MOIL LIMITED

(A Government of India Enterprise)
"MOIL BHAWAN", 1-A, Katol Road, NAGPUR – 440 013.

NOTICE INVITING TENDER (NIT)

FOR

DESIGN, ENGINEERING, PROCUREMENT & SUPPLY,

CONSTRUCTION, ERECTION, TESTING & COMMISSIONING

AND

COMPREHENSIVE OPERATION & MAINTENANCE FOR 5 YEARS OF SOLAR PV PROJECT OF

CAPACITY 15 MW (AC) WITH SEASONAL TILT AT RAJGARH KHAS IN MADHYA PRADESH

CONTACT ADDRESS

Shri S.K. Asati, Jt. G. M. (Electrical)

MOIL LIMITED,
1-A, MOIL Bhawan,
Katol Road, Nagpur – 440 013
Tel: 0712–2592017, Fax: 0712–22592073
Email: skasati@moil.nic.in

[Only through e-tender **(e-reverse auction)]**

SCHEDULE OF TENDER (SOT)

a. TENDER NO.DATE,	E-Tender/Domestic Tender No. **MOIL/ MOIL LIMITED/Project/6/25-26/ET/50 For** "Design, Engineering, Procurement & Supply, Construction, Erection, Testing & Commissioning and comprehensive operation & maintenance for 5 Years of Solar PV Project of Capacity 15 MW(AC) with seasonal tilt at Rajgarh Khas in Madhya Pradesh."
b. MODE OF TENDER	e-Tendering System Online submission of Part-I (Technical & Commercial Part), Part II (Price Part) and e-reverse auction through www.mstcecommerce.com/eprocn of MSTC Ltd.
c. e -Tender No.	**MOIL/ MOIL LIMITED/ Project/ 6 /25-26/ET/50**
d. Date of NIT available to firms to download	29/10/2025 from 05.00 PM
e. Date of Starting of online Pre-bid meeting	06/11/2025 at 11.00 AM
f. Date of Closing of online Pre-bid meeting	11/11/2025 at 05.00 PM. **Bidder may please note that they can raise query up to six hours prior to closing of pre-bid meeting).**
g. i) Earnest Money Deposit/ Bid Bond ---------- ii) Transaction Fee ---------- **Important Note:** 1) Please note that bidders will have the access to online e-tender only after payment of transaction fee to MSTC. Further, transaction fee is payable by NEFT/RTGS/Online in favour of MSTC Limited, Kolkata in all cases. 2) Submission of EMD as per Point No. 1 of Annexure A Part II. Bidders are advised in his own interest to ensure submission of above-mentioned payments positively and well in advance to avoid falling in the category of non-responsive bid. For details Refer Annexure 'A' Part-I & II.	**Rs. 50,00,000 (Rupees fifty lakh only)** Payment of Transaction fee by NEFT/RTGS/Online in favour of MSTC LIMITED (refer clause No. 3 of Annexure 'A' Part-I). Transaction fee to be submitted to MSTC immediate after appearing of live tender on MSTC website.
h. Date of Starting of e tender for submission of on-line Techno-Commercial Bid (Part-I) and Price Part (Part-II) at www.mstcecommerce.com/eprocn	20/11/2025 at 03.00 PM
i. Date of closing of online e-tender for submission of Techno-Commercial Bid (Part-I) and Price Part (Part-II).	02/12/2025 at 03.00 PM
j.	04/12/2025 at 03.30 PM

1. Date & time of opening of Part-I (i.e. Techno Commercial Bid). [Under unforeseen circumstances, if the due dates (i.e Date & time of opening of Part-I) fall on holiday, the same will be opened on the next full working day at the same time]. 2. Part-II Price Bid: Bidders who *qualify shall be required to participate in an electronic reverse auction process within a limited time period, on a date which shall be announced by MOIL. *on the basis of evaluation of their techno-commercial offer and tender terms and conditions.	

ANNEXURE 'A'

PART-1

1.0 Detail Tender Notice: This is an e-procurement event of MOIL Ltd. The e-procurement service provider is MSTC Ltd., 607-608 Raheja Centre, Nariman Point, Mumbai - 400 021.

1	**Requirement for Bidders/Vendors**: P.C. connected with Internet. Registration with MSTC Portal www.mstcecommerce.com/eprocn/ Register as Vendor. Registration is free of cost. The Bidder/vendor should possess Class III signing and encryption type digital certificate. Bidders are to make their own arrangement for bidding from a P.C. connected with Internet. MSTC/MOIL in no way responsible for this. (Bids will not be recorded without Digital Signature). In case of any clarification, please contact MSTC/MOIL Ltd., (before the schedule time of the e- tender). **For detail may kindly refer Annexure "B."** **CONTACT PERSON (MSTC):** 1) Centralized helpdesk for vendors: 033-22901004, 03340645207, 03340609118, 03340645316,03322901004, and 03322895064 2) Helpdesk at MSTC Mumbai for vendors 022-22870471/22886266/228885567 3) Shri Bibhuti Sankar Pradhan, DGM e-mail: ngropn1@mstcindia.in, CONTACT NO.+91-9903191469 4) Smt. Lisbeth Dias, Sr. Mgr. Mobile no.- +91-9820158988 Email-ngropn2@mstcindia.in 5) Bidders can also mail e-mail their issues at helpdesk@mstcindia.co.in **CONTACT PERSON (MOIL):** 1) Mr. Raja Talathoti, DGM (Systems) MOIL BHAWAN, 1A, KATOL ROAD, NAGPUR-440 013. CONTACT NO. 0712-2806168 MOBILE NO. 09860801149 EMAIL: raja@moil.nic.in 2) Mr. Nishikant S Khante, AGM (Process) CMC MOIL BHAWAN, 1A, KATOL ROAD, NAGPUR-440 013. CONTACT NO. 0712-2806192 MOBILE NO. 09420925817 EMAIL: nishikantkhante@moil.nic.in 3) Mr. S. K. Asati, Jt. General Manager (Elect) MOIL LTD, HO, 1A, MOIL Bhawan, District- Nagpur PIN- 440 013 MOBILE NO. 07709042646 EMAIL: skasati@moil.nic.in 4) Mr. Deepak Borkute, Jt. GM (Material) MOIL BHAWAN, 1A, KATOL ROAD, NAGPUR-440 013. CONTACT NO. 0712-2806130 MOBILE NO. 09096988864 EMAIL: dmb@moil.nic.in
2	**PRE-BID MEETING ON VIRTUAL MODE**: The e-tendering shall also have the event of virtual pre-bid meeting as detailed under "SCHEDULE OF TENDER (SOT)", Point No. 'e' & 'f'. For Technical/Commercial clarification(s) (if any), they may bring to the attention of Jt. General Manager (Elect.)/Jt. GM (Material). The queries & replies shall be given

	online. In the interest of bidder(s), they are requested also go through the final technical specifications and other terms & conditions to be uploaded on the date mentioned under Point 'h', 'i' & 'j' of "SCHEDULE OF TENDER (SOT)", based on the clarifications given during the pre-bid meeting and accordingly submit online tender. **Query (if any) required to be clarified during virtual pre-bid meeting shall be uploaded at our website. After pre-bid meeting, no query shall be entertained.** **Note:** MOIL reserves the rights to conduct pre-bid meeting off-line mode (if required). In such case, corrigendum shall be uploaded on the MSTC & CPP Portal. All entries in the tender should be entered online Part-I (Technical & commercial Part) & Part-II (Price Part) without any ambiguity. Documents pertaining to Part-I and Part-II are required to be submitted through on-line submission. The required documents need to be uploaded by the bidder as appearing in the text of the tender document.
3	**Special Note Towards Transaction Fee**: The vendors shall pay the transaction fee using "Transaction Fee Payment" Link under "Events" in the vendor login. The vendors have to select the particular tender from the event dropdown box. The vendor shall have the facility of making the payment either through NEFT or Online Payment. On selecting NEFT, the vendor shall generate a challan by filling up a form. The vendor shall remit the transaction fee amount as per the details printed on the challan without making change in the same. On selecting Online Payment, the vendor shall have the provision of making payment using its Credit/ Debit Card/ Net Banking. Once the payment gets credited to MSTC's designated bank account, the transaction fee shall be auto authorized and the vendor shall be receiving a system generated mail. Transaction fee is non-refundable. A vendor will not have the access to online e-tender without making the payment towards transaction fee. **NOTE:** 1) THE BIDDERS SHOULD SUBMIT THE TRANSACTION FEE "**WELL IN ADVANCE BEFORE THE LAST DATE OF SUBMISSION OF TENDER"** AS THEY WILL BE ACTIVATED FOR BID SUBMISSION ONLY AFTER RECEIPT OF TRANSACTION FEE BY MSTC. 2) THE BIDDERS TO NOTE THAT IN THE EVENT THEY REMIT TRANSACTION FEES TO MSTC BUT **NOT WELL IN ADVANCE BEFORE THE LAST DATE OF SUBMISSION OF TENDER** & IN RESPONSE MSTC ALLOWS ONLINE ACCESS FOR FURTHER PROCESSING REGARDING SUBMISSION OF TENDER/DOCUMENTS AND IN THIS CONNECTION, IF BIDDER FINDS/FEELS SHORTAGE OF TIME/DAYS DUE TO ***LAST MOMENT ACCESS** PROVIDED TO THEM, **THEIR REQUEST FOR EXTENSION IN DUE DATE OF OPENING OF THIS E-TENDER IS RESERVED WITH MOIL.** CONTACT DETAILS MSTC: Email ids: 1) ngropn1@mstcindia.in 2) ngropn2@mstcindia.in 3) wrofin1@mstcindia.in

	Bidders may please note that the transaction fee should be deposited by debiting the account of the bidder only; transaction fee deposited from or by debiting any other party's account will not be accepted. Transaction fee is nonrefundable. **In case of failure to reach the payment towards Transaction fee for any reason, the Bidder will not have the access to online e-tender.**
4	Vendors are instructed to use Upload Documents link in "My documents" to upload all scanned copies of documents viz. testimonials, registration certificates etc. in document library. **Hard copies of bidding document (Part I Techno-Commercial and Part II Price Bid) will not be considered for evaluation (except wherever requested).** Multiple documents can be uploaded. Once documents are uploaded in the library, vendors can attach documents through Attach Document link.
5	**Important Notes to all prospective bidders**: For online bidding through MSTC Portal, the bidders are to be registered with www.mstcecommerce.com/eprocn and the bidders should have Class III Digital Certificate both Signing & Encryption type issued by Certification Authority (Refer Point No.1 of this Annexure). In order to get the email/message notification regarding activities related to this tender, bidders/vendors are requested to subscribe to the category of tenders as per their choice selecting MOIL as the buyer under 'My Subscription'.
6	(A) Part I – Techno-Commercial will be opened electronically on specified date and time as given in the NIT. Bidder(s) can witness the status of the opening of bid under 'Event Details'.
	(B) Part II –Price Part will be opened electronically of only those bidder(s) whose Part I – Techno-Commercial Part is found to be acceptable, on specified date and time which shall be announced by MOIL. Bidder(s) can witness the status of the opening of bid under 'Event Details'. Such bidder(s) will be intimated date of opening of Part II-Price Part, through valid email confirmed by them.
7	All notices and correspondence to the bidder(s) shall be sent by email only during the process till finalization of tender by MOIL Ltd., as well as by MSTC (e-procurement service provider). Hence the bidders are required to ensure that their corporate email I.D. provided is valid and updated at the stage of registration of Bidder with MSTC (i.e. Service Provider). Bidders are also requested to indicate their valid corporate email I.D. and Mobile No. of authorized officials in Annexure-C (General, Qualification, Financial & Scope of work Terms & Conditions, Format) for communication through email/SMS alerts (if any). Bidders are also requested to ensure validity of their DSC (Digital Signature Certificate).
8.	i) Please note that there is no provision to take out the list of parties downloading the tender document from the web site mentioned in NIT. As such, bidders are requested to see the web site once again before the due date of tender opening to ensure that they have not missed any corrigendum uploaded against the said tender after downloading the tender document. **The responsibility of downloading the related corrigenda, if any, will be that of the downloading parties.** ii) No separate intimation in respect of corrigendum to this NIT (if any) will be sent to Bidders who have downloaded the documents from web site. Please see website www.mstcecommerce.com/eprocn of MSTC Ltd. & www.moil.nic.in of MOIL Ltd. & www.eprocure.gov.in. of CPP Portal.
9.	Bidders are also requested to download Bidder guide from the link www.mstcecommerce.com/eprocn. Bidders are requested to study Bidder Guide and post their queries, if any, to MSTC over e-mail well in advance.
10.	Bidders are requested to give sufficient time to bid in an organized manner and report any problem arisen to MSTC in advance & not in the closing stage.

ANNEXURE 'A'
Part-II

1	**A) Special Note towards Earnest Money Deposit (EMD):** The intending bidders should submit Earnest Money to MOIL Ltd., along with their offer otherwise their offer will be summarily rejected. The EMD shall be in one of the following forms: (i) EMD should be deposited Electronically (RTGS/NEFT) from Nationalised/Scheduled Commercial Bank only in the designated account as under: a. Name of Bank & Branch: IDBI Bank, Civil Lines Branch, Nagpur b. Account No. 0041102000038465 c. IFS Code: IBKL0000041 EMD should be deposited in one go and exact amount should be reflected in our Bank Statement on or before the opening date & time of tender. After remittance of Earnest Money as above, UTR No./Reference No. in case of IDBI Bank should be informed by participating bidder with Techno-commercial bid. The receipt of EMD shall be verified by MOIL Ltd., against details of the UTR No. /Reference No. in case of IDBI Bank and offers of those participating bidders whose receipt of EMD is confirmed by Finance Department, MOIL Ltd., shall be considered for further evaluation. In short, informing the correct UTR No. /Reference No. in case of IDBI Bank is mandatory, failing which the offer shall be liable to be rejected. OR (ii) An irrevocable bank Guarantee issued by a Nationalised / Scheduled commercial bank, having branch located at Nagpur, except cooperative bank, in the given format (copy attached) with validity 60 days beyond the validity of the tender or extended up to finalisation of tender issued by a Nationalised / Scheduled commercial bank. Scan copy of irrevocable bank Guarantee to be uploaded along with Part-I and original copy is to be submitted to this office after opening of Part-I techno-commercial bid. **B) PSUs:** State/Central Govt. Organization/PSUs are exempted from submission of EMD/SD. However, they should mandatorily mention the document type in the space provided in the Commercial Term Template on MSTC Portal and Upload the relevant document, failing which the offer shall be liable to be rejected. The Earnest Money (without any interest) will be returned to the un-qualified tenderer(s) on evaluation of Part-I and to the un-successful tenderer(s) as promptly as possible as but not later than 30 days after the expiry of the validity of the tender. The Earnest Money deposited by the successful tenderer will be returned after commencement of work as per work order and submission of Security Deposit for the due fulfilment of the Contract.

2	On receipt of the Transaction fee, bidders/vendors will be able to participate in the online bidding event.
3	e-tender cannot be accessed after the due date and time mentioned in NIT.
4	Any order resulting from this open e-tender shall be governed by the terms and conditions mentioned in this e-tender.
5	No deviation to the General, Financial, Technical, and Commercial Terms & Conditions are allowed.
6	After submitting an online bid, the bidder cannot access the tender, once it has been submitted with digital signature.
7	MOIL LIMITED reserves the right to cancel or reject or accept or withdraw or extend this e-tender in full or part as the case may be without assigning any reason thereof.
8	MOIL LIMITED reserves the right to vary the quantity of the item or to go for divisible contract (covered in this e-tender) **before the date and time of starting of e-tender** for submission of online Bid.
9	The online tender should be submitted strictly as per the terms and conditions and procedures laid down in the website www.mstcecommerce.com/eprocn of MSTC Ltd.
10	The bidders must upload all the documents required as per terms of NIT. Any other document uploaded which is not required as per the terms of the NIT shall not be considered.
11	i) EMD shall be forfeited or bank guarantee shall be invoked, if any bidder withdraws their offer before finalization of the tender. ii) The documents uploaded by bidder(s) will be scrutinized. In case any of the information furnished by the bidder is found to be false during scrutiny, EMD of defaulting bidder(s) will be forfeited or bank guarantee shall be invoked. Punitive action including suspension and banning of business can also be taken against defaulting bidders at the discretion of the Company.
12	a. Canvassing in connection with the tender, in any form is strictly prohibited and the tenders by such contractors, who resort to canvassing, will be liable to rejection. b. At the time of submitting bid or on the date of tender opening or at the time of placement of order by MOIL Ltd., if business dealings with the Agency have been banned by the Central or State Government or any other public sector enterprise, this fact must be clearly informed to MOIL Ltd. c. MOIL reserves the rights to keep on hold participation in tenders or to ban business dealings if any Agency has been found to have committed misconduct and also to suspend business dealings pending investigation.
13	As per new system of Central Public Procurement Portal (CPP-Portal) of Government of India, the tender document shall be uploaded on the website i.e., http:// www.moil.nic.in & http://www.eprocure.gov.in.

JOINT G.M. (CMC)

ANNEXURE-B

Important instructions for E-procurement

Bidders are requested to read the terms & conditions of this tender before submitting your online tender.

1	**Process of E-tender:** **A)** Registration: The process involves vendor's registration with MSTC e-procurement portal which is free of cost. Only after registration, the vendor(s) can submit his/their bids electronically. This submission of bids shall be done over the internet. The Vendor should possess a valid Class III signing and encryption type digital signature certificate. Vendors are to make their own arrangement for bidding from a computer connected with Internet. MSTC is not responsible for making such arrangement. (Bids will not be recorded without Digital Signature). SPECIAL NOTE: THE PRICE BID HAVE TO BE SUBMITTED ON-LINE AT www.mstcecommerce.com/eprocn Vendors are required to register themselves online with https://www.mstcecommerce.com/eprocn → Register (Filling up details and creating own user id and password) → Submit. Please follow the 'Registration Guide' available in the Registration link before proceeding. Vendors will receive a system generated mail confirming the registration in their email which has been provided during filling the registration form. The Vendors shall have to subscribe to the buyers and categories in order to receive system generated mails. In order to subscribe, a vendor has to login and click on 'My Subscription' followed by 'Add Subscription'. On successful subscription, a system generated mail shall be forwarded to the vendor. Please follow the guide for 'Subscription' of 'Download Guides' available in the Dashboard before proceeding. Centralized MSTC Helpdesk for Vendors: 07969066600 helpdeskho@mstcindia.in Please mention "HO Helpdesk" as subject while sending emails "9:30 AM to 5:00 PM on all working days for all Technical issues relating to e-Tenders, System settings etc." Contact person (MSTC Ltd): Sh. B. S. PRADHAN, Dy.GM, MSTC-Nagpur, ngropn1@mstcindia.in 07122550075, 9903191469, Smt. Lisbeth Dias, Sr. Manager, MSTC-Nagpur, ngropn2@mstcindia.in 07122550075, 9820158988 **B) System Requirement:** i) Operating System-Windows 10 and above ii) Web Browser-Google Chrome, IE or Firefox. iii) Signing and Encryption type digital signature System Settings Upon clicking on www.mstcecommerce.com/eprocn, a pop-up of system settings will appear, detailing the system settings. Press OK to proceed for checking system settings. Click on Download certificate and Download System Settings Guide. If you do not have Java installed, click on 'Download Java'. Based on the Java version (32 bit or 64 bit) vendor have installed, download the PKI application. OPEN PKI Application and follow the procedure as per the System Settings Guide.

