. Cable Trenches: Construction of RCC cable ducts inside the control rooms, earthen excavated cable trench with alternate layers of sand and brick as per relevant IS from PV arrays to inverter room to control room to switchyard shall be provided by the Contractor
- x. Main Gate: The Contractor shall provide main gate of structural steel and RCC material of appropriate design. Also, necessary arrangement has to be made by Contractor to erect the main gate on pylon stone.
- xi. Plant Safety Equipment: The Contractor shall provide appropriate numbers of foam type fire extinguishers / CO2 extinguishers, sand buckets and transformer discharge rod at Inverter Rooms, Control Room, Security Cabin and Switchyard/Substation. Further, all high voltage places to be provided with danger sign boards with appropriate size and material to last for 25 years.

24. APPROVED VENDOR LIST

Sr. No.	COMPONENT	SUPPLIER
i.	PV Modules	MNRE List from ALMM List 1 & ALMM List II
ii.	Inverter	Solis, Sungrow, TBEA, Wattpower, Sinengany reputed make
iii.	HV & LV Switchgears / Breakers	Siemens, Schneider ABB, L&K authorized system houses
iv.	DC Cables	Havells, Lapp, Siechem, Polycab, Universal, KEI, RPG
v.	MC4 Connectors	Staubli, ELMEX, ELCOM
vi.	AC Cables	Unistar, Nicco, KEI, Polycab, KEC, Havells, Apar
vii.	SCADA Components	Suryalogix, Enerman any reputed make
viii.	Inverter Duty Transformer	ESSANAR, VOLTAMP, KPRS, Kirloskar and any reputed make
ix.	Weather Monitoring System	Kipp and Zonen, MetOne, EKO, Jambhekar, Dynalog, Suryalogix
x.	Lightning Protection System	JEF Techno, PT, VNT, Indelec and any reputed make

Sr. No.	COMPONENT	SUPPLIER
xi.	Power evacuation System, metering Equipments, including Transmission Line	As per KTPCL approved vendor list
xii.	HT / LT cables	Unistar, Nicco, KEI, Polycab, KEC, havells, apar, SBEE
xiii.	CCTV System	Hikvision, CP Plus and any reputed make
xiv.	Lighting System	Bajaj, CGL, Philips and any reputed make
xv.	UPS	Exide, Amaron
Note: Equipment which comes under purview of KPTCL/DISCOM shall be supplied as per the approved vendor list of KPTCL/DISCOM		

25. APPROVAL OF DESIGNS / DRAWINGS

- All designs, specifications, reports, etc. shall be submitted to BAMUL/PMC for approval and upon clearance works shall be executed.
- Any deviation from approved vendor list, prior approval shall be taken from BAMUL/PMC with valid reasons. However the processing time for issuing additional make shall be absorbed within the project execution period, no extension shall be issued on this ground.
- Contractor shall submit in the Bid a comprehensive project management schedule in the form of a Gantt chart CPM/PERT chart and shall be liable for abiding by the schedule.

II. INSPECTION

a) INSPECTION

- BAMUL/PMC shall have free access to contractor manufacturer's works to inspect, expedite and witness shop floor tests. Any materials or work found to be defective or which does not meet the requirements of the specification will be rejected and shall be replaced at Bidder's cost. Owner reserves the right to carry out stage wise inspection of fabrication and components. The Contractor shall furnish a detailed quality assurance plan (QAP) for approval of PMC. The QAP shall contain all the relevant routine test to be conducted as per IS/IEC standards. Type test certificates (obtained within 5 years) for similar design and rating shall be submitted for BAMUL/PMC review.
- The test & inspection shall be carried out at manufacturer's work and at the site with the Contractor obligation. The test and Inspection shall be done in accordance with the relevant standards and the Manufacturer's standard before the delivery to site as well as after the erection and commission at site. The bidders shall give the list of tests that they will carry out at site to show the performance of plant.
- A detailed 'QAP' for Manufacturing and Inspection shall be submitted by the Contractor for BAMUL/PMC approval. The data of each test and inspection shall be recorded and submitted as soon as the test/ trials are conducted and will also be a part of final documentation.

- iv. The shop test shall be carried out to prove the performance parameters of the offered model. The testing shall be done in the presence of the representatives of the department.
- v. The PMC will nominate its representatives (max. of 2 nos.) for inspection for the agreed equipments and contractor shall bear the cost of all conveyance, boarding & lodging for the inspector.
- vi. Manufacturer has to submit procedure for Test carried out at their Factory:
 - 1. Start Up Trials
 - 2. Load Test
 - 3. Records & Measurements
 - 4. Safety Device List
 - 5. Setting values for all sensors for Pressure and Temperature
 - 6. Dimensional Check-up, Overall Inspection, Completeness of Scope of Supply
 - 7. Shop Test/Load Test for Solar Power Plant
- vii. Authorized Test Centers for Test Certificates
The PV modules/ Inverters/ cables and other Balance of system equipment deployed in the solar PV power plant shall have valid test certificates for their qualification as per specified IEC/ IS Standards by one of the NABL Accredited Test Centres in India. In case of module types/ equipment for which such Test facilities may not exist in India, test certificates from reputed ILAC Member body accredited Labs abroad (with proper proof of accreditation) will be acceptable. Random sample modules shall be tested in NABL Accredited Test centres in Karnataka.

b) LOAD TRIALS & RELIABILITY TEST AT SITE

- i. Performance Guarantee Test at Site for Grid Connect Solar Power Plant, HT Panel etc. These tests will be conducted at site as per site conditions at available load and after performing all pre-commissioning check and trials and after readiness of the entire Solar Power Plant system which are required to carry out the load trials.
- ii. All the tests which are mentioned in the load test of Solar Power Plant will be carried out in presence of BAMUL/PMC at project site at site conditions and the parameters checked in accordance with the data sheet and guaranteed parameters given by the Contractor.

c) WARRANTY / GUARANTEES

- i. PV modules used in grid connected solar power plants must be warranted performance for peak output wattage, which should not be less than 98% in first year and 90% at the end of 10 years and 80% at the end of 25 years. Module output currents in all the panels of the string shall be same.
- ii. All PV modules shall be minimum of 530 Wp, can exceed to any capacity of recent DCR compliant technology. However, all the panels shall be supplied with middle support bar / rib support in the rear side.
- iii. The modules shall be warranted for at least 10 years for failures due to material defects and workmanship.
- iv. All other components of the project including mechanical structures, electrical works and overall workmanship shall be warranted for 5 years or actual warranty from the manufacturer, whichever is higher.
- v. The Contractor must ensure that the goods supplied under the Contract are new, unused and of most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.

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

III. INSTALLATION & COMMISSIONING

a) INSTALLATION

i. Tools & Tackles

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

ii. Setting up/Supervision/Labor /Bench Mark

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

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

iv. Contractor's Supervision:

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

v. Workmen:

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

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

- vii. The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the entry of all workmen and personnel to be employed by Contractor on the Site.
- viii. The Contractor shall at all times during the progress of the Contract use its best endeavours to prevent any unlawful, riotous or disorderly conduct or behaviour by or amongst its employees and the workmen of its Sub-contractors.
- ix. The Contractor shall, in all dealings with its workmen and the workmen of its Sub-contractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the employment of workmen.

x. Contractor's Equipment

All equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the Engineer-In-Charge's consent that such Contractor's Equipment is no longer required for the execution of the Contract. Upon successful commissioning and approval from the BAMUL Representatives and Independent Consultant, Contractor can remove excess materials

- xi. Unless otherwise specified in the Contract, upon Completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor to the Site.

xii. Site Regulations and Safety

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

xiii. Site Clearance

Site Clearance in Course of Performance

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

xiv. Site Clearance after Completion

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

xv. Disposal of Scrap

The Contractor shall with the agreement of the Employer promptly remove from the Site

any 'Scrap' generated during Performance of any activities at Site in pursuance of the Contract. The term 'Scrap' shall refer to scrap/waste/remnants arising out of the unpacking of equipment, construction debris, fabrication of structural steel work and piping work at the Project Site in the course of execution of the Contract and shall also include any wastage of cables during the termination process while installing the cables.