2	The tender will be opened electronically on specified date and time as given in the NIT.
3	All entries in the tender should be entered in online Technical & Price Formats without any ambiguity.
4	All notices and correspondence to the bidder(s) shall be sent by email only during the process, up to the finalization of tender by MOIL Ltd/ MSTC Ltd. Hence the bidders are required to ensure that their official email ID provided is valid and updated at the stage of registration of vendor with MSTC (i.e. Service Provider). Bidders are also requested to ensure validity of their DSCs (Digital Signature Certificates).
5	E-tender cannot be accessed after the due date and time mentioned in NIT.
6	Bidding in e-tender: a. The process involves Electronic Bidding for submission of Bid. b. The bidder(s) can submit their Bid through internet in MSTC Website www.mstcecommerce.com/eprocn c. The NIT/ Documents shall be available for download in the event catalogue available under 'Event Details' of the Event. d. Please follow the guides for 'Uploading encryption public key' and 'Bidding' under 'Download Guides' available in the Dashboard before proceeding to submit bid. e. The bidders may upload the bidding related documents in the link 'My Documents'. The documents uploaded here shall be available for attaching with this event in the Bid Floor. f. In order to submit bid, a vendor has to go to 'Events' from the menu and select 'Bid Floor'. The vendor has to select the buyer 'MOIL' from the buyer list in order to view the live events list. The correct event has to be selected from the event list for participation. A vendor has to submit 'Event wise bid details' that may consist of 'Common Terms' and/ or 'Document Attach'. A vendor has to save the Common Terms and/ or attach documents by clicking the respective buttons. Once the event specific bids are saved, the status is updated in 'Event specific bid status' and the 'Lot specific bid' button appears on the bid floor. Thereafter vendor has to click button under 'Technical Cover' in order to save the technical bid for specific lots. Once the technical bid is saved, the 'Price Cover' button appears on the screen for respective lots. Once price bid is saved, the vendor has to click on 'Final Submit'. On final submission of bid, the status of the bid submission shall display 'Bid submitted' under 'Item specific bid status'. A vendor shall receive system generated mail. **NOTE:** The bid cannot be revised once the Final Submit button has been clicked by the bidder. However, if the bidder wishes to change his bids then he may delete the bid and re- submit the same. g. In all cases, bidder should use their own ID and Password along with Digital Signature at the time of submission of their bid. h. During the entire e-tender process, the bidders will remain completely anonymous to one another and also to everybody else. i. The e-tender floor shall remain open from the pre-announced date & time and for the duration mentioned above. j. All electronic bids submitted during the e-tender process shall be legally binding on the bidder. Any bid will be considered as the valid bid offered by that bidder and acceptance of the same by Buyer will form a binding contract between Buyer and the Bidder. k. It is mandatory that all the bids are submitted with digital signature certificate otherwise the same will not be accepted by the system.

	l. Buyer reserves the right to cancel or reject or accept or withdraw or extend the tender in full or part as the case may be without assigning any reason thereof. m. No deviation of the terms and conditions of the tender document is acceptable. Submission of bid in the e-tender floor by any bidder confirms his acceptance of terms & conditions for the tender. n. Unit of Measure (UOM)is indicated in the e-tender Floor. Rate to be quoted should be in Indian Rupee as per UOM indicated in the e-tender floor/tender document.
7	Any order resulting from this tender shall be governed by the terms and conditions mentioned therein.
8	No deviation to the terms & conditions are allowed.
9	Buyer has the right to cancel this e-tender or extend the due date of receipt of bid(s) without assigning any reason thereof.
10	The online tender should be submitted strictly as per the terms and conditions and procedures laid down in the website www.mstcecommerce.com/eprocn of MSTC Ltd.
11	The bidders should upload all the documents required (if any) as per terms of NIT. Any other document uploaded which is not required as per the terms of the NIT shall not be considered.
12	The bid will be evaluated based on the filled-in Price bid formats.
13	Canvassing in any form in connection with the Tender is strictly prohibited and the bids submitted by the bidders who resort to canvassing are liable to be rejected.

DGM (SYSTEM) & NODAL OFFICER

ANNEXURE - "B-1"

Important instructions for E-Reverse Auction

Bidders are requested to read the terms & conditions of this tender before participating e-reverse auction.

E-Reverse Auction:	
i	Vendors are to submit techno-commercial and price bid on line. Bidders who qualify for bidding prices of offered products (on the basis of evaluation of their techno-commercial offers) shall be required to participate in an electronic reverse auction process to submit their price quotation against the items covered by this tender within a limited time period on a date as announced by MOIL. Such bidders shall be allowed to participate in the reverse auction using their secured user ID, password and DSC to place their best bids during the auction period.
ii	During reverse auction process the bidders can respond on the spot to the price trends and can offer their competitive bids. The logged in bidders will know the prevailing lowest bid at any given point of time but not the identity of the other bidders. The bidders can place their bids from any place for which they need is a computer with a browser interface and good internet connectivity.
iii	Bidders shall be required to get themselves familiarized with the detailed step by step method of participation in the reverse auction and submission of on-line bid, by suitably getting in touch with MSTC. Failure to do so by any bidder shall be at their own risk and responsibility and MOIL / MSTC shall not entertain any request to re-conduct the auction process on the plea of lack of understanding of the auction process by a particular bidder.
Method of submission of online bid in the E-Reverse Auction:	
i	During the entire reverse auction process, the bidders will remain completely anonymous to all other bidders. Vendor to click on 'Bid Floor' and live event listing of MOIL will appear. Once Transaction fee is paid (if any), the tab 'RA Bid Floor' shall appear.
ii.	The bid floor shall have all the necessary information related to bidding for a lot. The 'Refresh' button reloads the bidding page. 'My Status' provides the latest status of the bidder for a particular lot. 'Bid History' provides the information about last few bids and the bidding trend. The 'Event Details' leads to the previous page. In order to place a bid, the button 'Bid' has to be clicked.
iii.	On entering the respective values against the price fields, the system calculates the 'Bid Amount' based on the predefined formula. On clicking 'Bid', the DSC gets verified and bid is placed. 'My Status' displays the bidder's own status for a particular lot of an event.
iv	During the reverse auction process prospective bidders shall not be allowed to increase their bid price after a bid is submitted by them. For example, if bidder, "A" has already submitted a bid of Rs.100/-, any subsequent bid by the bidder, "A" has to be lower than Rs.100/-.
v	Another bidder "B" shall have the option to quote only lower price than Rs.100/- at that point of time but not Rs 100/-. Even if he attempts to quote Rs 100/-, the system will reject the bid with a suitable message on the screen.
vi	The bid price for the item can be reduced by a bidder by a minimum pre decided amount (ranging between 0.2% to 0.5% of start bidding price). Please check MSTC Portal before participation in E-reverse auction.
vii	Only the chronologically last bid submitted by the bidder till the end of the auction, will be considered as the valid price bid of that bidder. Any bid submitted earlier by the bidder prior to submission of his last bid and before close of the auction will not be considered as the valid price bid.
viii	The bid history shall display the last bids received from different bidders in the auction in descending order of bid time. 'Bid History' displays the bid trend for the particular lot of an event.
ix	On expiry of the announced closing time of the auction, the bid history showing all the last valid bids offered will be published.

x	The auction floor for Reverse Auction shall remain open on a pre-announced date and time, which shall be intimated to techno commercially - qualified bidders in advance. There would be an option for auto extension of the bidding time by 5 minutes every time, if a bid lower the lowest bid till that time is received within the last 5 minutes of the initial time slot. And the process will continue till such time when there will be no bid for continuous five minutes.
xi	All electronic bids submitted during the reverse auction process shall be legally binding on the bidder. The chronologically last bid submitted by the bidder till the end of the auction as mentioned in clause above will be considered as the valid price bid offered by that bidder (and acceptance of the same by MOIL will form a binding contract between MOIL and the bidders).
xii	Bidders have to specifically accept the above methodology of submission of on-line price bid in the e-reverse auction.

ANNEXURE- "C"

General, Qualification, Financial, Technical & Commercial Terms & Conditions		
1. The bidder should confirm the acceptance of General, Qualification, Financial, Scope of work and indicate details. (Bidder should read the NIT and all the Annexure forming part of this e-tender before filling the details or confirming acceptance). **2.** Under column "Bidder Response", bidder has to fill up complete relevant details wherever "Remark" is mentioned. **3.** Scope of work shall include, but not limited to, the following:		
General, Qualification, Financial, Technical & Commercial Terms & Conditions		
Sl. No.	Particulars	Bidder Response
1.	**Name of the Work:** "Design, engineering, procurement & supply, construction, erection, testing & commissioning and comprehensive operation & maintenance for 5 Years of Solar PV Project of capacity 15 MW (AC) with seasonal tilt at Rajgarh Khas in Madhya Pradesh."	**AGREE**
2.	Name of the Bidder (Company / Firm / LLP)	REMARK
3.	Address for correspondence along with Telephone No. & Fax No.	REMARK
4.	Valid corporate e-mail ID of the bidder (Refer to Annexure "A" Part-I)	REMARK
5.	Mobile No. of authorized official of the bidder (Refer Annexure "A" Part-I)	REMARK
6.	Reference No. & date of bid.	REMARK
7.	The Total Project cost including 5 Years COMC cost is estimated for **INR 63.77 Crores** + GST as applicable.	AGREE
8.	The works are required to be completed within **6 months** from the date of signing of the contract, allowing a mobilization period of 20 days. The COMC for 5 Years shall be commenced after successful completion of warrantee period.	AGREE
9.	The Goods and Services Tax (GST) rates applicable for Lot No. 1 to 3 is 5% and on Lot No. 4 to 6 is 18% as mentioned in Annexure 'F'.	AGREE
10.	The total cost towards COMC (Comprehensive Operation and Maintenance) for 5 Years shall be fixed @ **10.58%** of total quoted/negotiated basic price by the tenderer for Lot No.1 to Lot No.5, which shall be in addition to the total price for Lot No.1 to Lot No.5.	AGREE
11.	The Bidder shall read all the clauses of Notice inviting Tender, Chapter-II (Conditions of Contract) of the Tender document and unconditionally agree to all the terms and conditions of the Tender document.	AGREE
12.	The bidder should upload necessary documents as desired under Eligibility criteria, Chapter-II, clause No. 3. Please upload the required documents in Techno-commercial (Part-I) under upload document link in live bid floor.	AGREE + UPLOAD
13.	The bidder should upload necessary documents as desired under Class-I and Class-II Local Supplier, Chapter-II, clause No. 5. Please upload the required documents in Techno-commercial (Part-I) under upload document link in live bid floor.	AGREE + UPLOAD
14.	The bidder should upload Integrity Pact as per Annexure G of Chapter-V. Please upload the required documents in Techno-commercial Part (Part-I) under upload document link in live bid floor.	AGREE + UPLOAD

	Integrity Pact: - a) The bidder is required to submit the integrity pact agreement duly filled, scanned & signed by authorized signatory of tender as per enclosed Annexure along with the tender document & upload. b) In event the bidder happens to be the successful bidder, the said bidder will have to submit the above-mentioned Integrity Pact on minimum Rs. 100/- (Non-judicial) Stamp Paper. For this the authorized signatory along with authorization letter will have to visit office of HoD, CMC, "MOIL Bhawan", 1-A, Katol Road, Nagpur, and ensure completion of all the formalities towards Integrity Pact. A person signing IP shall not approach the courts while representing the matters to IEMs and He/She will await their decision in the matter. The details of Independent External Monitor (IEM) nominated for this tender are given here as under: SN. Name of Independent External Monitor 1: Cmde Rakesh Anand (E-mail ansem_2000@yahoo.com) 2: Shri Nand Kumar Mishra (Email- lambodhar2021@gmail.com , adidev2014@gmail.com)	
15.	The bidder should upload covering letter as per Format 3 of Chapter V	AGREE+UPLOAD
16.	The bidder should upload declaration from all members of the bidder that they have not been banned or delisted by any Govt. or quasi-Govt. agencies or PSUs. Please upload the required documents in Techno-commercial Part (Part-I) under upload document link in live bid floor.	AGREE+UPLOAD
17.	The bidder should upload copy of PAN card Please upload the required documents in Techno-commercial Part (Part-I) under upload document link in live bid floor.	AGREE+UPLOAD
18.	The bidder should upload duly signed and stamped or digitally signed copy of complete tender document including drawings and annexures as a token of acceptance of all the terms and conditions of the tender document. Tender document should be signed by authorized signatory. Please upload the required documents in Techno-commercial Part (Part-I) under upload document link in live bid floor.	AGREE+UPLOAD
19.	The bidder should upload all the relevant Formats of Chapter V for qualification information. Please upload the required documents in Techno-commercial Part (Part-I) under upload document link in live bid floor.	AGREE+UPLOAD
20.	Please upload details of Earnest Money remitted /Document type towards exemption- a) Name of remitting bidder /contractor: b) Amount remitted: c) Date of remittance: d) U.T.R./Ref. No./BG Details.	REMARK+ UPLOAD
21.	a) Bidders are advised to inspect and examine the site and the surroundings and satisfy themselves before submitting their tenders, as to the nature of the ground / dump and sub soil (so far as is practicable), the form and nature of the site, the means of access to the site the accommodation they may require and in general shall themselves obtain all necessary information as to risk, contingencies and other circumstances which may influence or affect their tender. b) Submission of the tender by a bidder shall imply that he has read this notice and all other contract documents and has made himself aware of the scope and specification of the work to be done.	AGREE

22.	a) If the proprietor / partner / Director of the firm/ company has any relationship within the meaning of Section 2(77) read with Rule 4 of the Companies Act, 2013 with any of the employee working in MOIL Ltd or Director of MOIL shall declare the same in his bid. b) The person or team representing the firm is also representing any other firm participating against the tender and if so, give the details thereon. Non-disclosure/ Incorrect disclosure of the above details factually by a firm either on its own while submitting its offer or upon enquiry at the option of MOIL during the scrutiny of its offer may invite penal action against the firm, which may include rejection of the offer, suspension of business dealings or both.	AGREE
23.	a) The bidder shall submit the tender satisfying each condition laid down in the notice, failing which, the tender will be liable to be rejected. b) Any conditional tender is liable to be rejected summarily c) **VALIDITY OF OFFER**: Each bidder shall keep his offer open for a period of six months from the last date of submission of the bid and in the event of the bidder withdrawing the offer before the aforesaid period, for any reason, whatsoever, the earnest money deposited by the bidder may be forfeited.	AGREE
24.	a. All electronic bids submitted during the e-tender process shall be legally binding on the Bidder. Any bid will be considered as the valid bid offered by that Bidder & acceptance of the same by the MOIL will form a binding contract between MOIL & the Bidder. No deviation to terms & conditions of the tender document is acceptable. In case it is found that the Bidder has mentioned deviation in any other form or in any uploaded document, the same shall not be considered & offer shall be treated as non-responsive.	AGREE
25.	a) **RIGHT OF ACCEPTANCE:** MOIL does not bind himself to accept the lowest or any other tender and reserves the right of accepting the whole or any part of the tender or portion of the quantity offered. MOIL reserves the right to reject or accept any tender either in whole or in part without assigning any reason whatsoever. b) The bidding should be strictly as per the terms and conditions and procedures laid down in the tender document failing which the bid is liable for rejection. Tenders sent through Telegram, Telex, Fax, hard copy, e-mail or any other means except as allowed in the tender will not be considered. c) MOIL LIMITED has the right to cancel this e-tender or extend the due date of receipt of bid(s) without assigning any reason thereof. d) Bidders are also requested to download vendor guide from the link www.mstcecommerce.com/eprocn/. Bidders are to upload supporting documents WHEREEVER MENTIONED/REQUIRED	AGREE
26.	**DEVIATION:** The bidder shall submit a certificate stating "**This is to certify that, there is no deviation in the offer submitted by us, from the tender technical specifications, terms & conditions. In case, if there is any difference in any terms & conditions, the same may be ignored and considered to have been accepted by us in Toto as per NIT.**" Scanned copies of above certificate to be uploaded.	AGREE + UPLOAD
27.	The Bidder shall read all the clauses of **Chapter-II (**General terms and condition) of the Tender document and unconditionally agree to all the terms and conditions of the Tender document.	AGREE

28.	The Bidder shall read all the clauses of **Chapter- III** (Scope of work) of the Tender document and unconditionally agree to all the terms and conditions of the Tender document.	AGREE
29.	The Bidder shall read all the clauses of **Chapter- IV (**Time schedule) of the Tender document and unconditionally agree to all the terms and conditions of the Tender document.	AGREE
30.	The Bidder shall carefully read **Annexure-D** (Special Terms and Conditions) and all formats provided in **Chapter V** of the Tender Document. The Bidder shall unconditionally agree to all terms and conditions set forth in the Tender Document and shall upload all required documents accordingly.	AGREE + UPLOAD
31.	Details of the proposed system for solar power plant complete. **Please upload the required documents in the Technical and Commercial Part (Part-I) under upload document link in live bid floor.**	AGREE + UPLOAD
32.	Details of proposed technique for power evacuation system. **Please upload the required documents in the Technical and Commercial Part (Part-I) under upload document link in live bid floor.**	AGREE + UPLOAD
33.	The project is considered to have a capacity of 15 MW AC, which shall be deemed equivalent to 18 MWp (DC). No objections, arguments, or technical discussions regarding this equivalence will be entertained.	AGREE
34.	The bidder shall design the project and all related components in strict compliance with above Clause 31 ensuring full implementation thereof.	AGREE
35.	Technical specification of all deliverable P&M as per technical data sheets given in **Clause No. 4.1 to 4.45** of Chapter **IV. Please upload the required documents in Technical and Commercial Part (Part-I) under upload document link in live bid floor.**	AGREE + UPLOAD
36.	All relevant Statutes, Rules & Regulations including Indian Standards (IS) and other applicable standards have been referenced in this bid. Due care has been taken in this regard. However, the bidder is required to ensure compliance with the latest amendments thereto and include any additional applicable standards or rules that may have been omitted.	AGREE
37.	Detailed time schedule in BAR/GANTT chart. **Please upload the required documents in Technical and Commercial Part (Part-I) under upload document link in live bid floor.**	AGREE + UPLOAD
38.	Bidders are required to submit Copy of the PF registration duly allotted by Regional Provident Fund Commissioner. In case the tenderer does not possess the PF registration number at the time of submission of tender, then an undertaking on a Non-Judicial Stamp Paper of Value not less than Rs.100/- stating that "Within One Month from the date of issue of Letter of Intent/Letter of Award of Contract Tenderer shall obtain PF code Number and submit a copy of the same to MOIL "	AGREE + UPLOAD
39.	a) **GSTN Registration No.: (This is to be mentioned mandatorily)** b) Tenderer to mention their GST No. (for location from where the materials/Services shall be dispatch/provided by them upto Destination basis) Please Upload copy of document evidencing provisional GSTIN ID/or ARN issued by GSTN. Also upload **copy of PAN card.** c) Bidder to confirm HSN code for the offered lots. d) **GST will be extra as applicable.** e) **TDS provision under GST: - TDS under GST will be deducted as per applicable provision.**	AGREE + UPLOAD

	TAXES: Payment of Tax is primarily the responsibility of the Contractor. Any change in taxation during the tenure of contract, will be as per applicable statute. Under GST regime registration under GST is made mandatory. Tenderer shall mention GST provisional Id. Offers received from company/firm/individual without GST provisional Id are liable to be rejected.	
40.	**RISK PURCHASE:** In the event of placement of order if the successful tenderer fails to execute the same to the satisfaction of the Company within the stipulated time, the Company shall arrange execution of works /procurement of items at supplier's/tenderer's risk and cost. Notice for execution of order on risk & cost of any contractor can be issued during valid period of contract also if contractor either fails to start the work within reasonable time, the progress of the job is poor or for any breach of contract. In such a case, MOIL Limited shall be entitled (a) to forfeit the whole or such portion of the Security Deposit as it may be considered fit and (b) to re-tender and/ or recover from the contractor the cost of carrying out the balance work and such excess sums which becomes payable by MOIL Limited over & above the rates of work had it been carried out by the contractor under the terms of the work order.	AGREE
41.	In case any Bidder from a country which shares a land border with India will be eligible to bid in this NIT, if the Bidder is registered with the competent authority from Government of India. Please refer the Order No. F.No.6/18/2019-PPD, Public Procurement no. 1, dt.23-07-2020. In continuation of this, please also refer OM No -P-45021/112/2020-PP(BE-II) (E-43780) dated 24/08/2020 issued by Ministry of Commerce and Industry, Department of Promotion of Industry, and Internal Trade.	AGREE
42.	Tenderers are requested to quote the per unit basic Rate only (in all lots), as per unit of Measurement and without GST. GST will be paid extra by MOIL, as per the prevailing rate.	AGREE
43.	It is mandatory for bidder to quote their price against each line item provided in price bid of tender inquiry. If any line item found unquoted same will be considered as Nil and total price offered by him will be evaluated accordingly.	AGREE

ANNEXURE "D"

PRICE BID FORMAT

Part-II (Price Part)

1. The bidder should confirm the acceptance of the price bid formats and related instructions as appearing in the tender document and indicate details. (Bidder should read the NIT and all the Annexure forming part of this e-tender before filling the details or confirming acceptance).

2. Under column "Bidder Response", bidder to fill up complete relevant details wherever "UPLOAD" / ÄGREE" is mentioned.

IMPORTANT PRICE BID TERMS & CONDITIONS OF NIT

S. No.	PARTICULARS	BIDDER RESPONSE
1	The Bidder shall read all the clauses of Chapter-V (FORMATS) Annexure 'F' (Price Bid) and of the Tender document and unconditionally agree to all the terms and conditions of the Tender document.	AGREE
2	The bidder should upload un-priced Price bid as per format (Chapter V)	AGREE+ UPLOAD
3	**a)** All electronic bids submitted during the e-tender process shall be legally binding on the Bidder. Any bid will be considered as the valid bid offered by that bidder & acceptance of the same by the MOIL will form a binding contract between MOIL & the Bidder. **b)** Unit of Measure (UoM) is indicated in the e-tender (Price Bid Format). Bidder to quote as per above-mentioned UoM in Indian Rupees. Price should be quoted in Indian Rupees (INR) as per price bid. **c)** MOIL will place orders in the name of successful bidder only. **d)** The bid will be evaluated as per the evaluation criteria mentioned in the tender document to arrive at the lowest bidder. **e)** No deviation to terms & conditions of the tender document is acceptable. In case it is found that the Bidder has mentioned deviation in any other form or in any uploaded document, the same shall not be considered & offer shall be treated as non-responsive.	AGREE+ UPLOAD
4.	The total cost towards COMC (Comprehensive Operation and Maintenance) for 5 Years shall be fixed @ **10.58%** of total quoted/negotiated basic price by the tenderer for Lot No.1 to lot No.5, which shall be in addition to the total price for Lot No.1 to lot No.5. This amount shall be payable on annual basis after completion of operational acceptance including warrantee period of 12 months as under: After completion of 1st year of COMC – 18% of total COMC Cost of 5 Years After completion of 2nd year of COMC –19% of total COMC Cost of 5 Years After completion of 3rd year of COMC –20% of total COMC Cost of 5 Years After completion of 4th year of COMC –21% of total COMC Cost of 5 Years After completion of 5th year of COMC –22% of total COMC Cost of 5 Years	AGREE

NEWS PAPER ADVERTISEMENT

MOIL LIMITED
(A Government of India Enterprise)
"MOIL Bhawan", 1-A Katol Road,
NAGPUR- 440 013, MAHARASHTRA, INDIA
CIN NO. L99999MH1962GOI012398

TENDER NOTICE

Notice Inviting Tender No. MOIL/ MOIL LIMITED/ Project/6/25-26/ET/50

Sealed tenders in two parts are invited from bonafide and experienced contractors for the following works.

Sl. No	Description & place of work	Completion period	EMD amount (INR in Crore)	Estimated cost (approx.)
1.	Design, Engineering, Procurement & Supply, Construction, Erection, Testing & Commissioning and Comprehensive Operation & Maintenance for 5 Years of Solar PV Project of Capacity 15 MW(AC) with seasonal tilt at Rajgarh Khas in Madhya Pradesh.	6 Months	0.50	Project cost including 5 Years COMC cost is estimated to cost **INR 63.79 Crores** +GST as applicable.

For details of Tender Document and schedule of e-tender visit websites MOIL website https://moil.nic.in & e-tender website https://www.mstcecommerce.com/eprocn/ (for e-bid) and Indian Government's Central Public Procurement (CPP) Portal (https://eprocure.gov.in). Corrigendum if any shall be uploaded on the above mentioned websites and shall not be published in the Newspaper.

Har ek kam desh ke nam
MOIL - Adding Strength to Steel

Jt. General Manager (Elect.)
MOIL Limited

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CHAPTER-I

DEFINITIONS & INTERPRETATIONS

PREAMBLE

MOIL Limited intends to undertake the Project work "Design, Engineering, Procurement & Supply, Construction, Erection, Testing & Commissioning and Comprehensive Operation & Maintenance for 5 Years of Solar PV Project of Capacity 15 MW (AC) with seasonal tilt at Rajgarh Khas in Madhya Pradesh". The terms & conditions, requirements, and specifications for these works for the contract are set out in this tender document.

DEFINITION & INTERPRETATIONS

In the contract (as hereinafter defined) the following words and expressions shall have the meaning hereby assigned to them, except otherwise specified.

1. The **"COMPANY"** shall mean MOIL Limited, incorporated in India, having their registered office at MOIL Bhawan, 1-A, Katol Road, Nagpur- 440013 and hereinafter referred to as MOIL.

2. "**THE CHAIRMAN CUM MANAGING DIRECTOR**": shall mean the Chairman & Managing Director of MOIL, or his successors in office, as designated by the Company.

3. **"THE CONTRACTOR"** shall mean the person or persons, Firm or Company whose tender has been accepted by the Company an includes the contractor's legal representative, his heirs' successors, and assignees

4. "**EXCAVATION"** shall mean and include all works to be executed in accordance with the contract and shall include all activities such as site preparation, loading & transportation, and unloading at specified locations in the waste dumps.

5. "**CONTRACT"** shall mean the agreement between the Company and the Bidder for the execution of the works included therein, all documents such as the invitation to tender, instructions to tenderers, general conditions of the contract, time schedules of completion of jobs, drawings, awarding the work etc.

6. "**CONTRACT DOCUMENT**" shall mean collectively the tender documents designs, drawings, specifications and any other documents constituting the tender.

7. "**TEMPORARY WORK"** shall mean all temporary works of every kind required in or about the execution, completion, or maintenance of the works.

8. "**SPECIFICATIONS"** shall mean all directions, written or verbal by the authorized representative of MOIL various technical specifications, provisions and requirements attached to the contract.

9. **"PLANS"** shall mean and include all maps, sketches, layout, and section as are incorporated in the contract in order to define broadly the scope and specifications of the work or works and all reproductions thereof.
10. "**SITE"** shall mean the lands other places on, under in or through which the works are to be carried out and any other lands or places provided by the

Company for the purpose of contract.

11. "**NOTICE IN WRITING OR WRITTEN NOTICE**" shall mean a Notice in written, typed, or printed characters sent to the registered office of the addressee and shall be deemed to have been received in the ordinary course of post by which it would have been delivered.

12. "**THE COMPLETION CERTIFICATE**" shall mean the certificate to be issued by the designated Project In-Charge at Head office or the person so authorised, confirming that the Contractor has satisfactorily completed all construction, erection, installation and related works in accordance with technical specification specified and terms & conditions of the contract and shall include the committed performance of facilities for one month.

13. "**THE APPOINTING AUTHORITY**" for the purpose of arbitration shall be the Chairman cum Managing Director or any other person so designated by him.

14. **"THE ACCEPTING AUTHORITY**" shall mean the Chairman cum Managing Director of MOIL Limited or his authorized representative.

15. "**LETTER OF INTENT**" shall mean intimation by a letter to Tenderer that the tender has been accepted in accordance with the provisions contained in the letter.

16. "**MINE MANAGER"** shall mean Dy.GM (Mines)/ Chief (Mines)/Dy. Chief (Mines) etc. designated and authorized to work as a Mine Manager of the respective mine, in terms of the Mines Act.

17. "**WORK/WORKS**" shall mean the works to be executed, in accordance with the Contract and shall include all extra or additional, altered or substituted works, as required, for the performance of the Contract.

18. "**ENGINEER IN-CHARGE**" shall mean officer or officers as may be designated, deputed or authorized, by the company for the purpose of this contract and shall include Project in charge / Engineer in charge or representative as authorised so.

19. "**N.I.T"** shall mean all documents forming part of this notice of invitation of the tender.

20. **"Solar Power Plant**" shall mean Designing, Installation and commissioning with 5 years comprehensive O&M of 15 MW (AC) Grid Connected Solar Photovoltaic Power Plant.

21. **"Applicable Law"** means any statute, law, regulation, ordinance, notification, rule, regulation, judgment, order, decree, bye-law, approval, directive, guideline, policy, requirement or other governmental restriction or any similar form of decision of, or determination by, or any interpretation or administration having the force of law in the Republic of India and the State Government, by any Government Authority or instrumentality thereof, whether in effect as of the date of this Contract or thereafter.

22. **"Affected Party"** means Employer or the Contractor whose performance has been affected by an event of Force Majeure.

23. **"Bid"** shall mean the Techno Commercial and the Financial Proposal submitted by the Bidder along with all documents/credentials/attachments annexure etc., in response to this IFB, in accordance with the terms and conditions hereof.

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

25. **"CEA"** shall mean Central Electricity Authority.

26. **"Chartered Accountant"** shall mean a person practicing in India or a firm whereof all the partners practicing in India as a Chartered Accountant(s) within the meaning of the Chartered Accountants Act, 1949;

27. **"Commissioning"** A project shall be considered commissioned if all equipment as per rated capacity has been installed and tested for satisfactory performance and generated energy has flown into grid.

28. **"COMPLETION OF WORK"** means completion of all works related to erection and commissioning of full capacity in all respects and demonstration of guaranteed CUF, to the satisfaction of Employer

29. **"Contract Documents"** means the documents listed in the Form of Contract Agreement.

30. **"Contract Value"** means the firm value of the quoted price by the successful bidder specified in its financial proposal as the sum of individual contract value of supply, erection and civil works under different work packages specified in the financial proposal, subject to such additions and adjustments thereto or deductions there from, as may be made pursuant to the Contract excluding taxes, duties levy etc., as applicable.

31. **"Contractor"** means the successful Bidder whose bid to perform the Contract has been accepted by the Employer and is named as such in the Contract Agreement, and includes the legal successors or permitted assigns of the Contractor.

32. **"Contractor's Equipment"** means any equipment, accessories, instruments, machineries, tools etc belonging to the contractor, brought to the site by the Contractor, acknowledged by the authorised person nominated by the Employer, for the exclusive work related to the development of the Project which can be taken out of the site only through an outward gate pass, certifying that these materials belong to the contractor and not forms part of the facilities of the plant or spare parts and no more they are required for any day to day work of the plant, issued by the Owner

33. **"Contractor's Representative"** means any person nominated and authorised by the Contractor and approved by the Employer to perform the duties delegated by the Contractor.

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

35. **"Employer"** MOIL Limited (MOIL), Moil Bhawan, A-1, Katol Road, Nagpur, - 440013, and includes the legal successors or permitted assigns of the Employer.

36. **“Facilities”** means the Plant and Equipment to be supplied and installed, as well as all the Installation Services including all infrastructures as mention in scope of works mentioned in detail under Section III: Technical Specification of this IFB, to be carried out by the Contractor under the Contract.

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

38. **“GCC”** means the General Conditions of Contract hereof.

39. **“GHI”** means Global Horizontal Irradiance

40. **“Guarantee Test(s)”** means the test(s) specified in the Technical Specifications to be carried out to ascertain whether the Facilities or a specified part thereof is able to attain the Functional Guarantees specified in the Technical Specifications.

41. **“IEC”** means International Electro-Technical Commission

42. **“Installation Services”** means all those services ancillary to the supply of the Plant and Equipment for the Facilities, to be provided by the Contractor under the Contract; e.g., transportation and provision of marine or other similar insurance (s), inspection, expediting, site preparation works (including the provision and use of Contractor’s Equipment and the supply of all use structural and construction materials required), installation including civil and allied works etc., testing, pre-commissioning, commissioning, operations, maintenance, the provision of operations and maintenance manuals, training of Employer’s Personnel etc.

43. **"kWh"** means Kilo-Watt-hour.

44. **“LOI”** means Letter of Intent

45. **"MWp"** means Mega-Watt Peak.

46. **“NIT”** means Notice inviting Tender.

47. **“NTP”** means Notice to Proceed.

48. **“O&M”** means Comprehensive Operation and Maintenance of the Facilities

49. **“Operational Acceptance”** means the acceptance by the Employer of the entire Facilities, which certifies the Contractor’s fulfilment of the Contract in respect of Functional and Plant Performance Guarantees of the Facilities in complete. O&M period shall commence after Operational Acceptance of the Facilities by the Employer.

50. **“Plant and Equipment”** means permanent plant, equipment, machinery, apparatus, articles and things of all kinds to be provided and incorporated in the Facilities by the Contractor under the Contract (including the spare parts), but does not include Contractor’s Equipment.

51. **“PR”** means Performance Ratio.

52. **“Pre-commissioning”** means the testing, checking and other requirements specified in the Technical Specifications that are to be carried out by the Contractor in preparation for Commissioning.

53. **“Project Manager/Engineer-in-Charge (EIC)”** means the person appointed by the Employer to perform the duties delegated by the Employer.

54. **“Site”** means the land and other places upon which the Facilities are to be installed, and such other land or places as may be specified by the Employer through authorised representative in the Contract as forming part of the Site.

55. **“Tax”** means the taxes/ duties/ levies/ octroi etc. as applicable and put in force by the state Government / central Government/ Local or Statutory bodies etc. from time to time.

56. **“Time for Completion”** means the time within which Completion of the Facilities as a whole (or of a part of the Facilities where a separate Time for Completion of such part has been prescribed) is to be attained in accordance with the stipulations in the SCC and the relevant provisions of the Contract.

57. **“TS”** means Technical Specifications

CHAPTER-II

GENERAL TERMS & CONDITIONS

1. TENDER FOR "Design, Engineering, Procurement & Supply, Construction, Erection, Testing & Commissioning and Comprehensive Operation & Maintenance for 5 Years of Solar PV Project of Capacity 15 MW(AC) with seasonal tilt at Rajgarh Khas in Madhya Pradesh".

2. e-tender with name of work superscribed as above are invited from appropriate class of bidders of the MES/CPWD/PWD of Maharashtra State/ M.P.State/ Public Sector Undertakings/Semi or Quasi Govt. Organization /Reputed Private Sector having experience in similar nature of works. The tenders will be received in two parts (Part-I and Part-II). No Joint venture or Consortium is allowed.

The date of opening of Part-I of two bids tender is mentioned in SOT.

The PART-II shall be opened online on a date, to be intimated, to only those Bidders, who qualify the conditions of PART-I. The Company's decision, in this regard, shall be final and binding.

2.1 The Project cost including 5 Years COMC cost is estimated to cost **INR 63.77 Crores + GST as applicable.**

2.2 The tender shall be submitted in the prescribed form.

2.3 The works are required to be completed within **6 months** from the date of commencement mentioned in the Letter of Intent / work order, allowing a mobilization period of **20 days** or from the date of handing over of the site, by the Engineer in Charge, whichever is later.

2.4 Tender documents, consisting of plans, specifications, schedule(s) of quantities of the various classes of works, to be done, the conditions of contract and other necessary documents are attached with the tender.

2.5 Tenderers are advised to inspect and examine the site and the surroundings and satisfy themselves before submitting their tenders as to the nature of the ground / dump and sub soil (so far as is practicable), the form and nature of the site, the means of access to the site the accommodation they may require and in general shall themselves obtain all necessary information as to risk, contingencies and other circumstances which may influence or affect their tender. A tenderer shall be deemed to have full knowledge of site, whether he inspects it or not and no extra charges, consequent upon any misunderstanding or otherwise shall be allowed.

2.6 **Location and Site:** Gram panchayat- Nesdi, Village- Gordhanpura, Dist. Rajgarh, Madhya Pradesh, 103 Acres (Approx.) allocated to MOIL is in Northeastern part of nearby Rajgarh Khas, Rajgarh Dist. at the latitude 23.977611N and longitude 76.707306E. Nearest Air Port is Raja Bhoj International Airport Bhopal 180Kms. from Rajgarh. The nearest railway station is Lanka Railway Station - The Biaora Railway Station 25Kms. apart from Rajgarh. The site is in the proximity of Rajgarh Town.

3. Eligibility/Qualifying Criteria:

A. Similar Work: The bidder should submit Experience Certificate along with detailed work orders of successfully completed similar works (work order & its completion certificate to be submitted) during last seven years ending last day of month previous to the one in which applications are invited should be either of the following: -

i) Three similar completed works each costing not less than the amount equal to 40 (forty) percent of the estimated cost; or

ii) Two similar completed works each costing not less than the amount equal to 50 (fifty) percent of the estimated cost; or

iii) One similar completed work costing not less than the amount equal to 80 (eighty) percent of the estimated cost; and

In case work is executed for private parties, self-certified copy of relevant Tax Deduction at Source (TDS) Certificate should be submitted by the tenderer along with relevant work order to enable ascertaining scope of work in addition to satisfactory work completion certificate from the party. In addition to above, if required, MOIL shall be at liberty to seek independent confirmations from concerned party to ascertain the veracity of the particulars submitted including scope of work and the bidder should have no objection to seeking such confirmations.

Details of Similar Works: Designed, supplied, erected and commissioned ground mounted Solar Photo Voltaic (SPV) based grid-connected one power plant of 6 MW or above capacity.

B. The bidder should have successfully completed comprehensive operation & maintenance of minimum 6 MW capacity SPV based grid-connected power plant for at least 2 years from the date of its commissioning, with in last 7 years from the last date of submission of techno-commercial bid. The bidder should submit documentary evidence in this regard.

C. Copy of the latest Income Tax return acknowledgement for preceding 3 assessment years (2022-23, 2023-24 and 2024-25) filed with the Income Tax department.

D. Average Annual financial turnover of related services during the last three years (i.e. FY-2021-22, FY-2022-23 and FY-2023-24), ending 31st March of the previous financial year, should be at least 30% (thirty percent) of the estimated cost.

E. Audited balance Sheet & Profit & loss account during the last three years.

F. For proof of Turnover, the certificate issued by practicing Chartered Accountant or Cost Management Accountant (with Membership number, Firm Registration number & UDIN) certifying the annual turnover be submitted.

G. GST Registration.

H. EPFO / PF Registration

4. Employer reserves the right to reject any or all bids or cancel/ withdraw the Notice Inviting Tender (NIT) without assigning any reason whatsoever and in such case no bidder/intending bidder shall have any claim arising out of such action.

4.1 CLASS-I AND CLASS-II LOCAL SUPPLIER:

The instant tender shall be inter-alia subject to "Public Procurement (Preference to Make in India), Order 2017, (as amended from time to time) bearing No. P-45021/2/2017-PP (BE-II) issued by the Government of India, Ministry of Commerce and Industry, Department for Promotion of Industry and Internal Trade (Public Procurement Sector) dated 29/05/2019 which is a part of this tender as Annexure - I. The Tenderers who wish to take the preference under the said Order dated 29/05/2019 shall mandatorily be required to submit the requisite documents as prescribed under the Public Procurement (Preference to Make in India), Order 2017. Only after satisfactory submission of the requisite documents benefits under the aforesaid Order shall be provided.

Revised Public Procurement (Preference to Make in India): Only to facilitate, we may request to refer Clause No.9 (a) & (b) of above order towards "Verification of Local Content" reproduced hereunder and upload as applicable:

a. The 'Class-I local supplier'/'Class-II local supplier' at that time of tender, bidding or solicitation shall be required to indicate percentage of local content and provide self-certification that, the item offered meets the local content requirement for 'Class-I local supplier'/'lass-II local supplier', as the case may be. They shall also give details of the location(s) at which the local value addition is made.

b. In cases of procurement for a value in excess of Rs.10 Crores, the 'Class-I local supplier'/'Class-II local supplier' shall be required to provide a certificate from

   i) Statutory auditor or cost auditor of the company (in the case of companies) or

   ii) A practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.

As per Revised Public Procurement (Preference to Make in India), Order 2017, bidder to mention % of local content & details of the location(s) at which the local value addition is made. **Kindly upload the certificate giving the percentage (%) of local content and give details of the location(s)/address(s) at which the local value addition is made.**

As per Revised Public Procurement (Preference to Make in India), Order 2017, on 16/09/2020 enclosed, Clause No.3, bidder to mention in which category their firm belong i.e. **Class-I Local Supplier/ Class-II Local Supplier/ Non-Local Supplier. Kindly upload the certificate by mentioning the Class.**

The tendered job cannot be split and the order against the above tender would be placed on one bidder only.

Notes:

i) Documentary evidence in the form of a signed photocopy of the work order and satisfactory completion certificate from the appropriate authority proving compliance for

3 and signed photocopy of audited statement of profit & loss and annual report proving compliance should be submitted along with the tender (Part-I).

ii) Experience and Turnover of the Holding company or subsidiary of the bidder will not be considered for qualifying.

iii) Work experience of a bidder as a member of any consortium shall be considered only subject to the condition that the said bidder had executed similar type/portion of work during the specified period in that consortium. Copy of the MOU/agreement/documents of the said consortium containing the role of the bidder is required to be submitted.

iv) Submission of the tender by a tenderer shall imply that he has read this notice and all other contract documents and has made himself aware of the scope and specification of the work to be done and of conditions and rates at which stores, tools, and plant items etc. if any, will be issued to him, by the Company and local conditions and other factors bearing on the execution of the works. Tenderers are requested to upload one set scan copy of tender documents (Part-I-Techno Commercial Part and Part-II -Price part without indicating rates) with seal & signature on each page or digitally signed as the token of the acceptance of the terms & conditions of the tender document along with Part-I of the Tender.