- xvi. The ownership of such Scrap and excess material brought to site shall vest with the Contractor except in cases where the items have been issued by the Employer from its stores for their installation only without any adjustment to the Contract Value.
- xvii. The Contractor shall also indemnify to keep the Employer harmless from any act of omission or negligence on the part of the Contractor in following the statutory requirements with regard to removal/disposal of scrap. The Indemnity Bond shall be furnished by the Contractor as per Proforma enclosed as Schedule 3. Further, in case the laws require the Employer to take prior permission of the relevant Authorities before handing over the scrap to the Contractor, the same shall be obtained by the Contractor on behalf of the Employer.
- xviii. Watching and Lighting

The Contractor shall provide and maintain at its own expense all lighting, compound, watch and ward wherever necessary for the proper execution and the protection of the Facilities, or for the safety of the owners and occupiers of adjacent property and for the safety of the public. Standalone Solar street lights (LED type with minimum two days autonomy) to be provided in strategic locations of the boundary wall, peripheral road and internal roads.

b) COMMISSIONING AND COMPLETION OF THE FACILITIES

- i. Contractor shall submit the Commissioning procedure document for PMC review. The Commissioning shall be done as per the approved procedure.
- ii. As soon as installation of the Facilities has, in the opinion of the Contractor, been completed as specified in the Technical Specifications, excluding minor items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify the PMC/OWNER in writing for conducting Pre- Commissioning Test of the Facility in co-ordination with Employer representative.
- iii. As soon as all works in respect of Pre-Commissioning are completed and, in the opinion of the Contractor, the Facilities are ready for Commissioning, the Contractor shall so notify the PMC/OWNER in writing.
- iv. If the PMC notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies, and shall repeat the procedure.
- v. If the PMC is satisfied that the Facilities have reached Completion, the PMC shall, within seven (7) days after receipt of the Contractor's notice, confirm date for the PR guarantee test.
- vi. PR guarantee test shall be done as per the procedure defined in the respective clause. Upon successful PR test, BAMUL will issue a Completion Certificate stating that the Facilities have reached Completion as at the date of the Contractor's notice.
- vii. As soon as possible after Completion, the Contractor shall complete all outstanding minor items so that the Facilities are fully in accordance with the requirements of the

- Contract, failing which the Employer will undertake such completion and deduct the costs thereof from any monies owing to the Contractor.
- viii. Upon Completion and successful demonstration of the PR test, the Contractor shall be responsible for the care and custody of the Facilities, together with the risk of loss or damage thereto, and shall thereafter take over the Facilities or the relevant part thereof for the agreed duration of CMC as stipulated and mutually agreed terms and conditions.

IV. PERFORMANCE MEASUREMENT PROCEDURE

i. PR - PROVISIONAL ACCEPTANCE TEST VERIFICATION PROCEDURE

The Performance ratio test aims at the comparison of the actual PV plant energy production with the guaranteed value for a limited operation time of the PV plant of 7 consecutive days.

- ii. After Commissioning of the Plant and after receiving all the satisfactory results regarding the correct operation of the plant, there will be continuous monitoring of the performance for 7 days. This monitoring will be performed on the site under the supervision of the independent consultant / independent consultant's engineer.
- iii. The final tests to prove the guaranteed performance parameters shall be conducted at site by the Contractor in presence of the Independent consultant. The Contractor's commissioning / start-up Engineer shall make the plant ready to conduct such tests. The Performance Guarantee Tests (PG tests) shall be commenced, within a period of one (1) month after successful Commissioning. Any extension of time beyond the above one (1) month shall be mutually agreed upon. These tests shall be binding on both the parties to the contract to determine compliance of the equipment with the guaranteed performance parameters.
- iv. The test will consist of guaranteeing the correct operation of each plant individually over 7 days, by the way of the efficiency rate (performance ratio) based on the reading of the energy produced and delivered to the grid and the average incident solar radiation.
- v. "The guaranteed annual PR shall not be less than 75% at the plant metering end."**

- vi. The Efficiency or performance ratio (PR) of the PV Plant is calculated as follows (according to IEC 61724)

$$\text{PERFORMANCE RATIO (PR)} = [Y_A / Y_R] * [1 - A * (T_{\text{CELL AVG.}} - T_{\text{CELL}})]$$

Where;

Y_A = Final PV system yield (representing the number of hours that the system would need to operate at its rated output power P_{Nom} to contribute the same energy to the grid as was monitored)

Or

$$Y_A = E_{\text{ac}} / P_{\text{Nom}}$$

Y_R = Reference yield (representing the number of hours during which the solar radiation would need to be at STC irradiance levels in order to contribute the same incident energy as was monitored)

Or

$$Y_R = IR_{\text{Site}} / IR_{\text{STC}}$$

E_{ac} = AC energy injected into the grid during a clearly specified amount of time(kWh)
 P_{Nom} = Installed nominal peak power of modules (Flash test rating at STC) (kWp)
 IR_{Site} = Irradiation on the module plane of array during a clearly specified amount of time (measured with a pyranometer installed on the array plane) (kWh/sq. m)
 IR_{STC} = Irradiance at STC (kW/ sq. m)
 $T_{Cellavg}$ = Irradiance weighted module temperature for the measurement period ($^{\circ}C$)
 T_{Cell} = Predicted Irradiance weighted module temperature taken from PVsyst ($^{\circ}C$)
 α = temperature coefficient of power (negative in sign) corresponds to the installed module ($\%/^{\circ}C$)

Irradiance weighted module temperature ($^{\circ}C$) $T_{Cellavg}$ can be calculated as follows

$$T_{cellavg, period} = \frac{\sum_{period} (I_i \times T_{mod,i})}{\sum_{period} I_i}$$

I_i : actual insolation in POA as measured by the pyranometer for the i th interval

$T_{mod,i}$: actual module temperature as measured by a thermocouple for the i th interval

vii. MONITORING SYSTEM FOR PR VERIFICATION

The following instrumentation will be used to determine the Solar Plant Performance:

1. Power Meter at the delivery point.
2. Power Meter for each Inverter for reference only.
3. One nos. calibrated pyranometer to determine irradiance on the plane of array (with a target measurement uncertainty of ± 2).
4. One nos. calibrated pyranometer to determine irradiance on horizontal plane (with a target measurement uncertainty of ± 2)
5. Two nos. thermocouples to measure module temperature with a measurement uncertainty of $\pm 1^{\circ}C$.
6. Shielded ventilated thermocouple with a measurement accuracy of $\pm 1^{\circ}C$.
7. An anemometer mounted on a 10m mast to measure wind speed (without additional shadowing on modules).

Data measurement shall be witnessed in the format mutually agreed before the start of PR test by the BAMUL team and the Contractor jointly for the said period.

The Contractor shall arrange for Witness to BAMUL for the achieved PR for Operational Acceptance.

V. COMPREHENSIVE MAINTANANCE CONTRACT (CMC) FOR INITIAL 5 YEARS:

The Contractor shall provide experienced, non-expatriate technical support through its personnel during the Term of this contract to perform the Operation and Maintenance of the plant.

The scope of services to be provided by the Contractor during the Operation and Maintenance period shall include, but not limited to, the following:

THE O&M CONTRACTOR SHALL:

1. Deploys and supervise Contractor's own staff in the Operation, Maintenance and Repair of the Facility.
2. Administer and pay Contractor's personnel; and shall comply with the applicable Indian welfare/labour laws relating to conditions of work and wages and rights, hours of work, and occupational health and safety and all other statutory requirements.
3. Ensure the safety of the Facility, and Contractor's staff employed at the Site through the development and observance of an appropriate safety program;
4. Deploy experienced and skilled professionals in the job of Operation and Maintenance of the Facility to ensure efficient operation, however Contractor shall also give adequate training to Owner's staff;
5. The contractor shall depute the following manpower in mandate for Operation and Maintenance
 - Security – 3 Nos (3 Shifts)
 - Senior Technician – 1 Nos
 - Junior Technician – 1 Nos
 - Skilled Labour – 2 Nos
6. Maintain and renew all Clearances/Permits which are required by the Contractor.
7. Co-ordination with competent govt. authority / departments / KPTCL / DISCOMs / SLDC / RLDC for energy accounting etc. and monthly submit generation reports (Form – B, Form C etc.) to the relevant department.
8. Contractor shall obtain all Clearances necessary for Contractor to do business and services in India, including Clearances required for any of its employees, contractors or sub-contractors.
9. Contractor shall, maintain existing procedures necessary to comply with all Directives, including those related to prevention of injury to persons or damage to property at and in connection with the Facility.
10. Contractor shall keep the reasonable and agreed stock of the spares and consumables and procure the same as and when necessary at its cost. Maintain and update Spare Parts lists during the CMC Contract Term / extended Term (if Applicable);
11. Maintain, control, store, inventory, order, receive and stock, as appropriate utilities, Spare Parts, tools, supplies, chemicals, lubricants and other consumables. Contractor has to store all inspected goods in well condition and tag it properly. On requirement, goods can be retrieved within reasonable time.
12. Monitor the quality and quantity of all goods, services and materials.
13. Manage Health, Safety and Environmental aspects, including all fire-fighting equipment.
14. Housekeeping of the entire power plant and facilities is very important and the facilities shall be maintained in immaculate and clean condition.