5 Mode of Submission:

A. The tenderer should submit the tender online in two parts i.e. Part I and Part II. Part I shall consist of general information and technical and commercial aspects and Part II consists of online price bid only.

B. Mode of submission: The tenders should be submitted in two parts viz. Part I (Techno-commercial Part) & Part II (Price bid) at MSTC website (www.mstcecommerce.com). Please refer Schedule of e-tender (SOT) and instructions to the bidders (Annexure-A & B) to participate in this e-tender and for submission of this e-tender.

C. PART I will be the basis, on which a tenderer becomes qualified, to be considered for the price bid in PART II and shall consist of the following:

a. Information about experience of work of similar nature, indicating the type of work executed, value of work, time period taken and the complete description of work, in clause 3 (A to B) of Chapter II and TABLE -1 of Chapter V.

b. Information regarding equipment, tools etc. giving the details of the equipment, rated capacity of the equipment and other relevant details which have a bearing on the work to be executed in separate Annexure.

c. One set of tender documents (Part-I-Techno Commercial Part and Part-II- Price part without indicating rates) with seal & signature on each page or digitally signed as the token of the acceptance of the terms & conditions of the tender document along with Part-I of the Tender to be uploaded by bidder.

d. The tenderer shall submit the following documents as part of his tender:

i. Copy of the latest Income Tax return acknowledgement for preceding 3 assessment years (2022-23, 2023-24 & 2024-25) filed with Income tax department along with the copy of PAN card.

ii. Documents showing annual turnover for the past 3 financial years

(2021-22, 2022-23, 2023-24).

iii. Copies of the latest GST Registration certificate issued by appropriate Authority.

6. Earnest Money:

The intending bidders should submit Earnest Money to MOIL Ltd., along with their offer otherwise their offer will be summarily rejected. The EMD shall be in one of the following forms:

I. EMD should be deposited Electronically (RTGS/NEFT) from Nationalised / Scheduled Bank only in the designated account as under:

a. Name of Bank & Branch: IDBI Bank, Civil Lines Branch, Nagpur
b. Account No. 0041102000038465
c. IFS Code: IBKL0000041

EMD should be deposited in one go and exact amount should be reflected in our Bank Statement on or before the opening date & time of tender.

After remittance of Earnest Money as above, UTR No./Reference No. in case of IDBI Bank should be informed by participating bidder with Techno-commercial bid. The receipt of EMD shall be verified by MOIL Ltd., against details of the UTR No. /Reference No. in case of IDBI Bank and offers of those participating bidders whose receipt of EMD is confirmed by Finance Department, MOIL Ltd., shall be considered for further evaluation. In short, informing the correct UTR No. /Reference No. in case of IDBI Bank is mandatory, failing which the offer shall be liable to be rejected.

OR

An irrevocable bank Guarantee issued by a Nationalised / Scheduled commercial bank, having branch located at Nagpur, except cooperative bank, in the given format (copy attached) with validity 60 days beyond the validity of the tender or extended up to finalisation of tender.

II. Scan copy of irrevocable bank Guarantee to be uploaded along with Part-I.

III. PART II portion shall consist of price bid only. While quoting the price under this part, the tenderer shall specifically confirm that the price, as quoted, in this part are for the scope of work, detailed in the technical specifications of the tender document. In scope of work at Chapter -IV, the bidders are requested to quote unit rate, against each item.

IV. Evaluation of Part-II (Price Bid) will be done based upon total amount inclusive of Goods & Services tax (GST) after deducting input tax credit available to MOIL. The Evaluation shall be done on the overall lowest bid received for 15 MW AC Solar Power Project including COMC for 5 years (i.e. Lot No. 1 to 6).

V. The tenders shall not be witnessed by the other bidder or bidders who himself / themselves has / have tendered or who may have tendered for the same works. Failure to observe this condition shall render the tender

of the bidder, tendering as well as of those witnessing the tender, liable for rejection.

VI. MOIL Ltd. does not bind itself to accept the lowest tender and reserves the right to accept/reject and/or split any or all tenders, without assigning any reasons, whatsoever.

VII. The tenderers are advised to submit quotations based on the terms and conditions and specifications contained in the tender document and not to stipulate any condition of their own. Any tenderer doing so shall be at his own volition and may render the tender liable for rejection.

7. CLARIFICATIONS / ADDENDA / CORRIGENDA:

a. Any clarifications furnished by the Company may be uploaded at MOILs website/ CPP Portal. If found necessary, such clarifications will constitute addenda to and be read as part of the Tender document.

b. In addition to the clarification above, please refer clause above, the company may on its own furnish to tenderers such clarifications and additional information as it may in its own discretion deemed fit. All such clarifications and additional information will be addenda/ part of the tender document.

c. The Company will not be bound by any oral clarifications on the interpretation of the tender document or of any matter or thing connected with the work to be executed in accordance with the Tender documents which may be made by any of its employees.

8. ONLINE PRE-BID MEETING: Online pre-bid meeting shall be held during the dates as mentioned in SOT of NIT. Clarification/Reply of pre-bid queries shall be done by MOIL within specified time, online. No verbal or written pre-bid queries shall be entertained after closing date & time of pre-bid meeting.

9. COLLECTION OF DATA IS TENDERER'S RESPONSIBILITY:

a. Tenderers should acquaint themselves with site conditions, nature of strata etc.

b. It will be presumed that tenderer has visited and seen the site at which the work is to be executed and that Tender is based on full knowledge of the working condition prevailing at site and locality, nature, availability of labour, material, transportation facilities, probable site of camp for labour, site office, stores etc. and the extent of the lead and all other factors involved in execution of works.

c. Any negligence or failure on the part of the Tenderer in obtaining necessary reliable information upon the foregoing of any other matter affecting the Tender shall not relieve him from any liability or the entire responsibility for completion of the work at the scheduled rates and time in strict conformity with the tender document.

d. The Tenderer shall be deemed to have satisfied himself about the condition of all existing structures, if any, and also have made local independent enquiries about the sub-soil water and variations thereof and all other similar matters affecting the work. He is deemed to have acquainted himself of his liability for payment of taxes, levies, and other charges. Any information or any matter derived from this tender including

drawings and specifications as obtained from the Company shall not absolve or relieve the Tenderer from fulfilling all the terms and conditions of the contract including the execution of all work (s) which shall also cover incidental work (s) though not expressly in the tender document, but which, whether temporary or permanent, must evidently be required by reasons of the nature of the work included in the contract.

e. No verbal inference from conversation with any officer or with the Company shall anyway affect or modify any of the terms or obligations herein contained.

10. SECURITY DEPOSIT:

a. The successful tenderer shall submit the security deposit of 5% of the Contract Price, for the completion of the work, within 45 days from the date of 'Letter of acceptance' issued by the company for accepting the tender failing which the Company reserves the right to forfeit the earnest money deposit and cancel the Contract. Security deposit shall be in the form of Bank Guarantee from Nationalised /Scheduled Commercial bank acceptable to MOIL, except cooperative bank, in the given format and the same shall remain valid for a period 6 months i.e. upto date of issue of Completion Certificate, with additional claim period of minimum 6 months. Bank Guarantee will be extended by the Contractor, if completion of work is delayed for any reason whatsoever.

b. The Security Deposit, for the completion of the work, shall be held by the Company until the completion certificate issued by the Company and shall be refundable to the Bidder, only after adjusting any amounts, that may be due to the Company.

c. Without prejudice to its right of indemnity for all statutory and financial liabilities, the Company reserves the right to forfeit in full or in part, the Security Deposit, in the event of nonperformance / noncompliance with any provisions of the Contract, by the contractor for the reasons attributable to the contractor, other than Force Majeure reasons. The decision of the company regarding reasons attributable to the contractor shall be final and binding.

11. The tenderer shall submit the tender satisfying each and every condition laid down in the notice, failing which, the tender will be liable to be rejected. All the columns in schedules / proforma shall be duly filled-in. In case of any significant column found blank, the T.P.C. may seek clarification from the tenderer.

12.

12.1 The Company reserves the right of accepting the tender either in whole or part, and the tenderer shall be bound to execute the same at his quoted rates. The Company also reserves the right to relax the qualifying requirements up to 5%, in the deserving cases.

12.2 Tenders otherwise than in the prescribed line, form and pattern described herein are liable to be rejected.

12.3 Canvassing in connection with Tenders containing remarks, uncalled for or conditional tenders are liable to be rejected.

13. Any tax, leviable in respect of this contract shall be payable by the contractor and the Company will not entertain any claim whatsoever in this respect.

14. On completion of the work, all rubbish, brick-bats etc. shall be removed by the contractors at their own expenses and the site cleaned and handed over to the Company.

15. **NON-SCHEDULE ITEMS OF WORKS:** During the execution of the works in the event of certain changes or alterations of the drawings or specifications or certain items being added or deleted from the original schedule, it shall be binding on the contractor to execute these works as per directions at such rates, as may be computed and fixed by the Company.

16. Any conditional tender is liable to be rejected summarily.

17. **VALIDITY OF OFFER:** Each tenderer shall keep his offer open for a period of at least six months from the date of opening of the tender and in the event of the tenderer withdrawing the offer before the aforesaid period, for any reason, whatsoever, the earnest money deposited by the tenderer may be forfeited.

18. **SUB LETTING**: -The contractor shall not sublet or assign to any party or parties, the whole or any portion of the work without prior permission from Competent Authority under the contract.

18.1 The contractor shall not assign the work or any part thereof or any share of interest therein, or money due there under, or sub-let the work or any part thereof, or allow any person to become interested in the work or portion thereof, in any manner whatsoever except with the prior permission in writing of the Company. Even in the event of sub-letting the work or any part thereof, if permitted by the Company the fact remains that such permission has been accorded shall not establish any contractual relationship between the sub-Contractor and the Company. The Contractor shall always be responsible to the Company for the work being done by sub-Contractor under his sole responsibility at his own risk under the same conditions as if the work is done by him.

18.2 The sub-Contractor will have no claim whatsoever on the Company for the work done by him for the contactor. All the payments due for the work done by sub- Contractor and accepted by the Company will be made by the Contractor only.

18.3 If the Contractor desires to sub-let any portion of the work, full details of the sub-Contractor or sub-Contractors proposed to be engaged by him shall be furnished along with the name and place of business of each sub-Contractor and nature of work along with financial implication to be performed by each sub-Contractor.

18.4 The Contractor shall be responsible for all the acts or omission and commission of the sub-Contractor. It shall be the responsibility of the Contractor to ensure that the sub-Contractor follows all the relevant laws for executing the work.

19. The successful tenderer shall arrange to obtain the appropriate license of the Competent Authority under the Contract Labour (Regulation & Abolition) Act. 1970 within one month of the placement of the work order.

20. Canvassing in connection with the tender, in any form is strictly prohibited and the tenders by such bidders, who resort to canvassing, will be liable to rejection.

21. If the Contractor during the subsistence of contract, employs apprentices for specified periods, the permission for the same should be obtained, in writing from the Engineer in Charge or his authorized representative. The Contractor shall train them, as required, under the Apprentices Act. 1961 with latest amendments and shall be responsible for all the obligations of the employer under the Act, including the liability to make payment to apprentices, required under the Act.

22. Requisite statutory and other deductions shall be made from the bills as applicable from time to time.

23. **Agreement:** The bidder, whose tender has been accepted, shall execute an agreement, in the prescribed format within a fortnight, of the date of communication of the acceptance of his tenders. In the event of failure to do so, the earnest money shall be liable to be forfeited.

24. **CONTRACTOR'S CAMP**:

24.1 The Contractor may, at his option, on lands, ~~buildings owned~~ or controlled by the Company and allotted to him on mutually accepted terms for that purpose, maintain and operate camp (s) and mess halls for the convenience of his employees but patronage of such facilities shall be optional with the Contractor's employees. The Contractor shall comply with all local statutory requirements with the respect to licensees, and the regulations in connection with such camp (s) or services. The Contractor shall be responsible for maintaining his camp(s) in good order and for providing adequate and fair protection facilities. The land so provided shall be vacated after the completion of work in neat and tidy condition, failing which the Company will get it done at the Contractor's risk and cost.

24.2 The Contractor shall have no authority to establish or to lease the land so allotted to him or to issue concessions or permits of any kind to third parties for establishing commercial, amusement or other establishments.

24.3 The Company at one point will provide water and Electricity. Electricity will be charged prevailing MPEB rates applicable for domestic use. One residential accommodation, subject to availability, for Project Manager may be given on hire charges at mutually agreed terms.

25. **CONTARCTOR'S SITE OFFICE:** The Contractor shall provide and maintain the site office and land / building allotted by the Company for the office of Project Manager and the staff and the office shall be open at reasonable hours to receive instructions, notices, or other communications. In case the Project Manager is transferred or leaves the site, the contactor / Project Manager shall depute a suitable person as Project Manager (in-charge) and inform the Engineer In-Charge.

26. **URGENT WORK:** When any urgent work is required to be executed for which Contractor is liable (in respect of which, the decision of the Engineer In-Charge shall be final and binding) and the Contractor is unable or unwilling to carry out the work at once, the Engineer In-Charge may, on his own,

through other agencies carry it out as he may consider necessary. The expenses so incurred by the Company shall be recovered from the Contractor or adjusted or set-off against any sum payable to him.

27. **SECRECY:** The Contractor shall all times keep confidential all technical information relating directly or indirectly to the work, either disclosed to the Contractor by and / or on behalf or acquired by the Contractor during the performance of the contract. The Contractor shall not disclose the information to any third party without the Company's prior written approval. Any contravention of the provision of this clause will tantamount to the breach of the contract.

28. **PROGRESS EVALUATION MEETING:** The Project Manager shall attend the progress evaluation meeting as and when required.

29. **PROGRESS REPORT:** The Contractor shall submit daily progress of execution of work to the Engineer In-Charge. The form and manner of such report shall be as prescribed by the Engineer In-Charge.

30. **LABOUR RELATIONS:** The Contractor shall not take any action in relation to handling his employees as may adversely affect the existing labour relations of the Company and cause dispute and the unrest of the employees of the Company. If he does so, he is liable to pay damage to the Company.

31. **CLEANING UP:** During the progress of work, the Contractor shall keep the premises occupied by him in a neat and tidy condition and free from any unsightly accumulation of rubbish. On the completion of any portion of the work, the Contractor shall promptly remove all his equipment, temporary structures, and surplus construction materials not to be used at or near the same location during later stages of the work. Upon completion of the work and before the final payment is made the Contractor, at his own cost, will dispose of or remove from the vicinity of the work and from all other lands made available to him by the Company, to the satisfaction of Engineer-In-charge all construction plants, buildings, rubbish, unused material and other equipment and material belonging to him and used under his direction during the work and shall leave the premises in neat and tidy condition. In the event of his failure to do so the same may be removed and may be disposed-off by the Company at the Contractors cost.

32. **USE OF CONTRACT DOCUMENTS:** All documents, drawings, and specifications, provided by the Company to the Contractor shall be property of the Company and they shall not be used for work other than the work covered by the contract and shall be returned to the Company on completion of the contract.

33. **FAILURE OF CONTRACTOR:** If the Contractor fails to complete the works, and as a result, the order is cancelled, the amount due to him, on account of work executed by him, if payable, shall be paid to him, only after due recoveries, as per the provision of contract, and only after alternative arrangement to complete the work have been made, at the price risk of the Contractor.

34. FORCE MAJEURE CLAUSE:

If, at any time, during the currency of this contract, the performance in whole or in part, by either party, of any obligation under this contract, shall be prevented or delayed by reasons of war, hostility, acts of public enemy, civil commotion, sabotage, fires, floods explosions, epidemic, quarantine restrictions, Acts of State or other Acts of God, hereinafter referred to as eventualities, then, provided notice of the happenings of any such eventuality is given by either party to the other, within 15 days from the date of occurrence thereof, neither party shall by reason of such eventuality 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 and work under this contract shall resume as soon as practicable after such eventuality has come to an end or ceased to exist and the decision of the Employer as to whether the work has to be resumed shall be final and conclusive.

One or both parties be prevented from fulfilling their contractual obligations by a state of force - majeure lasting continuously for a period of at least three months, the two parties should consult each other regarding further implementation of the contract, provided always, that if no mutually satisfactory arrangement is arrived at, within a period of a month, from the expiry of three months referred to above, the contract shall be deemed to have expired at the end of the said 4th month referred to above, in which event the liability under the contract shall be settled taking into consideration the work carried out by the Contractor up to the expiry date without prejudice to the rights of Employer arising prior to the expiry date.

If there are any Judicial Pronouncement/Statutory notifications/orders, the employer reserves to himself the right to withdraw partly or fully any item/items of work as required for compliance of such orders without any financial claim on this account by the other party.

For delays arising out of Force Majeure, the Contractor will not claim extension in completion due for a period exceeding the period of delay, attributable to the causes of Force Majeure and neither the Company nor the Contractor shall be liable to pay extra costs, provided it is mutually established that Force Majeure condition did actually exist.

35. TERMINATION OF CONTRACT:

35.1 MOIL LIMITED reserves the right to terminate the contract, in full or in part, if:

a) The Contractor defaults in proceeding with the works due to lack of diligence and / or in complying with any of the terms & conditions, stipulated in the contract.

b) The Contractor fails to complete the works, as per the scheduled contract, before stipulated date of completion.

c) The Contractor or Firm or any of the partner represented by the Contractor, in the subject contract is adjudged as insolvent by the concerned authority.

d) The Contractor assigns / transfers / sub-lets the entire work or a portion

thereof without the approval of the Accepting authority.

e) The Contractor offers to give or agrees to give, in person of the Company's service or gift or any other consideration, as inducement or reward for seeking benefits in the contract.

35.2 **Termination of the contract in full or part** – The Engineer in charge shall determine the amount, if any that is recoverable from the Contractor, for the completion of the work, together with penalties and loss or damage, suffered by the Company as a result of the above termination.

35.3 The amount so worked out by the Engineer in charge, shall be recovered from money, due to Contractor, on any account and if such money not is sufficient the Contractor shall be called to pay the same within 30 days.

35.4 If the Contractor fails to pay to the Company, the required sum within the stipulated period of 30 days, the Engineer in charge shall have the right to sell part or all of the materials / plant / equipment / implements / temporary buildings etc., belonging to the Contractor and appropriate the proceeds of the same thereof, towards the satisfaction of any sum due from the Contractor.

Any sum from the above proceeds in excess of the amount due to the Company and any unsold materials / plant, implements, temporary buildings etc. shall be repaid to the Contractor, provided always that if cost or anticipated cost of the completion by the company of the work or part is less than the amount which the Contractor should have been paid had he completed the work.

35.5 **Termination of Contract, on death :-**If the Contractor is an individual or a proprietary concern and the individual or the proprietor dies or if the Contractor is a partnership concern and one of the partners dies, then unless the Accepting Authority is satisfied that the legal representatives of the individual Contractor or of the proprietor of the proprietary concern and in case of partnership, the surviving partners are capable of completing the contract, the Accepting Authority shall be entitled to cancel the contract, as to its uncompleted part, without the Company in any way being liable to payment of any compensation to the estate of the deceased Contractor and / or to the surviving partners.

In the event of such cancellation, the Company shall not hold the estate of the deceased Contractor and / or the surviving partners of the firm liable in damages for not completing the Contract.

36. FORECLOSURE:

If at any point of time, after the acceptance of the tender, the Company decides to abandon or reduce the scope of the contract work, for any reasons whatsoever, the Engineer in Charge shall give notice in writing, to that effect to the Contractor and the Contractor shall have no claims to any payment, on account of compensation or on account of profit advantage, that he would have derived by way of execution of work, but could not do so, because of foreclosure.

However, the Contractor shall be paid at contract rates, full amount for works executed at site and a reasonable amount as certified by the Engineer in charge, for the items mentioned hereunder, which could not be utilized, on

the work to the full extent, because of foreclosure.

36.1 Any expenditure incurred on preliminary site work e.g. temporary access roads, accommodation, water storage tanks etc.

36.2 The Company shall decide whether to take over any of the Contractor's materials or any part thereof, whose supply was accepted at site, provided however, that the Company shall take over only such materials or part thereof, as the Contractor does not desire to retain. The cost of such materials that shall be paid to the Contractor shall take into account purchase price, cost of transportation.

36.3 For Contractor's materials, not retained by the Company reasonable cost of transporting such materials from site to permanent stores of the Contractor or to his other works, whichever is less shall be paid to him.

36.4 If any materials supplied by the Company to the Contractor are rendered surplus, the same shall be returned by the Contractor to the Company at rates, at which they were originally issued and a reasonable cost on account of transportation from the site to the stores of the Company.

36.5 The Company shall pay to the Contractor, a reasonable compensation for transfer of Tools, Plant & equipment from site to Contractor's permanent stores or to his any other work site, whichever is less.

37. DISPUTES RESOLUTION & ARBITRATION:

All disputes and differences arising out of or in any way touching or concerning this Agreement / contract / tender whatsoever (except as to any matter, the decision of which is expressly provided for in the agreement / contact / tender) shall be referred to Sole Arbitrator appointed by mutual consent of both the parties, failing which the aggrieved party can resort to the provision of Section 11 of Arbitration and Conciliation Act, 1996 for appointment of arbitrator by the Hon'ble High Court at Bombay, Nagpur Bench, Nagpur. If the mutual consent as aforesaid is not arrived between the parties Section 11 of Arbitration and Conciliation Act can be resorted to by either of the parties.

The arbitrator shall enter the reference and conduct his proceedings according to the provisions of the Arbitration and Conciliation Act 1996 as amended till date. The Award of such an Arbitrator shall be final and binding on both the parties to this Agreement / contract / tender. It is a term of this agreement / contract / tender that in the event of such an Arbitrator to whom the matter is originally referred being transferred or vacating his office or being unable to act for any reason, the parties at the time of such transfer, vacation of office or inability of the Arbitrator to act, shall appoint another person to act as an Arbitrator in the same manner as aforesaid. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor. It is also a term of this Agreement / contract /tender that no person other than a person so appointed, as aforesaid, shall act as an Arbitrator and if for any reason that is not possible, the matter is not to be referred to the arbitration at all.

Provided further that the Arbitrator may, from time to time, with the consent of the parties enlarge the time for making and publishing the Award.

The costs of and in connection with the arbitration shall be in the discretion of the Arbitrator, who may make a suitable provision for the same in his Award.

The seat of the arbitration shall be at Nagpur, Maharashtra, India, and the language of the proceedings shall be English.

All disputes relating to this agreement/contract/tender, shall be limited to the jurisdiction of the Court at Nagpur Bench of Bombay High Court."

38. CONSULTANT:

a) A firm which has been engaged by the Company to provide goods or work for the project and any of its affiliates will be disqualified from providing consultancy services for the same project. Conversely, a firm hired to provide consulting services for the preparation or implementation of a project and any of its affiliates, will be disqualified from subsequently providing goods or works or services related to the initial assignment of the same project.

b) The consultants or any of their affiliates will not be hired for any assignment, which by its nature may be in conflict with another assignment of the consultants.

c) **Conflict of Interest in case of consultants:**

i) The consultant is required to provide professional, objective, and impartial advice, at all times holding the Procuring Entity's interest's paramount, strictly avoiding conflicts with other assignments or his/its own corporate interests, and acting without any consideration for future work.

ii) The consultant has an obligation to disclose to the Procuring Entity any situation of actual or potential conflict that impacts its/his capacity to serve the best interest of its client/Procuring Entity. Failure to disclose such situations may lead to the disqualification of the consultant or termination of its/his contract during execution of the assignment;

a) Conflicting activities: a firm that has been engaged by the client to provide goods, works, or nonconsultancy services for a project, or any of its affiliates, shall be disqualified from providing Consultancy service resulting from or directly related to those goods, works, or non- Consultancy services. Conversely, a firm hired to provide consultancy services for the preparation or implementation of a project, or any of its affiliates, shall be disqualified from subsequently providing goods or works or no consultancy services resulting from or directly related to the consultancy services for such preparation or implementation;

b) Conflicting assignments: Consultants (including its experts and sub- - consultants) or any of their affiliates shall not be hired for any assignment that, by its nature, may be in conflict with another assignment of the consultant for the same or for another Procuring Entity; and

c) Conflicting relationships: A consultant (including its/his experts and sub-consultants) that has a close business or family relationship with a professional staff of the Procuring Entity who are directly or indirectly involved in any part of:

I. the preparation of ToR for the assignment;
II. selection process for the contract; or
III. supervision of the contract, may not be awarded a contract, unless the conflict stemming from this relationship has been resolved in a manner acceptable to the client throughout the selection process and execution of the contract.

39. **DEVIATION**: No deviation of the terms and conditions of the tender document is acceptable. In case it is found that the bidder has mentioned deviation in any other form or in any uploaded document, the same shall not be considered & offer shall be treated as non-responsive.

40. **SUB CONTRACTING**: If a Contractor submits his bid, qualifies, and does not get the contract because of his being, not the lowest, he will be prohibited from working as a sub-Contractor for a Contractor who is executing the contract.

41. This notice of tender shall form a part of the agreement between MOIL and the successful Contractor for the purpose of this contract.

42. In usual course, no machineries shall be provided to the Contractor by the Company. However, in emergent situation the required machineries may be provided to the Contractor for such period as considered essential by the Company and the hiring charges for the same would be recovered, on the rates determined by the competent authority.

43. **STATUTORY RULES & REGULATIONS:** The Contractor shall be solely responsible for compliance with all labour laws, Payment of Wages Act, Employees Provident Fund Act, Workmen Compensation Act, GST Act, Minimum Wages Act, Industrial Dispute Act 1947, Contract Labour (Regulation & Abolition) Act 1970, CEAR 2023 with latest amendment, Turnover Tax Act (where ever applicable) and other relevant Central / State Govt. Rules.

The Contractor shall take full responsibility for stoppage of work, as a result of non-compliance to above rules and violations pointed by the enforcing agencies thereof.

The Contractor shall, at his own cost and time, rectify all the defects/violations pointed out by such statutory authorities.
Such stoppage of work shall not be taken as a valid reason for not achieving the targets and the Company shall be free to impose penalty, stipulated, in the tender document.

The Contractor shall defend, indemnify, and hold the Company harmless from any liability or penalty which may be imposed by the Central / State or local authorities, by the reasons of any assorted violation, by the Contractor and also from all claims, suites or proceedings that may be brought against the Company.

44. **INSURANCE:** From commencement to completion of the works, the Contractor shall have full responsibility for the case thereof and for taking precautions to prevent loss or damage to the assets at site and works under completion, the Contractor will obtain a comprehensive insurance policy covering all risks, damages, loss etc. The Contractor shall provide in the joint names of the employer and the Contractor, insurance cover from the start date to the end of the Defects liability period, in the amounts and deductibles stated in the Contract data for the following events which are due to the Contractor's risks.

a. loss of or damage to the works, Plant and Materials.
b. loss of or damage to Equipment.
c. loss of or damage of property in connection with the Contract and
d. Personal injury or death

Policies and Certificates for insurance shall be delivered by the Contractor to the Nodal Officer or his nominee for the Nodal Officer or his nominee's approval before the start date. All such insurances shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

45. The Contractor shall furnish to the Company complete information as may be required for compilation and submission of various returns / reports to different authorities from time to time.

46. The Contractor shall submit the list of equipment which will be used by Contractor for execution of works.

47. **COMPLETION PERIOD**: The works are required to be completed within 6 months from the date of commencement mentioned in the Letter of Intent / work order, allowing a mobilization period of **20 days** or from the date of handing over of the site, by the Engineer in Charge, whichever is later.

48. **LIQUIDATED DAMAGES FOR DELAY**:

a. In case of delay in completion of the Contract, Liquidated Damages (L.D.) may be levied at the rate of ½ (Half) % of the contract price per week of delay for uncompleted/balance part of contract quantity, subject to a maximum of 10% of the Contract price.

   For the purpose of this clause, value of such completed component of work, which cannot be put to use, in view of the unfinished component, shall also be deemed to be incomplete part of the contract.

b. However, the Competent Authority., may at his discretion, allow further extension of time, with or without levying of L.D.

c. The Competent Authority, if not satisfied with the progress of the work and in the event of failure of the Contractor to recoup the delays, in the mutually agreed time frame, may terminate the Contract and in such an event the Company shall be entitled to recover L.D. up to 10% of the Contract value and forfeit the Security deposit made by the Contractor, besides getting the work completed by other means at risk and cost to the Contractor.

49. **RATE OF PROGRESS**: The whole of the materials, plant, and labour to be provided by the Contractor under scope of work and the mode, manner and

speed of execution and maintenance of the works are to be a kind and conducted in a manner to the satisfaction of Engineer-in-charge. If the rate of progress of work at any time in the option of the Engineer-in-charge too slow to ensure the completion of the work by the scheduled time or extended time for completion, Engineer-in-charge shall so notify the Contractor in writing and the Contractor shall thereupon take such steps as the Contractor think necessary and the Engineer-in-charge may approve to expedite progress as to complete the work by prescribed time or extended time for completion, as the case may be.

50. DEFECTS & WARRANTY:

a. **Definition of period of warranty**: In these conditions the expression 'Period of warranty' shall means the period not less than 12 (Twelve) months from the date of issue of completion certificate by the Engineer-in-charge or the person so authorised, in terms of the contract. The Contractor shall warranty that the equipment will be free from defects in design, material, and workmanship.

b. **Execution of work of repairs**: The Contractor's obligation under the warranty expressed in the above paragraph shall be for repairing, amending, re- constructing, rectification, shrinkage, or replacement of defective equipment/part/component/works at site at his own cost with all transport charges. If it becomes necessary for the Contractor to replace or renew any defective equipment, the provision of this article shall apply to the replacement, until the end of six months after the completion of warrantee period.

c. **Cost of execution work or repairs etc**.: If, in the opinion of the Engineer-in-Charge, any work is found defective due to the use of substandard materials, poor workmanship, or the Contractor's failure to comply with the obligations under the contract, the Contractor shall, at his own expense, rectify such defects.

d. **Remedy on Contractor's failures to carry out as required**: If Contractor fails to do any such work as aforesaid required by the Engineer-in-charge, the company shall be entitled to carry out such work by his own workmen or by any other Contractors and if such work is part of the work which the Contractor should have carried out at Contractor's own cost shall be entitled to recover from the Contractor, the cost thereof or may deduct the same from any money due to Contractor.

51. Mobilization Advance: No advance payment shall be made during the currency of this work.

52. On receipt of LOI / LOA issued by the company for acceptance of the tender, the successful tenderer shall sign the Agreement for the due fulfilment of the contract. Failure to enter into the required Agreement within specified period shall entail forfeiture of the Earnest Money. The written Agreement to be entered into between the Contractor(s) and the company, shall be the foundation of the rights of both the parties and the contract shall not be deemed to be in force until the Agreement is signed by both the parties i.e. Contractor and Company. The proforma for Agreement is enclosed as Format of Chapter V, in Tender Document.

53. PAYMENT OF BILLS: This term regarding payment will govern this tender. The tenderers are requested not to put any additional condition in their

tender and shall quote strictly as per the following terms of payment. All bills certified by the Engineer In-Charge, shall be submitted to the Finance department at Head Office, after routing through the Engineer in Charge/ and approval of the Project in Charge at head Office.

54. THE PAYMENT TERMS SHALL BE AS FOLLOWS: Payments shall be released against each component of Price Bid in the following manner, within 30 days from the date of receipt of clear and acceptable tax invoice along with all the necessary certifications/ compliances, subject to statutory and other deductions adhering to the work order conditions or any amendment thereto.

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

i. 80% of the total price of material shall be released on a pro-rata basis against receipt of material and acceptance of supplies at site under the Contract, including test certificates/quality assurance certificates if any.

ii. 20% of the total price of supplies of Plant and Equipment shall be released after issue of Completion Certificate by the designated Project In-charge or the person so authorized and submission of performance bank guarantee for 10% of the project cost.

54.2 **For Erection, Testing and Commissioning:**

i. 80% of the total price of Erection, Testing and Commissioning shall be released on pro-rata basis on completion of installation of equipment on certification by the Engineer-In-Charge / Project Manager for the quantum of work completed after successful clearance of quality check points involved in the quantum of work billed.

ii. 20% of the total price of Erection, Testing and Commissioning shall be released after issue of Completion Certificate by the designated Project In-charge or the person so authorized and submission of performance bank guarantee for 10% of the project cost.

54.3 **For Civil and Allied Works:**

i. 80% of the total price of Civil Works shall be released progressively on certification by the Project Manager/ Engineer In-Charge for the quantum of work completed after successful clearance of quality check points involved in the quantum of work.

ii. 20% of the total price of Civil Works shall be released after issue of Completion Certificate by the designated Project In-charge or the person so authorized and submission of performance bank guarantee for 10% of the project cost.

54.4 **Payment for comprehensive O&M:** Payment for comprehensive O&M shall be released on successful Operation and Maintenance of the Solar

Power Plant on annual basis at the end of every year till 5 years after demonstration of committed CUF in the following manner:

After completion of 1st year of COMC – 18% of total COMC Cost for 5 Years
After completion of 2nd year of COMC –19% of total COMC Cost for 5 Years
After completion of 3rd year of COMC – 20% of total COMC Cost for 5 Years
After completion of 4th year of COMC – 21% of total COMC Cost for 5 Years
After completion of 5th year of COMC – 22% of total COMC Cost for 5 Years

The O&M of the plant starts after Operational Acceptance of warrantee period of 12 months.

Notes:

i. All the transactions shall be made directly between the Employer (i.e., MOIL) and the Contractor. Hence for every consignment, the consignee must be in the name of "MOIL Limited".

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

iii. The release of first progressive payment shall also be subject to submission of documentary evidence by the Contractor towards having taken the insurance policy(ies) in terms of relevant provisions of Chapter III Clause 24 (Insurance) and acceptance of same by the Project Manager/ Engineer-In-Charge.

iv. Contract Value (CV): The firm sum quoted by the Successful Bidder in its Price bid is the sum of prices quoted for supply, erection and civil works under different subheads.

v. MOIL shall issue separate work order for different components of the contract for 15 MW (AC) Solar Power Plant, i.e.

- Supply, Erection, Commissioning of Electrical and Civil & allied works Contract and;

- O&M Contract

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

a. All payment shall be made on the basis of actual measurement forth quantified items as per schedule of works and approved by Project Manager/ EIC within 30 days of submission of certified invoice by the contractor.

b. Income Tax, Surcharge and Education cess levied thereon or leviable by the Government will be deducted from the running bills at the prevailing rates applicable from time to time. Similarly, GST & other Govt. levies as applicable from time to time shall be paid at prevailing rates.

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

d. All such payments as per above shall be regarded as payments by way of advance against the final payments and not as payments for work actually done and completed and the Contractor Shall Supply, Design, Excavate, Fabricate, Erect, Construct and Commission as a result of Bad, Unsound, Imperfect or Unskillful work executed by him earlier without any additional payment.

55. Final Bill: Final bill shall be submitted by the contractor within 60 days of the completion of works and no further claims shall be made by the contractor, after submission of the final bill. Payment of the final bills shall be released within 30 days from the date of receipt of clear and acceptable tax invoice along with all the necessary certifications/ compliances subject to statutory and other deductions adhering to the work order conditions or any amendment thereto, pertaining to this or any other contract.

56. Price Escalation: No Price escalation is allowed. The rate(s) quoted against the work shall remain firm during the entire Contract period. Any change in Forex rate shall not be considered for price variation.

57. Withholding of Payments to Contractor and Company's lien on money due to the Contractor: Payments may at any time be withheld or reduced if in the opinion of the Company the Contractor is not diligently and efficiently endeavouring to comply with the terms of the Contract or if the Contractor fails to pay wages to his labour or for material.

The Company shall have a lien on all amounts that may become due and payable to the Contractor under this Contract or transaction of any nature whatsoever between the Company and the Contractor and the security deposit furnished by him under the Contract or any sum that may become due and payable to the Contractor till the Contractor pays and clears the claim immediately on demand.

The final bill shall be submitted by the Contractor within 60 days of the completion of the work; otherwise, the Engineer In-charge's certificate of measurement and the total amount payable for the work accordingly, shall be final and binding on both the parties.

58. FINAL PAYMENT AND RELEASE:

On completion of the work, the Project-In-charge will issue a completion certificate. The Contractor while applying for completion certificate shall incorporate the following documents:

a) The Technical documents according to which the work is carried out, and as built drawings, if any, and

b) One set of construction drawings (hard and soft copy), if any, showing therein modifications and correction made during the course of execution signed by the Engineer In-charge,
c) Certificate for “Embedded,” and “Covered up” works, if any,
d) Performance bank guarantee, if any,
e) Certificate of test performed for various works, if any, and
f) Material appropriation statement for the material issued by the Company for the work and the list of surplus material returned to the Company’s stores duly supported by necessary documents.

After the issue of the completion certificate by the Project-In-charge, as aforesaid and on the particulars contained therein, the Company shall determine the total value of the work done by the Contractor and after adjusting all sums paid to him already or due to the Company, and such further sums as the Company may require to reserve or retain under the terms of Contract, and release final payment.

Such final payment shall be released only when the Contractor furnishes the Company an undertaking to the effect that he has no further claim of whatever nature of description on the Company.

After release of final payment, Company will not be liable to pay any money to the Contractor except as specifically provided for in the Contract. Acceptance by the Contractor of the final payment as aforesaid shall release the Company in full of all liabilities on account of the contract.

59. RELEASE OF SECURITY DEPOSIT:

59.1 Notwithstanding issuance of completion certificate of the work by the Company to the Contractor and final payment by the Company to the Contractor and notwithstanding any provision contained in the Contract documents, the Contractor shall be responsible for faulty material and / or workmanship which appears within the period of liability reckoned from the date on which the entire work, executed in strict conformity with the specifications, shall have been completed and handed over by the Contractor to the Company and expected by the latter by issuance of completion certificate.

The Contractor shall rectify the defect due thereto and pay for any damage resulting there from which appears within the said period of liability. Such defect and damage being assessed by the Company in its sole judgment in regard to both nature and value thereof. In the event that the such defect and / or damage observed the Company shall promptly give notice to the Contractor specifying the nature of the defect and / or damage and the value of the damage assessed by the Company, and calling upon the Contractor to remedy the said defect and to pay for the said damage within the time so specified.

In the event that Contractor fails to remedy such defect or to pay for such damage within the time specified as aforesaid, the Company shall have the right without prejudice to other rights and remedies that may be available to it on its behalf to set off the cost of remedying such defect whether by itself or through other agencies and recover the value of such damage from Contractor’s security deposit.

59.2 Interest will not be payable on security deposit.

59.3 Security deposit shall be released after Operational acceptance and on completion of the warrantee period of twelve months.

60. STORES, MATERIALS & EQUIPMENT: Normally no materials shall be supplied from the Stores but in case the same are supplied by the Company, at its discretion, from any of the available materials in the store, the same shall be at actual cost +25% administration and handling charges and service charges as applicable, unless specifically specified otherwise.

The Company shall be not responsible or liable in any way for the supply of equipment, articles, materials, or stores of any description, excepting those for which express provision has been made.

61. TAXES & DUTIES:

Contract Price shall be inclusive of all taxes, duties and levies including CGST, SGST, IGST Customs duty, Social Welfare Surcharge, etc., wherever applicable. The Contractor shall submit all documents required by the Employer (MOIL) to avail the Input tax credit available to MOIL. In case, the Contractor fails to submit the required document for availing the Input tax credit by the Employer, the same may be recovered by the Employer from the Contractor unless the Contractor furnishes proper justification.

Timely compliance of GST Provisions and filing of GST returns is the responsibility of the bidder. Any non-compliance may result in withholding of bills partly or fully until it is reflected in form GSTR-2A.

Any statutory variation in the above or imposition of new taxes, duties or abolition of any tax during execution within contract period shall be reimbursed / adjusted at actuals against documentary evidence.

62. SUPERVISION OF THE WORK BY THE CONTRACTOR:

62.1 The Contractor shall have the sole and exclusive responsibility for the supervision of the work and all workmen engaged therein. It shall be obligatory on the part of the Contractor to keep statutorily qualified personnel all the time when work is in progress as required under the various statutes presently in force.

62.2 The Contractor shall name and depute a qualified person having sufficient experience in carrying out work of similar nature to whom the equipment, material, if any shall be issued and instructions for work is given.

62.3 The Contractor shall also provide to the satisfaction of Engineer In-charge, sufficient number of qualified staff for supervision and execution of the work. Such persons should have the requisite qualifications and previous experience to supervise and execute the type of work in such a manner that will ensure work of the best quality and timely completion. The Contractor shall ensure to the satisfaction of Engineer In-charge that efficient supervision by competent person is provided if the work is being executed by the sub-Contractor.