15. The Contractor shall procure at their own cost staff uniforms, safety equipment, all required Personal Protection Equipment (PPEs) for its personnel and consumables for the Contractor's office and shall utilize in day-to-day Operation and Maintenance without fail.
16. The O&M Contractor shall be responsible for cleaning of the Solar PV Modules and related structures as per agreed time interval. While cleaning the modules, it should not have shadow effect on the modules hence time for periodical cleaning should be decided accordingly.
17. Regular Cleaning of Solar PV Modules should be done with water or manual or any other approved method ensuring the efficient and effective operation of the entire plants / facility and equipment's therein.
18. The O&M Contractor's shall be responsible for the efficient and effective operation of the entire plants / facility and equipment's therein.
19. Use reasonable endeavors to act in accordance with Utility Good Practice with the object to provide reliable energy at the Interconnection Point in consultation with the KPTCL / DISCOM / SLDC.
20. Procure and pay for the required back up electricity and water of required quality and quantity for the O&M of the Facilities.
21. Handle and manage all waste generated in the operation of the Facility, which are to be disposed off at the permitted place.
22. The O&M Contractor to bear all cost pertaining to provisions of safety items, uniform, computer or other office equipment's etc. of their employees and also to bear the facsimile bill including control room facsimile and mobile cellular phone of the control room.
23. The Contractor shall manage and perform maintenance of the Facility in accordance to the maintenance cycle of the Facility and its various components and equipment in accordance to prudent industrial practice.
24. Any abnormalities in facility have to be informed by O&M Contractor to owner by telephone /mobile/ email/sms etc. immediately and in writing within 08 hrs.
25. Predictive, breakdown preventive, routine maintenance and repairs; including periodic overhauls of all equipment;
26. Unplanned major repair and maintenance;
27. Periodic scheduled outages and equipment inspections/ tests (including statutory / otherwise) major maintenance, repairs and overhauls (including procurement specification and requisition). Respective reports shall be given to the Owner.
28. Call any external agencies/additional personnel or OEM personnel for repairing/maintenance of the Facility or the part/equity thereof.
29. Co-ordinate the settings of all protective relays as required by KPTCL / DISCOM;
30. Operate and carry out routine maintenance of metering equipment and carry out all inspections, calibrations, metering and tests as may be required by Utility Good Practice or by the Owner.

31. Prepare and submit to the Owner the Quarterly / Six Monthly and Annual Operating Plans and Long-Term Forward Maintenance Plans;
32. Provide to KPTCL/DISCOM/SLDC and Owner the information related to the electricity generation and status of the plant as may be required.
33. Keep KPTCL/DISCOM/SLDC and Owner informed of the Project's electric generating capacity and of any impairment of its ability to generate electricity.
34. Notify the Owner promptly upon obtaining knowledge of any potential warranty claim;
35. Notify the Owner promptly upon obtaining knowledge of any event which may give rise to a claim under an insurance policy maintained by the Owner or the Contractor and prepare such information as is required relating to Facility operations and costs to submit insurance claims and assist the Owner in submitting and pursuing such claims;
36. Report to the Owner on the activities, generation, events and performance of the Facility as required and reasonable;
37. Participate in meetings as and when requested by the Owner with respect to issues relating to the Operation, Maintenance and Repair of the Facility;
38. Attend meetings with any Competent Authority relating to the Operation, Maintenance and/or Repair of the Facility;
39. Prepare any reports to KPTCL/DISCOM/SLDC/Authority or any government agency.
40. In the event that KPTCL/DISCOM objects to or disputes any invoice or any part thereof, prepare such information as is reasonably requested by the Owner to respond to KPTCL/DISCOM objections or correct any errors or lack of supporting information in any invoice.
41. Ensure compliance with grid code, ABT, Directives etc. as applicable from time to time.
42. O&M Contractor is responsible for communication and co-ordination to third party as suggested by owner.
43. The Contractor shall operate and maintain the Solar PV Power Plant including its associated HT line and all civil structures, Control Room building, Array Yard, Garden etc. for a period of initial 5 years from the date of COD.
44. Operation work includes day to day operation of Solar PV Power Plant including, maintenance of LT lines, HT lines and maintenance of all Civil Works.
45. The Contractor will furnish necessary details regarding technical competence, qualification and number of different grades of personnel to be posted at site along with proposed maintenance (preventive) schedule for a period of 5 years from the date of COD.
46. The maintenance staff of the Contractor shall be available in the Power Plant for 24 hours every day irrespective of whether the plant is in operation or not unless otherwise instructed by the Owner in writing.
47. The Contractor's representatives/employees shall conform to all general regulations in force at site and to any special conditions affecting by local administration issued by Owner. All employees of the Contractor living at site shall be deemed to be

aware of dangers and risks incidental to the conditions of the Owner's land and works from time to time and the Owner shall not be responsible for any injury arising there from.

48. Owner reserves the right to ask the Contractor to remove/transfer any staff of the Contractor from site without assigning any reason whatsoever. Instructions issued in writing to the Contractor in this matter shall be binding and the Contractor shall replace the transferred/removed person with a suitable person immediately.
49. All persons deployed by the Contractor for regular Maintenance & Operation must remain in proper uniform while on duty. The Contractor shall supply uniforms, raincoats, toolset, gloves, gumboots and other items required for carrying out the services.
50. Owner shall have power to disallow any maintenance personnel, if found unsuitable. The Contractor shall have to replace such persons within 24 hours.
51. The Contractor shall maintain attendance register for all their staff deployed for carrying out jobs on regular basis and shall be produced for verification on demand by authorized personal of Owner.
52. The contractor shall ensure that all safety measures are taken at the site to avoid the accidents to his employees or his co-contractor's employees.
53. The contractor shall comply with the provision of all relevant Acts of Central or State Governments including payment of Wages Act 1936, Minimum Wages Act 1948, Employer's Liability Act 1938, Workmen's Compensation Act 1923, Industrial Dispute Act 1947, Maturity Benefit Act 1961, Employees State Insurance Act 1948, Contract Labor (Regulations & Abolishment) Act 1970 or any modification thereof or any other law relating whereto and rules made there under from time to time.
54. In order to ensure longevity, safety of the core equipment and optimum performance of the system the contractor should use only genuine OEM spares of high-quality standards.
55. The Contractor shall immediately report the accidents, if any, to the OWNER / Engineer In charge & to all the concerned authorities as per prevailing laws of the state.
56. The Contractor shall provide his maintenance staff at the power Plant for day-to-day Operation and Maintenance. The maintenance personnel shall be qualified, certified by competent authorities and well trained so that they can handle any type of operational hazards quickly and timely. The responsibility of providing suitable Personal Protection Equipments rests solely with the Contractor.
57. The Contractor shall arrange to provide proper and elaborate O&M training of Solar Power Plant and associated power evacuation arrangement to the Owners staff for successful takeover of the plant in due course of time.
58. The security of the Power Plant will rest with the Contractor, till such time, Operation and Maintenance of the power plant is not handed over to the Owner.
59. The maintenance personnel shall be in a position to check and test all the equipment regularly, so that, preventive maintenance, could be taken well in advance to save any equipment from damage. Abnormal behavior of any equipment shall be brought to the notice of Owner not later than 2 hours for taking appropriate action.

60. All repairing & replacement works are to be completed by the Contractor within 24 hours from the time of occurrence of fault or defect. If it is not possible to set right the equipment within this time, the Contractor shall notify the Owner indicating nature of fault & cause of damage etc. within 12 hours from the time of occurrence of the fault.
61. During Operation and Maintenance if there is any loss or damage to any component of the power plant due to miss-management/ miss-handling or due to any other reasons, what so ever, the Contractor shall be responsible for immediate replacement / rectification of the same. The damaged component may be repaired, if it is understood after examination that after repairing performance of the components shall not be degraded, otherwise the defective components shall have to be replaced by new one without any extra cost to the Owner.
62. Regular Operation and Maintenance of the Solar PV Power Plant including water supply pump, if any, for a period of 5 years after COD and submission of daily performance data of the power plant. The Contractor shall keep a Record Book in this respect clearly indicating date of checking & comments for action etc.
63. The scope of operation includes injecting power to the nearest 11 kV or 33 kV GSS. Proper records of operation of power plant system are to be kept as per direction of Owner.
64. Cleaning of the Power Plant including array yard on regular basis.
65. Normal and preventive maintenance of the Power Plant such as cleaning of module surface, tightening of all electrical connections, Line accessories, Transformers and associated switch gear on the HT side.
66. Keeping & recording daily log sheet as per approved format for the Power Plant to be supplied after COD of the Power Plant.
67. Operation of the Power Plant has to be in accordance with the availability of Solar Energy and feeding to the grid. Under no circumstances, the operator shall run the power plant damaging the substation grid.
68. Contractor's employees shall use no part of the power plant building for residential or any other purpose except for running the plant.
69. The Contractor shall submit monthly performance report of Solar PV Power Plant indicating cumulative energy generation data as per approved format within 15 days of the following month.
70. The Contractor shall preserve all recorded data in either manual or through computer format and shall submit to Owner quarterly.
71. During 5 years maintenance period, the Contractor shall refill the Liquefied CO₂ Extinguisher as per manufacturer's recommendation before expiry.
72. Bidder shall maintain the mandatory spares, consumables & various components of SPV plant for smooth running during O&M period. Bidder shall also replenish the consumed mandatory spares during the O&M period to maintain the stock as mentioned in Bid Proposal Sheet. The bidder shall also mention the source of supply.
73. Cleaning of surface drain, sewerage line, septic tank, drainage outfall, down pipes, soil pipes, water pipe lines.

74. Repairing or replacement whatever necessary, and cleaning of all joineries as and when necessary.
75. Repairing or replacement whatever necessary of door, window fixtures, toilet accessories as and when necessary.
76. Cleaning & maintaining of power plant area.
77. All tit bit repair maintenance in case of building and all other structures as and when required as per instruction of Project Manager/Site-in-Charge.
78. Any O & M work which is not mentioned or included here but necessary for the plant shall be borne by The Contractor.
79. In case of any untowered accident /incident /mishap at the project location the Owner shall not be responsible for the same and any consequence raised / occurred due the same shall be dealt solely by the Contractor Lodging of any FIR / any legal matter etc. shall be solely handled / managed by the contractor.
80. The Contractor shall be responsible for disciplined behavior of O& M staff / other agencies. Any sort of illegal/ theft/ mishandling/ robbery activity is occurred at the site, it should be immediately informed to the Owner. Contractor shall be wholly responsible for compensating the material /financial / generation or any other sort of losses incurred by the Owner due to such events if any.
81. The Contractor shall be fully responsible for co-ordinate day to day affairs / routine operation matters, Common amenities with the Solar Plant under intimation to the Owner. The Contractor shall furnish monthly report all such issues and furnish copy of correspondence to the Owner regularly.
82. Timely Removal of Water logging at site during O&M contract period will be Contractor's responsibility.
83. The Contractor shall develop and maintain green grass/lawn and garden at suitable places within site.
 - i. Contractor shall perform the comprehensive maintenance of the solar plant for a period of 5 years from COD.
 - ii. The CMC shall include the complete operation and maintenance of the plant, servicing of equipment's, replacement spares, ensuring the committed energy generation as per the Bid condition till the agreed period.

ANNEXURES

ANNEXURE –I

LETTER OF BID

(On the letterhead of the Bidder)

Date:

To,

Bengaluru Co-Operative Milk Union Limited (BAMUL),

Dr. M.H. Marigowda Road (Hosur Road),
Dharmaram College Post,
Near Bangalore Dairy Circle,
Bengaluru, Karnataka – 560 029

Sub: PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M)

Dear Sir,

1. With reference to your RFP document I/we, having examined the Bid Documents and understood their contents, hereby submit my/our Bid for the aforesaid Project. The Bid is unconditional and unqualified.
2. All information provided in the Bid and in the Appendices is true and correct.
3. This statement is made for the express purpose of qualifying as a Bidder for PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M)at Karnataka.
4. I/ We shall make available to the Employer any additional information it may find necessary or require to supplement or authenticate the Bid.
5. I/ We acknowledge the right of the Employer to reject our Bid without assigning any reason or otherwise and hereby waive, to the fullest extent permitted by applicable law, our right to challenge the same on any account whatsoever.
6. We certify that in the last three years, we have neither failed to perform on any contract, as evidenced by imposition of a penalty or a judicial pronouncement or arbitration award, nor been expelled from any project or contract nor have had any contract terminated for breach on our part.
7. I/ We declare that:
 - a. I/ We have examined and have no reservations to the Bidding Documents, including any Addendum issued by the Employer.
 - b. I/ We do not have any Conflict of Interest in accordance with the RFP document;

- c. I/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, as defined in the RFP document, in respect of any tender or request for proposal issued by or any agreement entered into with the Employer or any other public sector enterprise or any government, Central or State; and
 - d. I/ We hereby certify that we have taken steps to ensure that in conformity with the provisions of the RFP, no person acting for us or on our behalf has engaged or will engage in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.
 - e. The undertakings given by us along with the Bid in response to the RFP for the Project were true and correct as on date of making the Bid and are also true and correct as on the Bid Due Date and I/We shall continue to abide them.
8. I/ We understand that you may cancel the Bidding Process at any time and that you are neither bound to accept any Bid that you may receive nor to invite the Bidders to Bid for the Project, without incurring any liability to the Bidders, in accordance with the RFP document.
9. I/ We believe that _____ (Bidder) satisfies the Financial Criteria and meet(s) the requirements as specified in the RFP document and are/ is qualified to submit a Bid in accordance with the RFP document.
10. I/ We certify that in regard to matters other than security and integrity of the country, we have not been convicted by a Court of Law or indicted or adverse orders passed by a regulatory authority which could cast a doubt on our ability to undertake the Project or which relates to a grave offence that outrages the moral sense of the community.
11. I/ We further certify that in regard to matters relating to security and integrity of the country, we have not been charge-sheeted by any agency of the Government or convicted by a Court of Law for any offence committed by us or by any of our Group Business Entity's.
12. The Statement of Legal Capacity as per format provided in the RFP document, and duly signed, is enclosed. The power of attorney for signing of Bid as per format provided at in the RFP, are also enclosed.
13. I/ We further certify that we are not barred by the Central/ State Government, or any entity controlled by them, from participating in any project, and the bar subsists as on the date of Bid, would not be eligible to submit a Bid.
14. I/ We further certify that no investigation by a regulatory authority is pending either against us or against our Group Business Entities or against our CEO or any of our Directors/ Managers/ employees.
15. I/ We undertake that in case due to any change in facts or circumstances during the Bidding Process, we are attracted by the provisions of disqualification in terms of the guidelines referred to above, we shall intimate the Employer of the same immediately.
16. We understand that in case Bidder, the continued eligibility shall be subject to approval of the Employer from national security and public interest perspective. The decision of the Employer in this behalf shall be final and conclusive and binding on the Bidder.

17. I/We hereby irrevocably waive any right which we may have at any stage at law or howsoever, otherwise arising to challenge or question any decision taken by the Employer in connection with the selection of the Bidder, or in connection with the Bidding Process itself, in respect of the above mentioned Project and the terms and implementation thereof.
18. In the event of we being declared as the Selected Bidder, We agree to enter into a Contract in accordance with the draft that has been provided to me/us prior to the Bid Due Date. We agree not to seek any changes in the aforesaid draft and agree to abide by the same.
19. We have studied all the Bidding Documents carefully. We understand that except to the extent as expressly set forth in the draft Contract, we shall have no claim, right or title arising out of any documents or information provided to us by the Employer or in respect of any matter arising out of or concerning or relating to the Bidding Process including the award of Rights.
20. The Total Price has been quoted by us after taking into consideration all the terms and conditions stated in the RFP; our own estimates of costs and revenues and all the conditions that may affect the Bid.
21. We offer an EMD of as per notification.
22. We agree and understand that the Bid is subject to the provisions of the Bidding Documents. In no case, We shall have any claim or right of whatsoever nature if the Project is not awarded to us or our Bid is not opened.
23. We agree to keep this offer valid for 90 (Ninety) days from the Bid Due Date.
24. We agree and undertake to abide by all the terms and conditions of the RFP document.

In witness thereof, I/we submit this Bid under and in accordance with the terms of the RFP document.

Yours faithfully,

Date:

(Signature of the Authorized signatory)

Place:

(Name and designation of the of the Authorised signatory)

Name and seal of Bidder

DETAILS OF THE BIDDER

(On the letterhead of the Bidder)

1.
 - (a) Name:
 - (b) Country of incorporation:
 - (c) Address of the corporate headquarters and its branch office(s), if any, in India:
 - (d) Date of incorporation and/ or commencement of business:
 - (e) GST No. of the Bidder (s)
2. Brief description of the Company including details of its main lines of business and proposed role and responsibilities in [this Project]:
3. Details of individual(s) who will serve as the point of contact/ communication for the Employer:
 - (a) Name:
 - (b) Designation:
 - (c) Company:
 - (d) Address:
 - (e) Telephone Number:
 - (f) E-Mail Address:
 - (g) Fax Number:
4. Particulars of the Authorized Signatory of the Bidder:
 - (a) Name:
 - (b) Designation:
 - (c) Address:
 - (d) Phone Number:
 - (e) Fax Number:

TECHNICAL CRITERIA OF THE BIDDER

(On the letterhead of the Bidder)

SOLAR PROJECTS UNDERTAKEN

Item	Particulars of the Project
Title & Nature of the Project	
Entity for which the project was developed	
Location	
Installed Capacity (in MWac)	
Project cost (Rs. Crore)	
Date of commencement of project	
Date of completion/ commissioning	
Tracker technology (Single Axis Tracker / Dual Axis tracker)	
Equity shareholding (with period during which equity was held)	

INSTRUCTIONS:

1. Bidder shall submit Technical Criteria as per Eligibility Criteria requirements.
2. Separate sheets should be filled for each project

(Signature of the Authorized signatory)

(Name and designation of the of the Authorized signatory)

Name and seal of Bidder

FORMAT FOR CERTIFICATE FOR TECHNICAL EXPERIENCE

(On the letterhead of the OWNER / KPTCL / CEIG)

TO WHOMSOEVER IT MAY CONCERN

Based on books of accounts and other published information authenticated, this is to certify that (Name of the Bidder) was an EPC Contractor for _____ (name of the Project). The project was commissioned on (date of commissioning of the project). The Project has generated _____(units of power) and the plant is satisfactorily working since _____.

We further certify that the total capital cost of the project is Rs. crores and the capacity of the project is ____MWac _____(Fixed / Single Axis tracking / Dual Axis Tracking) Solar PV Power Plant.

This certificate is being issued on the request of the EPC Contractor.