62.4 The Contractor shall keep at all times on the work site while the work is in progress, a properly qualified and competent project manager duly authorized and empowered to act for him and to receive on his behalf all such notices and communications as the Company and / or the Engineer In-charge may wish to issue from time to time. From the moment the project manager so appointed takes charge of the work such notices and communications shall operate as if the Contractor himself received them and

all acts done by the Project Manager shall be “Quit facit per alium perse”, which means “He who does through another does by himself.” The act of Project Manager is the act of the Contractor as binding as if done by the Contractor himself, notwithstanding absence of formal authority or definite instructions from the Contractor to the said project manager or any purported restriction or powers or limitations of authority imposed by the Contractor. It shall be open to the Company to enforce the replacement of the project manager and / or any other employees of the Contractor in the event that the Engineer In-charge deems the projects manager or any other employee to be incompetent, or otherwise unacceptable at any time. The project manager shall arrange for receipt of material, supplies, and equipment as per the Schedule.

62.5 The Contractor is expected to employ only Indian nationals. In case foreign expert(s) is/are required to be engaged he should specifically mention in the offer, but no foreign exchange will be payable by the Company. Wherever practicable, skilled/semi-skilled (if available) and unskilled personals are to be recruited locally for underground and surface work.

64. FABRICATION, ASSEMBLY, ERECTION AND COMMISSIONING:

64.1 Fabrication of the structure shall be made as per the drawings supplied by the Company or approved by the Engineer In-charge if supplied by the Contractor.

64.2 Any component or part received separately from the main body of the equipment shall be assembled to the equipment as per the drawings, specifications of the manufacture or as per the instructions of the owner.

64.3 The Contractor’s responsibility shall consist of lifting of the material to the proper level by means of the erection tools, to be provided by the Contractor.

64.4 Before putting the equipment on the foundation, it shall be the responsibility of the Contractor to check the orientation of all foundation, placing of anchor bolts and diameter of holes in the support / saddles etc. If any minor adjustments are required, the same shall be done by the Contractor after obtaining the prior approval of the owner.

64.5 The Contractor shall be entirely responsible for the perfect alignment and adjustment of machinery and equipment.

64.6 After the placement of equipment, it shall be properly fixed on to the structural foundation or grouted on the foundation.

64.7 Grouting of black holes with foundation bolts shall be carried out after placing of the equipment on foundation. Grouting below the base plate shall be done after finally checking the level and alignment and with the approval of the owner. Before final grouting, machinery/equipment shall be leveled on steel shims. These shims and wedges, wherever required shall be provided by the Contractor. The foundation bolt shall be fully tightened keeping proper grouting gap as per normal practice and / or specified by the manufacturers.

65 FENCING AND BARRICADES:

65.1 Contractor shall erect and maintain fencing and barricades required in connection with his operation to guard or protect:

I. Excavations,
II. Hoisting areas,
III. Areas adjudged hazardous by the Contractor or the Company
IV. Company's existing property likely to be damaged by Contractor's operations
V. Unloading spots, and
VI. Any other place as directed by Engineer In-charge.

66 LEGAL CONDITIONS TO OVERRIDE OTHER CONDITIONS:

66.1 **INTERPRETATION OF CONTRACT DOCUMENTS:**

Except if, and to the extent otherwise provided by the contract, the provisions of the conditions of various chapters of this Tender document shall prevail over those of any other documents forming part of the contract. Should there be any discrepancy, inconsistency, error, and omission or any of them in the contract, the matter may be referred to the Engineer In-charge, who shall give his decision and issue instructions to the Contractor in directing manner in which the work is to be carried out. The decision of the Engineer In-charge shall be conclusive and final and the Contractor shall carry out the work in accordance with the decision of the Engineer In-charge.

66.2 General conditions, technical conditions, financial conditions, specifications of work, drawings and any other documents forming part of the N.I.T shall be read in conjunction with the legal conditions. Notwithstanding the sub-division of the documents in this chapter, every part of each sub-division shall be deemed to be supplementary to and complimentary to every other part.

66.3 The general conditions, technical conditions (including scope of work) financial conditions, and special condition (s), if any, will be subservient to legal conditions.

66.4 Wherever it is mentioned in the specification, the Contractor shall perform certain work or provide certain facilities, it is understood that Contractor shall do so at his own cost, except where payment of the work is indicated.

67 Restriction on Workings: Contractor is allowed to work round the clock except on weekly day of rest and other holidays observed at Rajgarh Khas in Madhya Pradesh. In case the Contractor desires to work on any weekly days of rest or holidays, prior permission from the Engineer In-charge to be obtained. No delay charges will be accepted on this account.

68 Variations, Extra / Substituted Items:

I. Variations permitted should be ± 25% in quantity of each individual item and ± 10% of the total Contract price with the approval of the Executing Authority. However, for variation beyond ± 25% in quantity of each individual item and beyond ± 10% of the total Contract price shall be allowed in exceptional cases with the approval of the CA.
II. For items not existing in the bill of quantities or substitutions to items in the bill of quantities, rate payable shall be determined by methods given below and, in the order, given below:

a. Rate and prices in Contract, if applicable;

b. Rates and prices in the schedule of rates applicable to the contract ± tendered percentage, if applicable;
c. Market rates of materials and labour plus 10% overheads including profits of Contractor;

III. If there is delay in the owner and the Contractor coming to an agreement on the rate of an extra item, provisional rates, as approved by the Chief Executive should be payable till such time as the rates are finally determined.

IV. For items existing in the Bill of quantities but where quantities have increased beyond the permissible variation limits, the rate payable for quantity in excess of the quantity in the bill of quantity should be:

a. Rates and prices in Contract, failing which
b. Market rates of material and labour plus 10% for overheads including profits of the Contractor with the approval of the Competent Authority.

69 RESPONSIBILITIES OF THE CONTRACTOR:

a. The Contractor shall supply to each of the workers engaged by him a valid identity card. The identity card so supplied shall bear the workman's name, designation, signature, attested copy of the photograph and age and identified by Contractor's Project manager and counter signed by Engineer In charge of the Company. The Contractor shall ensure that his employees always carry with them their valid identity cards while on duty. The workers will not be permitted to enter the premises in the case if they do not carry the valid identity card.

b. Prior to the commencement of the work the Contractor shall notify to the Company regarding the working hours, weekly day of rest, date of wage payment, rates of wages to be paid by him to the workers. The same should also be displayed in the local language known to the workers at the place of work in legible condition.

c. The Contractor shall not engage any child or adolescent in any work. The Contractor shall not engage any workmen unless he proves his age, whenever necessary supported by medical certificate. The Contractor shall ensure the written declaration of the age of the workmen is given in the identity card and in the muster roll.

69.1 The Contractor shall be responsible for safety of his employees in all the places of the work and shall provide and enforce the use of any safety gadgets, as may be required by MMR 1961. In case of non-compliance, the Engineer In-charge may provide the same and recover the cost from the Contractor. The Contractor shall intimate about the accident within 2 hours from the occurrence of the accident to the Engineer In- charge and shall make arrangements to render all possible assistance to such employees.

70. CONTRACTOR'S SUB-ORDINATES, STAFF AND THEIR CONDUCT:

The Contractor shall be responsible for the proper behavior of all his supervisory staff and workmen and shall exercise a proper degree of control over them. The Contractor shall prohibit and prevent any employee trespassing or acting in any way, detrimental or prejudicial to the interest of

the community. In the event of such trespassing by his employees, the Contractor shall be fully responsible and relieve the Company of all consequent claims or actions. The decision of the Engineer In-charge upon any matter arising under this clause shall be final.

71. POWER OF THE ENGINER-IN-CHARGE TO ORDER SUSPENSION OF WORK:

71.1. The Engineer In-charge may, as he deems fit, by giving directions in writing and without invalidating the Contract, order the Contractor to suspend the work or any part thereof for such time and for such reasons as he may consider necessary. The Contractor shall not, alter such directions to suspend the work or any part thereof has been given, proceed with the work or part thereof until he receives a written order from the Engineer In-charge to so proceed. In the event of such suspension, the Company may, under the provision of the Contract, extend the time for completion of the work or part thereof by such period as it may consider reasonable provided the suspension is not due to violation of Regulations by the Contractor. The decision of the Company in the matter shall be final and binding on the Contractor.

71.2. The work or any part thereof shall not be suspended by the Contractor under any circumstances without prior knowledge and approval of the Engineer In-charge excepting accidents(s) involving loss of life or serious bodily injury. If the Contractor proposes to suspend the work or any part thereof, he should report to the Engineer In-charge furnishing the reasons necessitating such suspension(s) of work in detail, and should obtain his prior written order before such suspension(s).

If it appears to the Engineer In-charge that any work has been executed with unsound, imperfect or unskillful workmanship or with material or articles of unsound or of a quality inferior to the requirement of the Contract, the Contractor shall on order in writing from the Engineer In-charge, rectify or remove and reconstruct the work forthwith so specified in whole or in part as the case may be, remove the material or articles at his own cost notwithstanding that the same may have been passed, certified and paid for. In the event of his failing to do so within a period as specified by the Engineer In-charge in his aforesaid order then the Engineer In-charge may rectify, remove, re-construct and / or re-execute the work or as the case may be at the risk and cost of the Contractor.

72. WORKMEN'S COMPENSATION/INSURANCE

72.1. The Contractor shall be responsible for and shall pay compensation to the workmen which would be payable for injuries due to the accidents and / or notified and compensable decease under the workmen's compensation act – 1923 hereafter called the said act with latest amendments. If such compensation is paid by the Company as principal employer under sub-section (i) and sub-section (12) of the aforesaid act, such compensation may be recovered by the Company from the security deposit or from any sum which may be due or may become due to the Contractor or any account whatsoever. The Contractor should adequately insure the workers, and the Company shall not permit the Contractor to start the work unless such insurance certificate is produced.

72.2. First Aid facility and provisions as required under ISO 45001:2018 standard with latest amendments, shall be kept at the work site by the Contractor.

73. INDEMNITY:

73.1 The Contractor shall at all times, indemnify and keep indemnified the Company and the Engineer In-charge against any claim and hold them harmless from any and all liabilities for death, bodily injury and / or damages resulting from or arising out of any way connected with the operations covered by the Contract.

The Contractor shall be responsible for all risks arising in connection with on account of the operations covered under the Contract and he shall make good all losses and damages arising there from. In case of the Company or the Engineer In-charge incurred any cost, expense, or loss on account of any claim, demand or cause of action brought against them and arising out of the operation covered by the Contract, the Company shall recover such cost, expense, or loss from the Contractor.

The Company shall have the power without being bound to do so, to defend, contest or compromise any such claim, demand or cause of action and any amount that may become payable by the Company and any expense that may be incurred on this behalf shall also be recoverable from the Contractor.

73.2 The Contractor shall at all times indemnify and keep indemnified the Company and the Engineer In-charge and hold them harmless against any claim or demand which may be made arising out of any use of existing patents, or alleged infringement of such patent or of other patent rights committed by the Contractor in carrying out the operations covered by the Contract and against all liabilities in respect thereof, and against all acts, suit proceedings, claim, cost and expenses whatsoever which may be lodged against or incurred and become payable by the Company in respect thereof.

74. DECISION OF CHAIRMAN CUM MANAGING DIRECTOR IS FINAL:

Except where otherwise specified in the Contract, the decision of the Chairman cum Managing Director, MOIL shall be final, conclusive and binding on all parties to the Contract upon all questions relating to the meaning of the specifications, designs, drawings, and instructions, mentioned before herein and as to the quality of the workmanship or material used on the work, as to any other question, claim, right, matter or thing whatsoever arising out of or in relation to the Contract or any conditions concerning the work, or the execution or failures to execute the same, whether arising during the progress of work or after the completion or abandonment thereof.

75. MODIFICATIONS:

The Contract constitutes the entire agreement of the parties hereto. No modification(s) of the Contract shall be binding upon either of the parties to the Contract unless the same is (are) in writing duly signed by both, the Owner, and the Contractor.

76. CONFLICT OF INTEREST

MOIL requires that the Contractor should provide professional objective & quality work and at all times hold the MOIL's interest paramount, strictly avoid conflicts with other assignments/jobs or their own corporate interests and act without any consideration for future work.

77. AADHAR NUMBER

The tenderer during the execution of the work, shall mandatorily observe that he will give preference to those employees who either have Aadhar Number or have applied for Aadhar card or have agreed to apply for Aadhar card, while employing the labours/ employees for the awarded / allotted scope of work against this NIT, so as to establish their genuineness and to enable payments directly through Aadhar Payment Bridge.

In the compliance of the above clause, the tenderer shall give an undertaking along with the NIT, in the prescribed format as per Annexure II of Chapter III, duly signed by him along with the seal. Non-submission of the undertaking may result in rejection of the offer of the Contractor.

78. CURRENCY OF TENDER: The tenderer is to quote in INR only for all the items and Payment will be made in INR only.

79 INTEGRITY PACT: The tenderers shall be required to upload duly signed Integrity Pact along with the bid as per the format given in tender document as a pre-qualification to the submission of their tenders.

80 At the time of submitting bid or on the date of tender opening or at the time of placement of order by MOIL Ltd., if business dealings with the Agency have been banned by the Central or State Government or any other public sector enterprise, this fact must be clearly informed to MOIL Ltd.

81 MOIL reserves the rights to keep on hold participation in tenders or to ban business dealings if any Agency has been found to have committed misconduct and also to suspend business dealings pending investigation.

82 The Contractor shall not allow any visitor on the work sites, without the prior permission of the Engineer / executing authority/unit head.

83 Compliance with Statutes: The Contractor shall at his own cost, observe, perform and comply with the provisions of the Acts applicable during the execution of the contract, and Rules / Bye-laws framed there under including but not limiting to the following and shall maintain such registers and documents, as are required under the various statutes, for production of the same before the company and/or other Statutory Authorities prescribed in this behalf, as and when required. The contractor agrees to keep the Employer indemnified at all times against any demands / penalties by statutory authorities, and shall defray to the Employer any costs / expenses incurred by the Employer in proceedings before the statutory authorities. A list of the relevant laws applicable to the process of execution of work under the contract is given below.

The list is illustrative and not exhaustive.

i) The Contract Labour (Regulation & Abolition) Act, 1970 and Rules framed there under.
ii) The Payment of Wages Act, 1936
iii) The Employees' Provident Fund Act, 1952 & Schemes framed there under.
iv) The Maternity Benefit Act, 1961.
v) The Payment of Bonus Act, 1965.
vi) The Industrial Disputes Act, 1947.
vii) The Payment of Workmen's Compensation Act, 1923.
viii) The Minimum Wages Act, 1948.
ix) The Payment of Gratuity Act, as and when applicable.

x) Air & Water Pollution Acts
xi) Indian Forest Act, 1927
xii) Environment Protection Act, 1986 and Environment Protection Rules, 1986

84 FACILITIES AT WORK SITE:

84.1 **Water Supply:** The contractor will have to make his own arrangement for supply of water to the work site, including that required for dust suppression on haul roads. All pumping installation/pipelines networks, as and when required will have to be carried out by the contractor at his own cost.

84.2 **Power Supply**: The contractor will have to make his own arrangement for supply of power to the work site. The contractor shall provide suitable electric meter, fuses, safety appliances, switches etc. in lieu of the power so consumed, at his own cost.

The contractor shall be solely responsible for ensuring the availability of power supply at the site, and non-availability of power, for any reason, shall not relieve the contractor of his obligation to provide alternate power supply and to complete the work within the time stipulated in the contract.

Arrangement for adequate safety and lighting, at the work site shall also be made by Contractor.

84.3 **Places for Office, stores etc.;** The contractor shall have to make his own arrangement, in respect of his office, stores, workshop, residential accommodation etc. for his supervision /managerial staff etc. The Engineer in Charge may render necessary assistance in this regard, to the extent possible, subject to availability, on payment basis.

85 Performance Bank Guarantee (PBG):

(a) The successful bidder required to submit a PBG of amount equal to 10% value of project cost for completion of 15 MW AC Solar Power Project, the validity of the PBG shall be one year from the date of completion of work with an additional claim period of minimum six months issued by a Nationalised / Scheduled commercial bank, having branch located at Nagpur, except cooperative bank, in the given format (copy attached). Bank Guarantee will be extended by the Contractor, if the work is delayed for any reason whatsoever. MOIL Ltd. have right to deduct the amount if the performance found non satisfactory during one-year period.

(b) The successful bidder required to submit a PBG of amount equal to 10% value of cost for Comprehensive Operation and maintenance of 15 MW AC Solar Power Project for the period of five years, after successful completion of warrantee period of 12 Month, the validity of the PBG will be for five years with an additional claim period of minimum six months issued by a Nationalised / Scheduled commercial bank, having branch located at Nagpur, except cooperative bank, in the given format (copy attached). Bank Guarantee will be extended by the Contractor, if the work is delayed for any reason whatsoever. MOIL Ltd. have right to deduct the amount if the performance found non satisfactory during contract period.

Chapter III

Scope of Work

1. **Project Overview:** MOIL Limited (MOIL) (hereinafter called as "Employer") invites online bids from eligible bidders for Design, Procurement, Supply, Transport, Construction, Erection, Commissioning and 5 years comprehensive O&M of 15 MW (AC) Grid Connected Solar Photovoltaic Power Plant with seasonal tilt at Rajgarh Khas in Madhya Pradesh on turnkey basis, as per the Scope of Work mentioned hereinafter – EPC towards successful commissioning plus one year of assured performance demonstration from date of commissioning including comprehensive O&M of the plant for 5 years thereafter.

The project glimpse is shown in the table below.

Table-1: Project details

Sr. No.	Particulars	Description
1	Project Site	Nesdi, Gordhanpura, Rajgarh in M.P.
2	Village Name	Gordhanpura, Rajgarh Khas in M.P.
3	Tehasil	RAJGARH
4	District Name	RAJGARH
5	Name of the State	Madhya Pradesh
6	Latitude	23.977611N
7	Longitude	76.707306E
8	Altitude	406 m
9	Road Accessibility	Bhopal-biaora-Rajgarh (About 180 Km from Bhopal
10	Nearest Airport	Bhopal MP
11	Nearest Railway Station	Biaora – 25Kms.
12	Nearest S/S and Connectivity	220/132/33 kV S/S at Rajgarh (4.0 Km from site)

2. **Brief Scope of work:**

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

2.1 The Engineering, Procurement and Construction (EPC) contractor shall be engaged by MOIL for design, engineering, procurement & supply of equipment, materials, testing at manufacturers works, inspection, packing and forwarding, supply, unloading at site, associated civil works, services, permits, installation and incidentals, insurance at all stages, erection, testing and commissioning plus one year of assured performance demonstration from date of commissioning and comprehensive O&M for 5 years of the Solar Power Plant thereafter. The selected bidder has to demonstrate assured performance of the Plant as specified in the bidding documents considering the following for the project site.

1) Assessment of solar PV energy generation potential using standard licensed software and standard data like NASA, IMD, Meteonorm, PV Syst etc., this will also include Energy yield & site assessment.

2) Energy projections, shading assessments, estimate of gross energy production, assessment of losses, review of OEM technical specifications, drawings & test reports, etc.

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

A. Solar panels including module mounting structures and fasteners.

B. All power conditioning systems including junction boxes, Inverters, DC and AC circuit breaker(s).

C. Supply and erection of weather monitoring station including solar radiation sensors.

D. All associated electrical works and equipment required for interfacing at 33 kV underground cable (i.e. transformer(s) – power and auxiliary, breakers, isolators, lightning arrestor(s), LT/ HT/ other panels, protection system, cables, metering at 33kV level, earthing of transformer etc.) as per technical specifications.

E. Design, supply, erection, testing & commissioning of 33 kV underground cabling and 33 kV overhead lines from solar power substation to DISCOM/TRANSCO substation with associated switchgear equipment, transformer and metering equipment for connecting into a 33 KV Bus bay to be constructed by the successful bidder at the 220/132 kV /33kV Substation at Rajgarh, which is about 4.0 kM from the site, as per technical specification and state regulations.

F. Design and implementation of plant string level monitoring scheme with compatible software, hardware, internet infrastructure and cabling for accessing the SCADA data remotely at a MOIL's location/site.

G. Install and setup a communication infrastructure to provide telemetry data to the respective State Load Dispatch Centre (SLDC) in compliance to CERC/ MPERC norms/specifications.