[Signature and Seal of the Client]

FINANCIAL CRITERIA OF THE BIDDER

(On the letterhead of the Statutory Auditor)

TO WHOMSOEVER IT MAY CONCERN

We have verified the relevant statutory and other records of M/s.
..... [Name of the Bidder], and certify the **NET WORTH** is Rs
..... Crores (Rupees
Crores) as on March, 31, 2026.

The **Annual Turnover** over the last three Financial Years of M/s.
..... [Name of the Bidder] as follows:

Sr. No.	Financial Year	Annual Turnover, Rs. In Crores
1.	FY 2025 – 26 (Provisional)	
2.	FY 2024 - 25	
3.	FY 2023 - 24	
4.	FY 2022 - 23	

This certificate is being issued to be produced before **Bengaluru Co-Operative Milk Union Limited (BAMUL)**, for the PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M).

Signature and Seal:

Registration number of Statutory Auditor/ Independent Auditor

NOTE:

For the computation of Net worth, the following formula shall be used:

Net Worth shall mean

For company = (Subscribed and Paid-up Capital + Reserves) - (Revaluation Reserves + Miscellaneous expenditure not written off)

Paid up share capital will include

- 1) Paid –up equity share capital, and
- 2) Fully, compulsorily and mandatory convertible Preference Shares, and
- 3) Fully, compulsorily and mandatory convertible Debentures

**POWER OF ATTORNEY FOR SIGNING OF BID IN FAVOR OF
AUTHORIZED REPRESENTATIVE**

(To be executed on Stamp paper of appropriate value)

Know all men by these presents, We, (Name of the Contractor& address of the registered office) do hereby irrevocably constitute, nominate, appoint and authorize Mr./Ms.....(Name), son/daughter/wife of and presently residing at, who is [presently employed with us and holding the position of], as our true and lawful attorney (hereinafter referred to as the “**Attorney**”) to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Bid for the PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M)proposed by BAMUL (the “**Owner**”) including but not limited to signing and submission of all applications, Bids and other documents and writings, participate in Bidders' and other conferences and providing information / responses to the Owner, representing us in all matters before the Owner, signing and execution of all contracts including the draft Contract and undertakings consequent to acceptance of our Bid, and generally dealing with the Owner in all matters in connection with or relating to or arising out of our Bid for the said Project and/or upon award thereof to us and/or till the entering into the Contract with the BAMUL.

AND we hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things lawfully done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE, THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS DAY OF, 20.....

For.....
(Signature) (Name, Title and Address)

WITNESSES:

- 1.
- 2.

Accepted
(Signature)
(Name, Title and Address of the Attorney)

[Notarized]

Notes:

- The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the

executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.

- **Also, wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a BOARD RESOLUTION/POWER OF ATTORNEY IN FAVOUR OF THE PERSON EXECUTING THIS POWER OF ATTORNEY for the delegation of power hereunder on behalf of the Bidder.**
- For a Power of Attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the Power of Attorney is being issued. However, the Power of Attorney provided by Bidders from countries that have signed the Hague Legislation Convention 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Apostille certificate.

FORMAT FOR BID SECURITY / EARNEST MONEY DEPOSIT (EMD)

(To be executed on Stamp paper of appropriate value)

B.G. No.....

Dated:

6. In consideration of you, having its office at (hereinafter referred to as “**Employer**”, which expression shall unless it be repugnant to the subject or context thereof include its, successors and assigns) having agreed to receive the Bid of [a Company registered under provision of the Companies Act, 1956] and having its registered office at (hereinafter referred to as the “**Bidder**” which expression shall unless it be repugnant to the subject or context thereof include its/their executors administrators, for Selection of EPC Contractor for PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M) (hereinafter referred to as “**the Project**”) pursuant to the RFP Document dated issued in respect of the Project and other related documents (hereinafter collectively referred to as “**Bidding Documents**”), we[Name of the Bank] having our registered office at and one of its branches at (hereinafter referred to as the “**Bank**”), at the request of the Bidder of the RFP, irrevocably, unconditionally and without reservation guarantee the due and faithful fulfilment and compliance of the terms and conditions of the Bidding Documents (including the RFP Document) by the said Bidder and unconditionally and irrevocably undertake to pay forthwith to Employer an amount of Rs..... (Rupees..... as Bid Security (hereinafter referred to as the “**Bid Security / EMD**”) as our primary obligation without any demur, reservation, recourse, contest or protest and without reference to the Bidder if the Bidder shall fail to fulfill or comply with all or any of the terms and conditions contained in the said Bidding Documents.
7. Any such written demand made by Employer stating that the Bidder is in default of the due and faithful fulfilment and compliance with the terms and conditions contained in the Bidding Documents shall be final, conclusive and binding on the Bank.
8. We, the Bank, do hereby unconditionally undertake to pay the amounts due and payable under this Guarantee without any demur, reservation, recourse, contest or protest and without any reference to the Bidder or any other person and irrespective of whether the claim of Employer is disputed by the Bidder or not merely on the first demand from Employer stating that the amount claimed is due to Employer by reason of failure of the Bidder to fulfill and comply with the terms and conditions contained in the Bidding Documents including failure of the said Bidder to keep its Bid open during the Bid Validity Period as set forth in the said Bidding Documents for any reason whatsoever. Any such demand made on the Bank shall be conclusive as regards amount due and payable by the Bank under this Guarantee. However, our liability under this

Guarantee shall be restricted to an amount not exceeding Rs.....
(Rupees).

9. This Guarantee shall be irrevocable and remain in full force for a period of **90 (Ninety) days from the Bid Due Date (BDD)** inclusive of a claim period of 30 (Thirty) days or for such extended period as may be mutually agreed between Employer and the Bidder, and agreed to by the Bank, and shall continue to be enforceable till all amounts under this Guarantee have been paid.
10. We, the Bank, further agree that Employer shall be the sole judge to decide as to whether the Bidder is in default of due and faithful fulfilment and compliance with the terms and conditions contained in the Bidding Documents including, inter alia, the failure of the Bidder to keep its Bid open during the Bid Validity Period set forth in the said Bidding Documents, and the decision of Employer that the Bidder is in default as aforesaid shall be final and binding on us, notwithstanding any differences between Employer and the Bidder or any dispute pending before any Court, Tribunal, Arbitrator or any other Employer.
11. The Guarantee shall not be affected by any change in the constitution or winding up of the Bidder or the Bank or any absorption, merger or amalgamation of the Bidder or the Bank with any other person.
12. In order to give full effect to this Guarantee, Employer shall be entitled to treat the Bank as the principal debtor. Employer shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee from time to time to vary any of the terms and conditions contained in the said Bidding Documents or to extend time for submission of the Bids or the Bid validity period or the period for conveying acceptance of Letter of Award by the Bidder or the period for fulfilment and compliance with all or any of the terms and conditions contained in the said Bidding Documents by the said Bidder or to postpone for any time and from time to time any of the powers exercisable by it against the said Bidder and either to enforce or forbear from enforcing any of the terms and conditions contained in the said Bidding Documents or the securities available to Employer, and the Bank shall not be released from its liability under these presents by any exercise by Employer of the liberty with reference to the matters aforesaid or by reason of time being given to the said Bidder or any other forbearance, act or omission on the part of Employer or any indulgence by Employer to the said Bidder or by any change in the constitution of Employer or its absorption, merger or amalgamation with any other person or any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of releasing the Bank from its such liability.
13. Any notice by way of request, demand or otherwise hereunder shall be sufficiently given or made if addressed to the Bank and sent by courier or by registered mail to the Bank at the address set forth herein.
14. We undertake to make the payment within 2 (two) working days on receipt of your notice of claim on us addressed to.....
[name of Bank along with branch address] and delivered at our above branch that shall be deemed to have been duly authorized to receive the said notice of claim.

15. It shall not be necessary for Employer to proceed against the said Bidder before proceeding against the Bank and the guarantee herein contained shall be enforceable against the Bank, notwithstanding any other security which Employer may have obtained from the said Bidder or any other person and which shall, at the time when proceedings are taken against the Bank hereunder, be outstanding or unrealised.
16. We, the Bank, further undertake not to revoke this Guarantee during its currency except with the previous express consent of Employer in writing.
17. The Bank declares that it has power to issue this Guarantee and discharge the obligations contemplated herein, the undersigned is duly authorized and has full power to execute this Guarantee for and on behalf of the Bank.

Signed and Delivered by Bank

By the hand of Mr./Ms....., its
..... and authorized official.

(Signature of the Authorized Signatory) (Official Seal)

ANNEXURE – VIII

FORMAT FOR PERFORMANCE BANK GUARANTEE (PBG) / SECURITY DEPOSIT

[To be on non-judicial stamp paper of Rupees Five Hundred Only (INR 500/-) or appropriate value as per Stamp Act relevant to place of execution, duly signed on each page.]