H. The Contractor shall plan and design for the electrical/ mechanical/ civil requirements including but not limited to;

i. Plant Configuration
ii. Solar insolation data and basis for generation
iii. Detailed technical specifications (GTP) of all the equipment
iv. General arrangement and assembly drawings of all major equipment
v. Space Optimization
vi. Schematic diagram for entire electrical system (DC, AC and auxiliary systems)
vii. GTP & G.A. drawings for all types of structures/ components, 33 kV & 415 V switchgears (as applicable) & other interfacing panels
viii. Rapid shutdown mechanism of Solar facility and its implementation scheme / design as per NFPA 70.
ix. Test reports (for type, routine and acceptance tests)
x. Design calculations and sheets (licensed software as well as design templates)
xi. Geo technical investigation data and Topographical survey report including topographical survey data in digital format (Excel file) and Contour plan of the area.
xii. GA drawings of the entire project including equipment rooms/ inverter control rooms, office cum control room, roads, storm water drainage, sewage networks, security gate, fire protection system, perimeter fencing, transformer yard fencing etc.

xiii. Transmission line drawings and erection plans as per DISCOM/ STU (State Transmission Utility) guidelines
xiv. Quality assurance plans for manufacturing (MQP), Standard Operating procedure (SOP) and field activities (FQP)
xv. Detailed site EHS plan, fire safety & evacuation plan and disaster management plan.
xvi. Detailed risk assessment and mitigation plan.
xvii. O&M Instruction's and maintenance manuals for major equipment
xviii. As-built drawings / documents

I. Design and Engineering, including all associated civil works:

i. Earthwork for Site grading, cutting, filling, levelling & compacting in land provided for solar power plant. The bidders shall judiciously decide on making the price-bid accordingly.
ii. Construction of module mounting structure foundations, transformer and other power equipment foundations including power evacuation facility, cable trenches for cable routing and earthing pits
iii. Construction of perimeter fencing (Chain Link Type) for the complete land area provided for Solar PV(SPV) Project with security gate(s)
iv. Construction of Equipment room, and Office cum Control room including store, toilet etc.
v. Arrangement of permanent water supply infrastructure for module washing and daily usage including storage (as applicable).
vi. Construction of Storm water drainage & sewage network
vii. Construction of a road network within the plant area for easy access to main locations as well as connecting road to the nearest public road.
viii. Street lighting and area lighting within plant
ix. Any other civil structure required for development of proposed Solar PV Plant

2.3 Other systems

i. Setting up of a comprehensive Fire Protection system
ii. Supply of mandatory spares
iii. Demonstration of performance of the plant as per the requirement specified in the bidding documents.
iv. Comprehensive operation & maintenance of the SPV plant for 5 years after successful commissioning and one year assured performance guarantee demonstration, as detailed in technical specification including supply and storage of all spare parts, consumables, repairs/ replacement of any defective equipment etc.
v. Obtaining all associated statutory and regulatory compliances and approvals required for successful construction, commissioning, grid connection and operation of plant.

3. Local Conditions

3.1 It is mandatory for the bidder to visit site to understand the location and gather information about the condition of site, available infrastructure / facility at site, provision for delivery substation, overhead power line route to avoid any ambiguity and to plan the layout to reduce the expenditure during estimation of project cost and MOIL shall not be held responsible for any lack of information of the site condition.

3.2 The Bidder is advised to examine the site conditions, traffic, location, surroundings, climate, availability of power, water and other utilities for construction, access to site, handling and storage of materials, weather and insolation data, applicable laws and regulations, and obtain for itself on its own responsibility all information, as per their understanding, may be necessary for preparing the Bid and entering into the Contract Agreement. All the expenses of visiting the Site and its associated costs shall be borne by the Bidder.

3.3 The Bidder and any of its personnel or agents shall be granted permission by the Employer to enter upon its premises and lands for the purpose of such inspection, but only upon the express condition that the Bidder, its personnel or agents, shall release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof and shall be responsible for personal injury (whether fatal or otherwise), loss of or damage to property and any other loss, damage, costs and expenses.

3.4 Failure to visit the Site or failure to study the NIT document shall in no way relieve the successful Bidder from furnishing any material or performing any work in accordance with the NIT document.

3.5 Unless and otherwise specified, in no case the date of Time for Completion of the project shall be extended.

3.6 The Bidder must conduct its own inspection of the Project Site, access to the Project Site and surroundings at its own cost in order to make a proper estimate of the works to be performed under consideration of site-specific constraints. This applies in particular to the transportation of equipment to the Project site and the scope of site works. The Bidder shall also inspect the site and the access to site from the point of manufacturer to make sure that its equipment is suitable for the available access and the site terrain.

3.7 It shall be deemed that by submitting a Bid, the Bidder has:

(i) Made a complete and careful examination of the NIT document;
(ii) Received all relevant information requested from the Employer;
(iii) Acknowledged and accepted the risk of inadequacy, error or mistake in the information provided in the NIT documents or furnished by or on behalf of the Employer relating to any of the matters referred to in Clause 2 above;
(iv) Satisfied itself about all matters, things and information including matters referred to in the Abridged Bid Information, necessary and required for submitting an informed Bid, execution of the Project in accordance with the NIT document and Performance of all of its obligations mentioned there under;
(v) Acknowledged and agreed that inadequacy, lack of completeness or incorrectness of information provided in the NIT document or ignorance of any of the matters referred to in Clause 2, herein shall not be a basis for any claim for compensation, damages, extension of time for Performance of its obligations, loss of profits etc., from the Employer, or a ground for termination of the Contract Agreement; and
(vi) Agreed to be bound by the undertakings provided by it under and in terms hereof.

3.8 Any data provided by the Employer to the bidder is for information only. The Employer shall not be liable for any omission, mistake or error on the part of the Bidder in respect of any of the above or on account of any matter or thing arising out of or concerning or relating to the NIT document or the Bidding Process, including any error or mistake therein or in any information or data given by the Employer.

3.9 **Local Regulatory Frame Work:** It shall be imperative for each Bidder to fully inform itself of all local conditions, laws and factors which may have any effect on the execution of the Contract as described in the Bidding Documents. The Employer shall not entertain any request for clarification from the Bidder, regarding such local conditions.

3.10 It is the responsibility of the Bidder that such factors have properly been investigated and considered while submitting the Bid proposals and that no claim whatsoever including those for financial adjustment to the Contract awarded under the NIT document shall be entertained by the Employer and that neither any change in the time schedule of the Contract nor any financial adjustments arising thereof shall be permitted by the Employer.

4. Use of Contract Documents & Information

4.1 The Contract (s) will be signed in three (3) originals and the Contractor shall be provided with one signed original and the rest will be retained by the Employer.

4.2 The Contractor shall provide/ submit, free of cost to the Employer all the engineering data, drawings and descriptive materials with the bid, in at least two (2) copies to form a part of the Contract immediately after LOI.

4.3 The Contractor shall not, without the Employer's prior written consent, disclose the Contract or any provision thereof or any specification, plan, drawing, pattern therewith to any person other than person employed by the Contractor in Performance of the Contract. Disclosure to any such employed person shall be made in confidence and shall extend strictly for purpose of Performance only.

4.4 The Contractor shall not, without Employer's prior written consent, make use of any document or information except for purpose of performing the Contract.

4.5 Any document other than the Contract itself, shall remain the property of the Employer.

5. Governing Laws

5.1 The Contract shall be governed by and interpreted in accordance with laws in force in India. The Courts of Nagpur shall have exclusive jurisdiction in all matters arising under the Contract.

5.2 The contract must be interpreted and read under the influence of Indian Contracts Act, 1872 and all amendments as on date.

6. Scope of Facility

6.1 Unless otherwise expressly limited in the Technical Specifications, the Contractor's obligations cover the provision of all Plant and Equipment including spares and the Performance of all services required for the design, manufacture (including procurement, quality assurance, construction, installation, associated civil, structural and other construction works, Pre-commissioning and delivery) of the Plant and Equipment and the installation, commissioning, completion of facilities and carrying out guarantee tests for the Facilities in accordance with the plans, procedures, specifications, drawings, codes and any other documents as specified in the Technical Specifications. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labourers, materials, equipment, spare parts and accessories; Contractor's Equipment; construction utilities and supplies; temporary materials, structures and facilities; transportation (including, without limitation, loading, unloading and hauling to, from and at the Site); insurance

and storage, except for those supplies, works and services that will be provided or performed by the Employer.

6.2 The Contractor shall, unless specifically excluded in the Contract, perform all such work and/or supply all such items and materials not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Completion of the Facilities as if such work and/or items and materials were expressly mentioned in the Contract.

6.3 Bidder is requested to provide the list of all the spares required to maintain the facility for O&M period of 5 years. Contractor agrees to supply such spare parts, as recommended or otherwise required for the effective and hassle free operation and maintenance of the Facilities. However, the contractor, with its previous experience, is to provide a list of spares including specifications, supplier details and indicative price, as recommended by him and OEM. The contractor shall keep and maintain the inventory of such spares for the hassle free operation during the complete O&M period without additional cost to Employer. Also, at the end of penultimate year of the O&M contract, contractor shall supply a list of all recommended spares as per the operational requirement of the plant and with reference to the mean time between failures (MTBF), along with detailed specifications, supplier details and tentative cost for future purchase. The price of such spare parts shall include the breakup of taxes and duties as applicable towards purchase and supply of spare parts. Employer, at its discretion, will purchase the spare as required for future operation.

7. Contractor's responsibility

7.1 The Contractor shall design, procure, manufacture (including associated purchases and/or subcontracting), install, commission and complete the Facilities, carry out the Guarantee tests with due care and diligence in accordance with the Contract including the O&M for the prescribed period.

7.2 The Contractor confirms that it has entered into this Contract on the basis of proper examination of the data relating to the Facilities provided by the Employer and assessed by himself at the site location, after proper due diligence relating to the Facilities prior to bid submission. The Contractor acknowledges that any failure to obtain or acquaint itself with all such data and information shall not relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Scope of Work.

7.3 The Contractor shall acquire, on behalf of Employer, in the employers' name, all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located that are necessary for the setting up of the plant mentioned under the Contract, including, but not limited to, entry permits for all imported Employer's Equipment (if any). In this regard, any document required from Employer shall be intimated at least 10 days prior to submission. Contractor has to ensure safekeeping of the documents and diligent use. It is the responsibility of the contractor to safe keep and return all the approvals, permits, licenses, certificates and other relevant document generated as a result of the setting up of project and O&M process to the Employer.

All regulatory permissions and permission from licensee for grid connection on behalf of Employer shall be under scope of successful bidder.

7.4 The Contractor shall acquire in its name all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located that are necessary for the Performance of the Contract, including, but not limited to, the right of way for the access to site and for erection of power evacuation lines as applicable, visas for the Contractor's and Subcontractor's

personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals and/or licenses that are not the responsibility of the Employer under Sub-clause 7 hereof and that are necessary for the Performance of the Contract.

7.5 Contractor shall also seek for any exemption applicable for the project as per the orders released from GOI time to time. In this regard, contractor shall be responsible to take all necessary certificates as a proof of exemptions on behalf of Employer. However, all the documents required from Employer, as needed for the process, will be provided by Employer. The demand of such documents shall be made to the Employer in at least 10 (Ten) day's advance.

7.6 The Contractor shall comply with all laws in force at the place, where the Facilities are installed and where the Installation Services are carried out. The laws will include all national, provincial, municipal or other laws that affect the Performance of the Contract and binding upon the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Subcontractors and their personnel, but without prejudice to Sub-Clause 7 hereof.

7.7 Any plant, material, spares & spares inventory and services that will be incorporated in or is required for the facilities and other supplies shall have their origin.

7.8 Unless otherwise specified in the Contract or agreed upon by the Employer and the Contractor, the Contractor shall provide/ deploy sufficient, properly qualified operating and maintenance personnel; shall supply and make available all raw materials, spares, other materials and facilities; and shall perform all work and services of whatsoever nature, to properly carry out Pre-commissioning, Commissioning and Guarantee Tests, all in accordance with the provisions of "Scope of Works and Supply by the Employer" to the Contract Agreement at or before the time specified in the program furnished by the Contractor hereof and in the manner thereupon specified or as otherwise agreed upon by the Employer and the Contractor.

8. Employer's responsibility:

8.1 The Employer shall be responsible for providing legal and physical possession of the Site thereto required for the proper execution of the Contract. The Employer shall give full possession or phased possession of site and accord all rights of access thereto on or before the date(s) of LOI/ NTP or as agreed in contract agreement.

8.2 The Employer shall pay fees for all permits, approvals and/or licenses from all local, state or National Government authorities or public service undertakings in the country where the Site is located for the plant establishment, which such authorities or undertakings require the Employer to obtain them in the Employer's name, are necessary for the execution of the Contract (they include those required for the Performance by both the Contractor and the Employer of their respective obligations under the Contract), including those specified in "Scope of Works and Supply by the Employer" at the Contract Agreement on providing the proper demand note letter. However, such demand notes must be provided to the Employer at least 7 (Seven) days prior to the submission.

8.3 If requested by the Contractor and up-on Employer's sole discretion, the Employer shall use its best endeavours to assist the Contractor in obtaining in a timely and expeditious manner all permits, approvals and/or licenses necessary for the execution of the Contract from all local, state or national government authorities or public service undertakings that such authorities or undertakings required for the Contractor or

Subcontractors or the personnel of the Contractor or Subcontractors, as the case may be, to obtain.

8.4 The Employer shall be responsible for the operation of the Facilities after Completion and proper hand over of the site by contractor. However, the Contractor, under the O&M Contract, shall be responsible for the care and custody of the facility.

9. Representatives

9.1 Project Manager / Engineer- In –Charge (EIC):

If the Project Manager/ EIC is not named in the Contract, then within seven (7) days of the Effective Date, the Employer shall appoint and notify the Contractor in writing of the name of the Project Manager/EIC. The Employer may from time to time appoint some other person as the Project Manager/ EIC in place of the person previously so appointed, and shall give a notice of the name of such other person to the Contractor without delay. The Employer shall take reasonable care, unless unavoidable to see that no such appointment is made at such a time or in such a manner as to impede the progress of work on the Facilities. The Project Manager/EIC shall represent and act for the Employer at all times during the currency of the Contract. All notices, instructions, orders, certificates, approvals and all other communications under the Contract shall be given by the Project Manager/ EIC, except as herein otherwise provided. All notices, instructions, information and other communications given by the Contractor to the Employer under the Contract shall be given to the Project Manager/ EIC, except as herein otherwise provided.

9.2 Contractor's Representative & Construction Manager

A. If the Contractor's Representative is not named in the Contract, then within seven (07) days of the Effective Date, the Contractor shall appoint the Contractor's Representative and shall request the Employer in writing to approve the person so appointed. If the Employer makes no objection to the appointment within seven (07) days of submission, the Contractor's Representative shall be deemed to have been approved. If the Employer objects to the appointment within seven (07) days giving the reason therefor, then the Contractor shall appoint a replacement within seven (07) days of such objection, and the foregoing provisions of this Sub- clause shall apply thereto.

B. The Contractor's Representative shall represent and act for the Contractor at all times during the tenure of the Contract and shall give to the Project Manager/ EIC all the Contractor's notices, instructions, information and all other communications under the Contract.

C. All notices, instructions, information and all other communications given by the Employer or the Project Manager/ EIC to the Contractor under the Contract shall be given to the Contractor's Representative or, in its absence, its deputy, except as herein otherwise provided.

D. The Contractor shall not revoke the appointment of the Contractor's Representative without the Employer's prior written consent, which shall not be unreasonably withheld. If the Employer consents thereto, the Contractor shall appoint some other person as the Contractor's Representative, pursuant to the procedure set out in Sub-Clause 9.2A.

E. The Contractor's Representative may, subject to the approval of the Employer (which shall not be unreasonably withheld), at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Contractor's Representative, and shall specify the powers, functions and authorities thereby delegated or revoked. No such delegation

or revocation shall take effect unless and until a copy thereof has been delivered to the Employer and the Project Manager/EIC.

F. Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with this Sub-Clause 9 E. shall be deemed to be an act or exercise by the Contractor's Representative.

G. Notwithstanding anything stated in Sub-clause 9 and 9 A. above, for the purpose of execution of contract, the Employer and the Contractor shall finalize and agree to a Contract Co-ordination Procedure and all the communication under the Contract shall be in accordance with such Contract Co-ordination Procedure.

H. From the commencement of installation of the Facilities at the Site until Final Acceptance, the Contractor's Representative shall appoint a suitable person as the construction manager (hereinafter referred to as "the Construction Manager"). The Construction Manager shall supervise all work done at the Site by the Contractor and shall be present at the Site throughout normal working hours except when on leave, sick or absent for reasons connected with the proper Performance of the Contract. Whenever the Construction Manager is absent from the Site, a suitable person shall be appointed to act as his or her deputy.

I. The Employer may by notice to the Contractor object to any representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Employer, may behave inappropriately, may be in-competent or negligent, or may commit a serious breach of the Site regulations and safety. The Employer shall provide evidence of the same, whereupon the Contractor shall remove such person from the Facilities.

J. If any representative or person employed by the Contractor is removed in accordance with Sub-Clause 9 D., the Contractor shall, where required, promptly appoint a replacement.

10. Project Implementation

10.1 Work Schedule

Within fourteen (14) days after the date of Issue of LOI/Work Order, the Contractor shall prepare and submit to the Project Manager/ EIC a detailed program of Performance of the Contract, made in the form of PERT Chart and showing the sequence in which it proposes to design, manufacture, transport, assemble, install and pre-commission the Facilities. The program so submitted by the Contractor shall accord with the Time Schedule indicated in SCC and any other dates and periods specified in the Contract. The Contractor shall update and revise the program as and when appropriate or when required by the Project Manager/EIC, but without modification in the Time for Completion given in the SCC and any extension granted in accordance with clause for extension of time, and shall submit all such revisions to the Project Manager/ EIC.

10.2 Progress Report

A. The Contractor shall monitor progress of all the activities specified in the work schedule referred in Sub-Clause 10.2 above, and submit the progress report to the Project Manager as per the Contract Co-ordination procedure.

B. The progress report shall be in a form acceptable to the Project Manager/EIC and shall also indicate:

(a) Percentage completion achieved compared with the planned percentage completion for each activity; and

(b) Where any activity is behind the program, giving comments and likely consequences and stating the corrective action being taken.

C. If at any time the Contractor's actual progress falls behind the scheduled program, or it becomes apparent that it will so fall behind, the Contractor shall, at the request of the Employer or the Project Manager/ EIC, prepare and submit to the Project Manager/ EIC a revised program, taking into account the prevailing circumstances, and shall notify the Project Manager/ EIC, of the steps being taken to expedite progress so as to attain Completion of the Facilities within the Time for Completion. If any extension thereof entitled under Sub-Clause 10.1, or any extended period as may otherwise be agreed upon between the Employer and the Contractor, Contractor shall submit the revised plan for completion of Facility accordingly.

10.3 Maintenance of Records of Weekly Progress Review Meeting at Site

The Contractor shall be required to attend all weekly site progress review meetings organized by the 'Project Manager/ EIC' or his authorized representative. The deliberations in the meetings shall inter-alia include the weekly program, progress of work (including details of manpower, tools and plants deployed by the Contractor vis-à-vis agreed schedule), inputs to be provided by Employer, delays, if any and recovery program, specific hindrances to work and work instructions by Employer. The minutes of the weekly meetings shall be recorded in triplicate in a numbered register available with the 'Project Manager/ EIC' or his authorized representative. These recordings shall be jointly signed by the 'Project Manager/EIC' or his authorized representative and the Contractor and one copy of the signed records shall be handed over to the Contractor.

11. Design and Engineering

11.1 Specifications and Drawings:

A. 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.

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

C. The Contractor shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designated by or on behalf of the Employer, by giving a notice of such disclaimer to the Project Manager/ EIC.

11.2 Codes and Standards: Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date of bid submission shall apply unless otherwise specified.

11.3 Approval / Review of Technical Documents by Project Manager: The Contractor shall prepare list of documents as per technical specifications and furnish to the Project Manager for Approval of the same and Review of work schedule. Any part of the Facilities covered by or related to the documents to be approved by the Project Manager shall be executed only after the Project Manager's approval thereof.

A. The vendor has to submit basic design data, design documents, drawings and engineering information including GTP (Guaranteed Technical Particulars) / Data Sheets and test reports to MOIL for review and approval in hard copy and soft copy

from time to time as per project schedule. Vendor shall carry out detailed study of the location, complete design study / engineering, and prepare the report to install Solar PV Plant to provide the maximum output which is proposed as 15 MW (AC).

B. Within 3 days after receipt by the Project Manager of any document requiring the Project Manager's approval, the Project Manager shall either return one copy thereof to the Contractor with its approval endorsed thereon or shall notify the Contractor in writing of its disapproval thereof and the reasons therefor and the modifications that the Project Manager proposes.

C. The Project Manager shall not disapprove any document, except on the grounds that the document does not comply with some specified provision of the Contract or that it is contrary to good engineering practice.

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

E. The procedure for submission of the documents by the Contractor and their approval by the Project Manager shall be as per the Contract Co-ordination procedure.