Reference No. Bank Guarantee No. Dated: (On stamp paper of Rs. 500/-)

1. In consideration of the [Insert name of the '**Successful Bidder**'] (hereinafter referred to as '**Contractor**') submitting the response to NIT inter alia for PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M) on turnkey basis in the State of Karnataka, in response to the RFP dated..... issued by BAMUL (hereinafter referred to as BAMUL) and BAMUL considering such response to the RFP of (insert the name of the Contractor] (which expression shall unless repugnant to the context or meaning thereof include its executors, administrators, successors and assignees) and selecting the Contractor and issuing Letter of Award No. to (Insert Name of Contractor) as per terms of RFP and the same having been accepted by the Contractor. As per the terms of the RFP, theinsert name & address of bank] hereby agrees unequivocally, irrevocably and unconditionally to pay to BAMUL at[Insert Name of the Place from the address of BAMUL] forthwith on demand in writing from BAMUL or any Officer authorized by it in this behalf, any amount up to and not exceeding Rupees.....Insert amount] only, on behalf of M/s. [Insert name of the Contractor]. This guarantee shall be valid and binding on this Bank up to and including[insert date of validity] and shall not be terminable by notice or any change in the constitution of the Bank or the term of contract or by any other reasons whatsoever and our liability hereunder shall not be impaired or discharged by any extension of time or variations or alternations made, given, or agreed with or without our knowledge or consent, by or between parties to the respective agreement.
2. Our liability under this Guarantee is restricted to Rs.(Rs. only).
3. Our Guarantee shall remain in force until[insert date of validity]. BAMUL shall be entitled to invoke this Guarantee till until [Insert date which is 30 days after the date in the preceding sentence].

4. The Guarantor Bank hereby agrees and acknowledges that BAMUL shall have a right to invoke this BANK GUARANTEE in part or in full, as it may deem fit.
5. The Guarantor Bank hereby expressly agrees that it shall not require any proof in addition to the written demand by BAMUL, made in any format, raised at the above mentioned address of the Guarantor Bank, in order to make the said payment to BAMUL.
6. The Guarantor Bank shall make payment hereunder on first demand without restriction or conditions and notwithstanding any objection by [Insert name of the Contractor] and/or any other person. The Guarantor Bank shall not require BAMUL to justify the invocation of this BANK GUARANTEE, nor shall the Guarantor Bank have any recourse against BAMUL in respect of any payment made hereunder.
7. This BANK GUARANTEE shall be interpreted in accordance with the laws of India and the courts at Bengaluru shall have exclusive jurisdiction.
8. The Guarantor Bank represents that this BANK GUARANTEE has been established in such form and with such content that it is fully enforceable in accordance with its terms as against the Guarantor Bank in the manner provided herein.
9. This BANK GUARANTEE shall not be affected in any manner by reason of merger, amalgamation, restructuring or any other change in the constitution of the Guarantor Bank.
10. This BANK GUARANTEE shall be a primary obligation of the Guarantor Bank and accordingly BAMUL shall not be obliged before enforcing this BANK GUARANTEE to take any action in any court or arbitral proceedings against the selected Contractor, to make any claim against or any demand on the selected Contractor or to give any notice to the selected Contractor or to enforce any security held by BAMUL or to exercise, levy or enforce any distress, diligence or other process against the selected Contractor.
11. The Guarantor Bank acknowledges that this BANK GUARANTEE is not personal to BAMUL and may be assigned, in whole or in part, (whether absolutely or by way of security) by BAMUL to any entity to whom BAMUL is entitled to assign its rights and obligations.
12. Notwithstanding anything contained hereinabove, our liability under this Guarantee is restricted _____ to _____ Rs.(Rs. only) and it shall remain in force until..... We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if BAMUL serves upon us a written claim or demand.

Signature:

Name:

Power of Attorney No.

For

[Insert Name of the Bank] Banker's Stamp and Full Address.

Dated this _____ day of __, 20..

Witness:

1.

Signature

Name and Address

2.

Signature

Name and Address

SELF DECLARATION FORMS

(To be submitted on the letterhead of the Bidder)

SDF - I: STATEMENT OF LEGAL CAPACITY

Ref. Date:

To,

Managing Director,

BAMUL

Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029

Dear Sir,

I/We hereby confirm that we satisfy the terms and conditions laid out in the

We have agreed that (insert individual's name) will act as our representative and has been duly authorized to submit the Bid. Further, the authorized signatory is vested with requisite powers to furnish such letter and authenticate the same.

Thanking you,

Yours faithfully,

(Signature, name and designation)

For and behalf of _____ (name of the company)

SELF DECLARATION FORMS

(To be forwarded on the letterhead of the Bidder)

SDF - II: ANTI – COLLUSION CERTIFICATE

We hereby certify and confirm that in the preparation and submission of our Bid for PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M), we have not acted in concert or in collusion with any other Bidder or other person(s) and also not done any act, deed or thing which is or could be regarded as anti-competitive.

We further confirm that we have not offered nor will offer any illegal gratification in cash or kind to any person or agency in connection with the instant Bid.

Dated thisDay of, (month/year)

.....(Name of the Bidder)

.....(Signature of the Authorized Person)

.....(Name of the Authorized Person)

SELF DECLARATION FORMS

(To be forwarded on the letterhead of the Bidder)

SDF – III: NO DEVIATION CERTIFICATE

To,

**Managing Director,
BAMUL**

Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029

Dear Sir,

Sub: PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M)

We, (Bidder's Name), confirm our acceptance to all terms and conditions mentioned in the , and all subsequent clarifications, in totality and withdraw all deviations raised by us, if any.

Yours faithfully,

(Signature of the Authorized signatory)

(Name and designation of the of the Authorized signatory)

Name and seal of Bidder:

Date:

Place:

SELF DECLARATION FORMS

SDF – IV: DECLARATION ON BIDDER'S RELATION TO DIRECTORS

(To be forwarded on the letterhead of the Bidder)

This has reference to our proposed Contract regarding selection of a Contractor to PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M) to be entered into Contract with BAMUL.

We certify that to the best of my/our knowledge:

- i. I am not a relative of any Director of BAMUL
- ii. We are not a firm in which a Director of BAMUL or its relative is a partner
- iii. I am not a partner in a firm in which a Director of BAMUL, or its relative is a partner
- iv. We are not a private company in which a Director of BAMUL is a member or director
- v. We are not a company in which Directors of BAMUL hold more than 2% of the paid-up share capital of our company or vice-versa.

Place:

Date:

Yours faithfully,

(Signature of the Authorized signatory)

SELF DECLARATION FORMS

**FORMAT FOR AFFIDAVIT CERTIFYING THAT THE ENTITY/PROMOTER'S /
DIRECTOR'S OF ENTITY ARE NOT BLACKLISTED**

(On a Stamp Paper of appropriate value)

SDF – V: ANTI-BLACKLISTING AFFIDAVIT

I, M/s.....(Single Business Entity),
(the names and addresses of the registered office) hereby certify and confirm that we or any
of our promoter/s / director/s are not barred by BAMUL / any other entity of Government
of Karnataka or blacklisted by any state government or central government / department /
agency in India from participating in Project/s, as on the _____ (Bid Due Date).

We further confirm that we are aware that our Bid for the Project would be liable for
rejection in case any material misrepresentation is made or discovered with regard to the
requirements of this _____ at any stage of the Bidding Process or thereafter during the
agreement period.

Dated this Day of, 20....

Name of the Bidder:

Signature of the Authorized person

Name of the Authorized Person:

SELF DECLARATION FORMS

**SDF – VI: DECLARATION OF ADOPTING SOLAR PV MODULES &
CELLS AS PER ALMM LIST I (MODULES) & LIST II (CELLS)**

(On a the Letterhead of the Bidder)

Declaration of adopting Solar PV Modules & Cells as per latest ALMM List I (Modules) & List II (Cells) respectively as published by MNRE latest orders.

I/We (Name of the Bidder) understand that, as per Bid conditions, we hereby declare that I/We will be using Solar PV Modules & Cells as per latest ALMM List I (Modules) & List II (Cells) guidelines respectively as published by MNRE orders as on bid due date.

We further confirm that we are aware that our Bid for the Project would be liable for rejection in case any material misrepresentation is made or discovered with regard to the requirements of this RFP at any stage of the Bidding Process or thereafter during the agreement period.

Dated this Day of, 20....

Name of the Bidder:

Signature of the Authorized person:

Name of the Authorized Person

INTEGRITY PACT

(To be submitted by the Sole Bidder)

THIS AGREEMENT is entered into between the following Parties:

Bengaluru Co-Operative Milk Union Limited (BAMUL),

Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029 hereinafter referred to as “**The Principal**”,

and

Name & Address of the Party

.....
.....
.....

Hereinafter referred to as “**The BIDDER/ Contractor**”.

Preamble:

The Principal intends to award a contract, following its laid-down organizational procedures, for PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M). The Principal values full compliance with all relevant laws and regulations and the principles of economical use of resources and of fairness and transparency in its relations with its BIDDER(s) and /or Contractor(s).

In order to achieve these goals, the Principal cooperates with the renowned international Non-Governmental Organization, “**Transparency International**” (TI). Following TI's national and international experience, the Principal will appoint an Independent External Monitor (IEM) who will monitor the Bid process and the execution of the Contract for compliance with the principles mentioned below.

IT IS AGREED AS FOLLOWS:

DEFINITIONS:

- a) “**Principal**” means BAMUL, incorporated under the Companies Act 1956, having their registered office at Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029 and includes their successors.
- b) “**BIDDER**” means the person, firm or company submitting a Bid against the Invitation to Bid and includes his/ its/ **their** staff, consultants, parent and associate and subsidiary companies, agents, sub-contractors and suppliers, heirs, executors, administrators, representatives, successors.
- c) “**Contractor**” means the **BIDDER** whose Bid has been accepted by the Principal or Company whose Bid has been accepted and shall be deemed to include his/ its/ their

successors, representatives, heirs, executors and administrators unless excluded by the Contract.

- d) **"Independent External Monitor"** means a person, hereinafter referred to as IEM, appointed, in accordance with **clause 8.a** below, to verify compliance with this agreement.
- e) **"Party"** means a signatory to this agreement.
- f) **"Contract"** means the contract entered into between the Principal and BIDDER/Contractor for the execution of work mentioned in the preamble above.

COMMITMENTS OF THE PARTIES:

SECTION 1 - COMMITMENTS OF THE PRINCIPAL:

The Principal commits itself to take all measures necessary to prevent corruption (inducement to violate duty assigned to its employees) and to observe the following principles;

- i) No employee of the Principal, personally or through family members or any third person, will in connection with all stages of Bidding or the execution of Contract, demand or take a promise, or accept, for him/herself or any third person, any material or non-material benefit which he/she is not legally entitled to;
- ii) The Principal will, during the Bid process, treat all Bidders with equity and reason. The Principal will in particular, before and during the Bid process, provide to all Bidders the same information and will not provide to any BIDDER any information/ clarification through which the BIDDER could obtain an advantage in relation to the Bid process or the Contract execution;
- iii) The Principal will not take, directly or indirectly, any steps, which could unduly influence the functioning of IEM.
- iv) If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the relevant Anti-corruption Laws of India/ guidelines of Govt. / guidelines of CVC/ guidelines of Principal, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.
- v) If the Principal obtains information of conduct of a bidder, contractor or sub-contractor or of an employee or a representative or an associate of a bidder, contractor or sub-contractor, which constitutes corruption, or if the Principal has a substantive suspicion in this regard, the Principal will inform the Vigilance Department of the principal.

SECTION 2 - COMMITMENTS OF THE BIDDER(S)/CONTRACTOR(S):

2.1. The BIDDER /Contractor commits himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the Bid process and during the Contract execution;

- i) The BIDDER / Contractor will not directly or through any other person(s) or firm, offer, promise or give to the Principal, or to any of the Principal's employees involved in the Bid process or the execution of the Contract or to any third person any material or immaterial benefit which he / she is not legally entitled to in order

to obtain, in exchange, an advantage during the Bid process or to vitiate the Principal's Bid process or the execution of the Contract.

- ii) The BIDDER / Contractor will not enter with other Bidders into any illegal agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or actions to restrict competitiveness or to vitiate the Principal's Bid process or the execution of the Contract.
- iii) The BIDDER / Contractor will not commit any criminal offence under the relevant Anti-corruption Laws of India; further, the BIDDER / Contractor will not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- iv) The BIDDER / Contractor of foreign origin shall disclose the name and address of the agents/representatives in India, if any. Similarly, the BIDDER / Contractor of Indian Nationality shall furnish the name and address of the foreign principals, if any.
- v) The BIDDER / Contractor will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the Contract.
- vi) The BIDDER/ Contractor will not take, directly or indirectly, any steps, which could unduly influence the functioning of IEM.
- vii) The BIDDER / Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.

2.2. Obligation to Ensure Compliance

- b) Each Party will take all reasonable steps to ensure that the provisions of this agreement which are binding on it are complied with by all of its staff, consultants, parent and associated and subsidiary companies, agents, sub-contractors and suppliers.
- c) Each Party will appoint an appropriate senior manager with responsibility for ensuring that the provisions of this agreement are complied with.

SECTION 3 - DISQUALIFICATION FROM BID PROCESS AND EXCLUSION FROM FUTURE CONTRACTS

- a) If the BIDDER, before award of Contract, has committed a transgression through violation of any of the terms under **Section 2** above or in any other form such as to put his reliability or credibility as BIDDER into question, the Principal is entitled to disqualify the BIDDER from the Bid process or to terminate the Contract, if already signed, for such reason.
- b) If the BIDDER / Contractor has committed a transgression through a violation of any of the terms under **Section 2** above or in any other form such as to put his reliability or credibility into question, the Principal is entitled also to exclude the BIDDER / Contractor from future Contract award processes. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the circumstances of the case, in particular the number of transgressions, the position of the transgressors within the company hierarchy of the BIDDER /Contractor and the amount of the damage. The exclusion will be imposed for a minimum of six (6) months and a maximum of three (3) years.

- c) If the BIDDER / Contractor can prove that he has restored/ recouped the damage caused by him and has installed a suitable corruption prevention system, the Principal may revoke the exclusion before the expiry of the period of such exclusion.
- d) A transgression is considered to have occurred if, in light of all available evidence, a reasonable doubt is possible.

SECTION 4 - COMPENSATION FOR DAMAGES

- a) If the Principal has disqualified the BIDDER from the Bid process prior to the award according to **Section 3** above, the Earnest Money Deposit (EMD) furnished, if any, along with the offer as per the terms of the Invitation to Bid (ITB) shall be forfeited. This is apart from the disqualification of the BIDDER as may be imposed by the Principal as brought out at **Section 3** above.
- b) If the Principal has terminated the Contract according to **Section 3** above, or if the Principal is entitled to terminate the Contract according to **Section 3** above, the Bid Security / EMD/Security Deposit / Performance Bank Guarantee (PBG) furnished by the contractor, if any, as per the terms of the ITB /Contract shall be forfeited. This is apart from the disqualification of the BIDDER, as may be imposed by the Principal, as brought out at **Section 3** above.

SECTION 5 - PREVIOUS TRANSGRESSION

- a) The BIDDER hereby declares that no previous transgressions with respect to provisions of Integrity pact occurred in the last three (3) years with any other Company / Body / Institution / Govt. agency in any country or with any other Public Sector Enterprise in India and, as such, there is no case for his exclusion from the Bid process.
- b) The BIDDER hereby agrees that if he has made/makes incorrect statement in regard to this aspect, he can be disqualified from the Bid process or the Contract, if already awarded, can be terminated for that reason.

SECTION 6 - EQUAL TREATMENT OF ALL BIDDERS/CONTRACTORS/ SUB-CONTRACTORS

- a) The BIDDER / Contractor undertakes to obtain from all sub-contractors a commitment consistent with this integrity pact, and to submit it to the Principal at the time of seeking approval of the principal for appointment of sub-contractors.
- b) The principal will enter into agreements with identical conditions as that of this Integrity Pact, with all Bidders / Contractors.
- c) It is essential for all Bidders / Contractors to sign the Integrity Pact with the company if the value of the transaction is more than 30 lakhs. The Principal will disqualify from the Bid process all Bidders/ contractors who do not sign this Pact or violate its provisions.

SECTION 7 - BREACHES OF THIS AGREEMENT

- a) In the event that any Party believes that there is prima facie evidence that there has been a failure by a Party to comply with any provision of this agreement, such Party will take the following actions:
 - i) It will report full details of such suspected non-compliance to the IEM and CVO with copies to the Chief Executives of each of the Parties.
 - ii) If any such non-compliance has been carried out, or assisted by an individual who is a member of a professional association, and such non-compliance may constitute a breach of any disciplinary code of such professional association, such Party may report such matter to the professional association.

- b) If such non-compliance may constitute a criminal offence, either in the country in which the Contract is being carried out, or in the home country of the organization or individual which carried out or assisted such non-compliance, such Party may report such matter to the appropriate criminal authorities in those territories.
- c) In the event that any Party breaches any provision of this agreement, the other Parties may, in addition to the rights under this agreement, claim damages against the defaulting Party, and exercise any other rights they may have against the defaulting Party.
- d) The Parties will take appropriate disciplinary or enforcement action against any of their staff, consultants, parent and associated and subsidiary companies, agents, sub-contractors and suppliers who cause or assist in any breach of any provision of this agreement.

SECTION 8 - INDEPENDENT EXTERNAL MONITOR/MONITORS (IEM)

- a) The Principal, will appoint a competent and credible IEM/Number of IEMs for the duration of this agreement from the panel of IEMs appointed in consultation with the Central Vigilance Commission (CVC).
- b) The IEM will assess, on an independent and objective basis, the extent to which the Parties comply with their obligations under this agreement.
- c) The Parties will, after submission of a Bid; after the award of any contract to them and for the duration of the contract:
 - i) Allow the IEM unrestricted access to all books, records and staff relevant to such Bid;
 - ii) Ensure that the IEM has unrestricted access to the relevant books, records and staff of their consultants, parent and associated and subsidiary companies, agents, sub-contractors and suppliers.
- d) In the event that the IEM believes that there is prima facie evidence that there is a violation of this agreement, the IEM will report the same to CEO of the Principal.
- e) Upon receipt of a report from the IEM, CEO of the Principal and the Board will discuss and try to agree upon the appropriate action to be taken in line with **Sections 3,4 & 5** above to deal with such violation.
- f) The IEM has no power to inquire any of the Parties to undertake any actions. No statement by the IEM, whether oral or in writing, is binding on any of the parties. Any Party in legal or dispute resolution proceedings can use all reports and other documentation issued by the IEM. The IEM can be called as a witness in legal or dispute resolution proceedings.
- g) Fee and /or any other incidentals including traveling/conveyance expenses, if any, payable to IEM shall be borne by the Principal.
- h) The IEM can only be removed from his appointment, if:
 - 1. All parties agree in writing to remove him: or
 - 2. He resigns: or
 - 3. He is removed from his office by order of a Court having appropriate jurisdiction.
- i) On completion of the term by the IEM or if the IEM is removed from his appointment or in case of death of IEM (whichever is earlier), the Principal will appoint another IEM as per **Section 8.a)** above for the remaining duration of this agreement.

SECTION 9 - DURATION OF AGREEMENT

- a) This agreement comes into force as soon as it has been signed by all the Parties have signed it. It cannot be terminated or varied except by the written agreement of all the Parties.

- b) This agreement will expire after 12 months from the date of last payment under the respective Contract for the Contractor, and for all other Bidders 6 months after the award of the Contract.

SECTION 10 - OTHER PROVISIONS

- a) The Principal will disqualify from the Bid process all Bidders who do not sign this Pact or violate its provisions.
- b) Should any occasion arise entailing IEM to undertake any investigation under the provisions of this agreement, the venue for such investigation shall generally be at BAMUL, Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029.
- c) This agreement is subject to Indian law. Place of performance and jurisdiction is the corporate office of the Principal. In case of any dispute, the courts at Bengaluru only shall have jurisdiction.
- d) Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- e) Addresses along with other relevant details of the Chief Executives of the Parties are as given under;

<p>i. PRINCIPAL: Chairman-cum-Managing-Director, BAMUL, Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029</p>	<p>Tel: Mobile: Email: Fax:</p>
<p>ii. BIDDER / Contractor: </p>	<p>Tel: Mobile: Email: Fax:</p>

- f) Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In that case the parties will strive to come to an agreement to their original intentions.

For the Principal

For the BIDDER/ Contractor

Place.....Place.....

Date

Date

Witness 1:.....
 Name & address) (Name & address)

Witness 1:

Witness 2:.....
 (Name & address) (Name & address)

Witness 2:

BILL OF MATERIALS (BOM)

Sl No	Description	Qty - 11kV	Qty - 33kV
1	Geo Tech Investigation - Soil Test, ERT, Contour Survey	1 Lot	1 Lot
2	Land Grading, Vegetation Cleaning & Land Levelling	1 Lot	1 Lot
3	Borewell	4 Nos	4 Nos
4	Compound Wall - Pre Cast	xxx RMT	xxx RMT
5	Construction of Control Room	1 Ls	1 Ls
6	Civil foundation for Equipments	1 Ls	1 Ls
7	Solar Panels - DCR	16.8 MW	16.8 MW
8	Inverter	12 MW	12 MW
9	MMS - Module Mounting Structure	16.8 MW	16.8 MW
10	DC Cables	1 Lot	1 Lot
11	AC Cables	1 Lot	1 Lot
12	HV Cables	1 Lot	1 Lot
13	Auxiliary Cables	1 Lot	1 Lot
14	Communication Cables	1 Lot	1 Lot
15	DWC / HDPE Conduits	1 Lot	1 Lot
16	Glands, Sleeves, Lugs & Termination Kits	1 Lot	1 Lot
17	LT Panel (if Opted for String Inverter)	4 Nos	4 Nos
18	IDT (Inverter Duty Transformer) 11kV or 33kV	2 Nos	-
19	IDT (Inverter Duty Transformer) 33kV	-	1 Nos
20	Auxiliary Transformer	1	1
21	Auxiliary PDB Panel (415V)	1	1
22	HT Panel 11kV or 33kV	2 Nos	-
23	Metering Panel 11kV or 33kV- Solar Plant side	2 Nos	1 Nos
24	Transmission Line 11kV or 33 kV	xx Kms	xx Kms
25	Terminal Bay 11kV or 33 kV	2 Ls	1 Ls
26	Construction of Control Room	1 Ls	1 Ls
27	Civil foundation for Equipments	1 Ls	1 Ls
28	Canopy for Outdoor Equipments	1 Ls	1 Ls
29	Chain Link Fence for Transformer Yard	1 Lot	1 Lot
30	MCS - Module Cleaning system with Pipeline	1 Ls	1 Ls
31	Plant Earthing System	1 Lot	1 Lot
32	Lightning Arrestor	1 Lot	1 Lot
33	RO Plant	1 Lot	1 Lot
34	SCADA & WMS with Monitoring System	1 Lot	1 Lot
35	UPS System	1 Lot	1 Lot
36	Illumination System	1 L/s	1 L/s
37	Fire Safety equipment's	1 L/s	1 L/s
38	Sign Board, Danger Boards, Cable Route Markers	1 Lot	1 Lot
39	Plant Main Gate	1 Lot	1 Lot
40	Security Portable Cabin	1 Lot	1 Lot
41	Approvals from Government/Concerned Department	1 Lot	1 Lot

UN-PRICED BID (PART OF TECHNO - COMMERCIAL BID)

To

Managing Director**BAMUL,**

Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029

Subject: PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M)

Sr. No.	Description	Quantity	Amount, in Crores
1.	Development of 12.0 MW AC / 16.80 MWp DC Solar Power Project on Turnkey EPC scope	LUMPSUM	QUOTED
	The EPC Cost shall include GST, Land cost, registration & stamp duty charges, land conversion cost, out of pocket expenses, travel, boarding, lodging, visits to site, all other taxes and duties and all expenses related to this service.		
2.	Comprehensive Operation and Maintenance (O&M) for initial 5 years (Cost inclusive of GST)		

Thanking you and looking forward to the valuable order from BAMUL.

Yours sincerely,

For _____

Signature and Name

Company Seal

PRICE BID

To

**Managing Director
BAMUL,**

Dr. M.H. Marigowda Road (Hosur Road), Dharmaram College Post, Near Bangalore Dairy Circle, Bengaluru, Karnataka – 560 029

Subject: PROCUREMENT OF LAND, DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, TRANSPORT, STORAGE OF SUPPLY ITEMS, ERECTION, TESTING, COMMISSIONING, EXTERNAL TRANSMISSION LINES AND RIGHT OF WAY, BAY EXTENSIONS, POWER EVACUATION SYSTEM FOR THE DEVELOPMENT OF 12.0 MWAC (16.80 MWP DC) CAPTIVE SOLAR POWER PLANT IN KARNATAKA FOR BAMUL WITH 5 YEARS COMPREHENSIVE OPERATION AND MAINTENANCE (O&M)

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2.	Comprehensive Operation and Maintenance (O&M) for initial 5 years (Cost inclusive of GST)		
3.	Total Amount	Rs.	

(In words: Rupees..... only).

Thanking you and looking forward to the valuable order from BAMUL.

Yours sincerely,

For _____

Signature and Name

Company Seal

CHECK LIST – LIST OF DELIVERABLES

File No.	Title	Bidder (YES/NO)	Remarks
TECHNICAL BID COVER – I			
1.	Cover letter for Technical Bid Submission		
2.	Bid Fee / Receipt		
3.	Bid Security / Earnest Money Deposit (EMD) in the form of Bank Guarantee (BG)		
4.	Power of Attorney for signing of Bid in favor of Authorized Representative		
5.	Board Resolution for Authorized Signatory to sign the Bid Document		
6.	Signed Documents as specified in Annexure – I and Annexure - : Techno-Commercial Bid		
7.	Integrity Pact		
8.	Un-priced Bid in Bidders Letter Head		
9.	Audited Balance sheet / Auditor certified copy of turnover confirming the Turnover criteria		
10.	CA Certificate –Fulfillment of Turnover and Net worth Criteria		
11.	Commissioning Certificate and Purchase Order/Work order or Contract Agreement Confirming the Technical Experience		
12.	Details of Provident Fund (PF) Account No., if available		
13.	Details of the PAN No. copy to be enclosed		
14.	Company Incorporation Documents, MOA, AOA		
15.	ESI No., if available		
16.	GST Number		
17.	TIN, if available		
18.	Self-Declaration Form - Statement of Legal Capacity		
19.	Self-Declaration Form – Anti-Collusion Certificate		
20.	Self-Declaration Form –No Deviation Certificate		
21.	Self-Declaration Form –Declaration on Bidder's relation to Directors		
22.	Anti – Blacklisting Affidavit		

File No.	Title	Bidder (YES/NO)	Remarks
23.	Any other Documents insisted in this Bid Document		
24.	Signed RFP Copy without any deviation		
FINANCIAL BID COVER – II (TO BE UPLOADED IN E PROCUREMENT ONLY)			
1.	Section –H : Price Bid		

TO(Electrical)

Manager(Engg)

Manager(NMPC)

Manager(Production)

General Manager(Engg)