F. If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the Project Manager of any document and/or any modification(s) thereto that cannot be settled between the parties within a reasonable period, then such dispute or difference may be settled in accordance with Chapter II Clause 38 (Settlement of Dispute) hereof. If such dispute or difference is referred as per clause 38, the Project Manager shall give instructions as to whether and if so, how, Performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the Project Manager's instructions, provided that if the Arbitration upholds the Contractor's view on the dispute, then the Contractor shall be reimbursed by the Employer for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Arbitration shall decide, and the Time for Completion shall be extended accordingly.

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

H. The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Project Manager an amended document and obtained the Project Manager's approval thereof, pursuant to the provisions of this Sub-Clause 11.3.C.

I. If the Project Manager requests any change in any already approved document and/or in any document based thereon, generally shall be taken care by the contractor if the change is not causing any major financial impact.

12. Procurement:

12.1 Plant and Equipment: The Contractor shall procure and transport all the Plant and Equipment in an expeditious and orderly manner to the Site to achieve completion of

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

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

12.3 **Packing and Marking:**

A. 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.

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

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

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

13. Materials and Workmanship:

13.1 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.

13.2 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.

13.3 If the Contractor offers equipment manufactured in accordance with other international well-recognized standards (mentioned above), he shall, in that case, supply a copy in English of the Standard Specification adopted and shall clearly mention in what respect such standard specification differs from Indian Standard Specifications. The Plant, equipment, and materials offered by the Contractor should comply with one consistent set of Standards only to make the system compatible and work in harmony as far as possible, except if mentioned otherwise.

14. Installation

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

14.2 Setting up/Supervision/Labor:

A. Bench Mark:The Contractor shall be responsible for the true and proper setting-up of the Facilities in relation to benchmarks, reference marks that are mutually agreed upon by the contractor and employer.

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

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

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

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

The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the entry of all labor 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 labor of its Subcontractors.

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

14.3 Contractor's Equipment:

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

B. Unless otherwise specified in the Contract, upon completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor onto the Site.

14.4 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 contractor, if required, will provide necessary safety training to workmen. The Employer shall not be responsible for any such accidents. In addition, contractor shall engage sufficient security guards to protect Facility from any theft and unauthorized access to Site.

14.5 Site Clearance:

A. Site Clearance in Course of Performance:
In the course of carrying out the Contract, the Contractor shall keep the Site reasonably free from all unnecessary obstruction, store or remove any surplus materials, clear away any wreckage, packaging material, rubbish & debris and temporary installations from the Site, and remove any Contractor's Equipment no longer required for execution of the Contract.

B. Site Clearance after Completion:
After Completion of all parts of the Facilities, the Contractor shall clear away and remove all wreckage, packaging material, rubbish & debris and temporary works & installations of any kind from the Site, and shall leave the Site and Facilities clean and safe.

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

The disposal of such Scrap shall vest with the Contractor for the items supplied by the Contractor and issued by Employer under this contract for installation and construction without any additional cost to the Employer. The removal of scrap shall be subject to the Contractor producing the necessary clearance from the relevant authorities (Custom, Excise etc.), if required by the law, in respect of disposal of the scrap. The liability for the payment of the applicable taxes/duties shall be that of the Contractor.

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

D. Watch & Ward and Lighting:
The Contractor shall provide and maintain at its own expense all lighting, fencing, watch and ward wherever necessary for the proper execution and the protection of

the Facilities, or for the safety of the owners and occupiers of adjacent property and for the safety of the public.

15. Inspection & Testing

15.1 The Employer or its authorized representative shall have, at all time, access to the Contractor's premises and also shall have the power, at all times, to inspect and examine the materials and workmanship of project work during its manufacture, shop assembly and testing. If part of the plant is required to be manufactured in the premises other than the Contractor's, the necessary permission for inspection shall be obtained by the Contractor from the Employer or his duly authorized representative.

15.2 The Employer shall have the right to serve notice in writing to the Contractor on any grounds of objections, which he may have in respect of the work. The Contractor has to forthwith take necessary actions to remove the cause to the complete satisfaction of the Employer otherwise, the Employer at its liberty may reject all or any component of plant or workmanship connected with such work.

15.3 The Contractor shall issue request letter to the Employer or its authorized representative for testing of any component of the plant, which is ready for testing at least 07 days in advance from the date of actual date of testing at the premises of the Contractor or elsewhere. However, the Employer at its own discretion may waive the inspection and testing in writing under very special circumstances. In such case, the Contractor may proceed with the tests which shall be deemed to have been made in the Employer presence, and it shall forthwith forward two sets of duly certified copies of test results and certificates to the Employer for approval. The Contractor, on receipt of written acceptance from the Employer, may dispatch the equipment for erection & installation.

15.4 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 the Employer or its authorized representative to accomplish such testing.

15.5 The Employer or his authorized representative shall have the right to carry out inward inspection of the items on delivery at Site and if the items have been found to be not in line with the approved specifications, shall have the liberty to reject the same.

15.6 If Employer desires, testing of any component(s) of the plant be carried out by an independent agency, the inspection fee, if any, shall be paid by the Employer. However, the Contractor shall render all necessary help to Employer whenever required free of charge.

15.7 The Contractor has to provide the necessary testing reports to the Employer as and when required.

15.8 Neither the waiving of inspection nor acceptance after inspection by the Employer shall, in anyway, absolve the Contractor of the responsibility of supplying the plant and equipment strictly in accordance with specification and drawings etc.

16. Authorized Test Centers for test certificates:

The PV modules/ inverters/ cables and other Balance of system equipment deployed in the solar PV power plant shall have valid test certificates for their qualification as per above specified IEC/ IS Standards by one of the NABL accredited Test Centers in India. In case of module types/ equipment for which such Test facilities may not exist in India,

test certificates from reputed ILAC Member body accredited Labs in abroad (with proof of accreditation) will be acceptable.

17. Commissioning and Completion of the Facilities

17.1 As soon as installation of the Facilities has, in the opinion of the Contractor, been completed as specified in the Technical Specifications, the Contractor shall so notify the Employer (Project Manager/ EIC) in writing to witness the pre- commissioning of the facility.

17.2 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 Project Manager in writing. The Contractor shall commence Commissioning of the facilities as per the Sub – Clause 17.3.

17.3 Commissioning of the Facilities shall be completed by the Contractor as per procedures detailed in the Technical Specifications and in the presence of the Project Manager or the representatives of the employer.

17.4 If the Project Manager notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies, and shall repeat the procedure described in Sub- Clause 17.2.

17.5 If the Project Manager is satisfied that the Facilities have reached Completion, the Project Manager shall, within seven (7) days after receipt of the Contractor's repeat notice, issue a Completion Certificate stating that the Facilities have reached Completion as at the date of the Contractor's repeat notice.

17.6 If the Project Manager is not so satisfied, then it shall notify the Contractor in writing of any defects and/or deficiencies within seven (7) days after receipt of the Contractor's repeat notice, and the above procedure shall be repeated.

17.7 If the Project Manager fails to issue the Completion Certificate and fails to inform the Contractor of any defects and/or deficiencies within fourteen (14) days after receipt of the Contractor's notice under Sub-Clause 17.2 or within seven (7) days after receipt of the Contractor's repeated notice under Sub-Clause 17.3, or if the Employer makes use of the Facilities, then the Facilities shall be deemed to have reached Completion as of the date of the Contractor's notice or repeated notice, or as of the Employer's use of the Facilities, as the case may be.

17.8 As soon as possible after Completion, the Contractor shall complete all outstanding minor items so that the Facilities are fully in accordance with the requirements of the Contract, failing which the Employer will undertake such completion and deduct the costs thereof from any monies owing to the Contractor.

17.9 Upon Completion, commissioning and successful demonstration of the PR test, the contractor shall be responsible for the care and custody of the Facilities, together with the risk of loss or damage thereto, and shall thereafter take over the Facilities or the relevant part thereof for the agreed duration of operation and maintenance as stipulated and mutually agreed terms and conditions.

18. Guarantee Test and Operational Acceptance

18.1 Functional Guarantees:

A. 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.

B. 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.

C. The contractor shall notify the Employer upon completion of the necessary changes, modifications and/or additions, and shall seek the Employer's consent to repeat the Guarantee Test. If the level of the specified Functional Guarantee parameters, as demonstrated even during repeat of the Guarantee Test(s), are outside the acceptable shortfall limit, the Employer may at its option, either

- Reject the Equipment and advise immediate replacement to suit the provisions of Technical Specification without any additional cost or;
- Reject the Equipment and recover the payments already made, or;
- Terminate the Contract and recover the payments already made, or;
- Accept the equipment after levy of liquidated damages in accordance with the provisions specified.

18.2 Plant Performance Guarantee Test:

The plant Performance Guarantee (as mentioned in TS) Test shall be conducted by the Contractor after Commissioning of the Facilities to ascertain whether the Facilities or the relevant part(s) can attain the Functional Guarantees specified in the Contract Documents. The Contractor's and Project Manager's advisory personnel shall attend the Guarantee Test. The Employer shall promptly provide the Contractor with such information as the Contractor may reasonably require in relation to the conduct and results of the Guarantee Test (and any repeats thereof). The detailed procedure for Performance Guarantee Test shall be carried out as per procedure laid down in Technical Specifications.

18.3 Operational Acceptance:

A. Operational Acceptance shall occur in respect of the Facilities when:

- The Plant Performance Guarantee Test (PR Test) in accordance with the procedure specified in Technical Specifications has been successfully completed and the Functional Guarantees are met; or

- The Contractor has paid the liquidated damages, if any, specified in Chapter III Clause 15 and Annexure 'F' thereof;

18.4 Final Acceptance

A. Final Acceptance shall occur in respect of the Facilities when:

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

B. At any time after the events set out in Sub – Clause 18.4.A. have occurred, the Contractor may give a notice to the Project Manager requesting the issue of Final Acceptance Certificate in the form provided in the Bidding Documents or in another form acceptable to the Employer in respect of the Facilities or the part thereof specified in such notice as at the date of such notice.

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

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

19. Inter-changeability:

All the parts shall be made accurately to applicable Standards and specification to facilitate replacement and repairs. All corresponding parts of similar apparatus shall be interchangeable.

20. Negligence:

20.1 If the Contractor neglects to manufacture or supply or construct the plant and equipment with due diligence and with expeditiousness or refuses or neglects to comply with any reasonable order given to it in writing by the Employer or contravenes any provisions of the Contract, the Employer may give (7) seven days' notice in writing to the Contractor, to make good the failure, neglect or contravention complained of. If the Contractor fails to comply with the notice within reasonable time depending on the nature of affected work, which is evaluated by the Project Manager from the date of serving thereof, in the event of failure, neglect or contravention capable of being made good within that time, then in such case, if the Employer thinks fit it may get the work done at the risk and cost of the contractor.

20.2 If the cost of executing the work as aforesaid shall exceed the balance due to the Contractor and the Contractor fails to make good such deficiency, the Employer shall take action in the manner it may consider deem fit in terms of the Contract.

21. Statutory Responsibility

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

22. Insolvency

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

If the Contractor being an individual or a firm or any partner thereof shall at any time, be adjudged insolvent or shall have a receiver appointed from administration against it or shall take any proceeding for compensation under any Insolvency Act for the time being in force or make any conveyance or assignment with its creditors or suspend payment or if the firm be dissolved under Partnership Act, or court or a Receiver, Liquidator or manager on behalf of the Debenture holder is appointed or circumstances

have arisen which entitle the Court or debenture holder to appoint a Receiver, Liquidator or Manager.

23. Defect Liability

23.1 The Contractor must warrant that the Facilities shall be free from defects in the design, engineering, materials and workmanship of the Plant and Equipment supplied and of the work executed.

23.2 If it shall appear to the Project Manager that any supplies have been executed with unsound, imperfect or unskilled workmanship, or with materials of any inferior description, or that any materials or articles provided by the Contractor for the execution of Contractor are unsound or otherwise not in accordance with the Contract, the Contractor shall on demand in writing inform the Project Manager or its authorized representative specifying the item, materials or articles complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for. The Contractor shall forthwith rectify or remove and replace that item so specified and provide other proper and suitable materials or articles at its own charge and cost, and in the event of failure to do so within a period to be specified by the Project Manager in its demand aforesaid, the Project Manager may on expiry of notice period rectify or remove and re-execute the item or remove and replace with others, the materials or articles complained of as the case may be at the risk and expense in all respects of the Contractor. The decisions of the Project Manager in this regard shall be final and binding.

23.3 The Contractor shall also be undertaking the operation and maintenance of the Facility and consequently shall be required to rectify any defects that emerge during the operation of the Facilities for the entire term of this Contract.

23.4 The Defect Liability Period shall be of 12 months from the date of completion of the Facilities, during which the Contractor must repair any defect identified by the Project Manager / EIC after commissioning of the plant. All the expenses to repair the defects shall be borne by the contractor and no additional cost charged to the Employer (“Defects Liability Period”).

23.5 If during the Defect Liability Period any defect should be found in the design, engineering, materials and workmanship of the Plant and Equipment supplied or of the work executed by the Contractor, the Contractor shall promptly, in consultation and agreement with the Employer regarding appropriate remedying of the defects, and at its cost, repair, replace or otherwise make good (as the Contractor shall, at its discretion, determine) such defect as well as any damage to the Facilities caused by such defect.

23.6 Furthermore, without prejudice to the generality of the foregoing, it is clarified that the Contractor shall also be responsible for the repair, replacement or making good of any defect, or of any damage to the Facilities arising out of or resulting from any of the following causes:

- Improper operation or maintenance of the Facilities by the Contractor during operation and maintenance of the Facility; and
- Operation of the Facilities outside specifications of the Facilities.

23.7 The Employer shall give the Contractor a notice stating the nature of any such defect together with all available evidence thereof, promptly following the discovery thereof. The Employer shall afford all reasonable opportunity for the Contractor to inspect any such defect.

23.8 The Employer shall provide the Contractor all necessary access to the Facilities and the Site to enable the Contractor to perform its obligations under this Clause 23 (Defect Liability). The Contractor may, with the consent of the Employer, remove any Plant and Equipment or any part of the Facilities that are defective from the Site, if the nature of the defect and/or any damage to the Facilities caused by the defect is such that repairs cannot be expeditiously carried out at the Site.

23.9 If the repair, replacement or making good is of such a nature that it may affect the efficiency of the Facilities or any part thereof, the Employer may give to the Contractor a notice requiring that tests of the defective part of the Facilities shall be made by the Contractor immediately upon completion of such remedial work, whereupon the Contractor shall carry out such tests.

23.10 If such part fails the tests, the Contractor shall carry out further repair, replacement or making good (as the case may be) until that part of the Facilities passes such tests. The tests, in character, shall in any case be not inferior to what has already been agreed upon by the Employer and the Contractor for the original equipment/part of the Facilities.

23.11 If the Contractor fails to commence the work necessary to remedy such defect or any damage to the Facilities caused by such defect within a reasonable time (which shall in no event be considered to be less than seven (7) days), the Employer may, following a notice to the Contractor, proceed to do such work, and the costs incurred by the Employer in connection therewith shall be paid to the Employer by the Contractor or may be deducted by the Employer from any monies due to the Contractor or claimed under the Performance Guarantee, without prejudice to other rights, which the Employer may have against the Contractor in respect of such defects.

23.12 If the Facilities or any part thereof cannot be used by reason of such defect and/or making good of such defect, the Defect Liability Period of the Facilities or such part, as the case may be, shall be extended by a period equal to the period during which the Facilities or such part cannot be used by the Employer because of any of the aforesaid reasons. Upon correction of the defects in the Facilities or any part thereof by repair/replacement, such repair/replacement shall have the defect liability period of twelve (12) months from such replacement.

23.13 In addition, the Contractor shall also provide an extended warranty for any such component of the Facilities and for the period of time. Such obligation shall be in addition to the defect liability specified under Clause 23.2.

24. Insurance

From commencement to completion of the works, the contractor shall have full responsibility for the case thereof and for taking precautions to prevent loss or damage to the assets at site and works under completion, as per this work order, and in case of projects, special works exceeding a cost of Rs.50 Lakhs and above or where ever mentioned, specifically, in the tender documents, the contractor will obtain an insurance policy covering all risks, damages, loss etc.

The Contractor shall provide in the names of the Employer, insurance cover from the start date to the end of the Defects liability period, in the amounts and deductibles stated in the Contract data for the following events which are due to the Contractors risks. a) Loss of or damage to the works, Plant and materials b) Loss of or damage to Equipment c) Loss of or damage of property (except the Works, Plant, Materials and Equipment) in connection with the Contract and Personal injury or death Policies and Certificates for insurance shall be delivered by the Contractor to the Nodal Officer or his nominee for

the Nodal Officer or his nominee's approval before the Start Date. All such insurances shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred. If the Contractor does not provide any of the policies and certificates required, the Employer may effect the insurance which the Contractor should have provided and recover the premiums from the Employer has paid from payments otherwise due to the Contractor or if no payment is due, the payment of the premium shall be a debt due. Alterations to the terms of insurance shall not be made without the approval of the Nodal Officer or his nominee. Both parties shall comply with all conditions of the insurance policies.

24.1 During the Contract period, i.e., during Construction and initial 01 year of assured performance period O&M, all insurance related expenses shall be borne by the Contractor. The goods supplied under the Contract shall be fully insured against the loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in such a manner that Employer shall not incur any financial loss, as long as the plant continues to remain under the custody of the Contractor.

24.2 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.

24.3 The Contractor shall arrange to supply/ rectify/ recover the materials even if the claim is unsettled for timely completion of the project. The final financial settlement with the insurance company shall rest upon the Contractor.

24.4 In case of any delay of the project attributable to the Contractor, the Contractor himself in consultation with Employer should take the extension of insurance. Any financial implications shall, however, be borne by the Contractor.

24.5 The Contractor should arrange for providing insurance coverage to its workmen under Workmen's Compensation Act or similar Rules and Acts as applicable during execution of work for covering risk against any mishap to its workmen. The Contractor shall also undertake a Third Party Insurance. The Employer will not be responsible for any such loss or mishap.

24.6 All other insurance like in–transit insurance (Marine/ Cargo/ others as applicable), Contractor All Risk, Erection All Risk, workmen compensation, third party liability, insurance against theft and acts of GOD and others as required for the Construction and O&M of the plant and to indemnify the Employer/ equipment/ material and resources shall be borne by the Contractor. Fire insurance is to be arranged by the Contractor up to the years of O&M of the Contract.

24.7 Employer shall be named as co – insured under all insurance policies taken out by the contractor pursuant to Clause 24, except for the workmen compensation, third party liability and Employer's liability insurances. Also, Contractors' sub –contractor shall be named as co – insured under all insurances taken out by the contractor pursuant to Clause 24 except for Cargo insurance, workmen compensation insurance and Employer's liability insurance. All insurers' rights of subrogation against such co – insured for losses or claims arising out of the performance of the contract shall be waived under such policies.

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

24.9 The insurance is to be suitably taken for the activity/ act which is required to cover all the risks associated to the activity / act. The contractor shall be responsible to take

suitable insurance till the completion of the O&M contract and indemnify the Employer from all associated risks whatsoever. The insurance premium for the O&M period of 5 years shall be paid by the Contractor, and the same shall be reimbursed by the Employer.

25. Hazardous Material

Any hazardous material used during construction or used as part of the plant has to be taken back by the supplier for recycling or dumping purpose after its operating / working life, so that it may not affect the environment or any living being. Bidder(s) have to comply with State Pollution Board regulation.

26. Stoppage of Work

Employer shall not be responsible and not liable to pay any compensation due to stoppage of work as a reaction from local public due to any undue action on the part of the Contractor causing annoyance to local people.

27. Hindrance Register

The Contractor may also maintain a Hindrance Register where reasons for delay/ fault may be recorded from time to time and at the time of occurrence of the hindrance and get it duly certified by the Project Manager or his authorized representative.

28. Manuals

The Contractor shall supply all necessary erection and commissioning manuals, O&M manuals etc. as and when required. Six sets of test results, manuals etc. shall be submitted by the Contractor on completion of the work to the employer.

29. Deduction from Contract Price

29.1 All costs, claims, damages or expenses, which the Employer may have paid for which the Contractor is liable, will be deducted by the Employer from deposited Performance Bank Guarantee(s) or from any money due or which become due to him under this Contract or any contract are being executed elsewhere with the Employer.

29.2 Any sum of money due and payable to the Contractor, as per the Contract Agreement, may be appropriated by the Employer and set off against any claim of the Employer, for the payment of a sum of money arising out of or under any other contract made by the Contractor with the Employer. It is an agreed term of the Contract that the sum of money, withheld or obtained under this clause by the Employer, will be kept withheld or retained as such by the Employer or till t h e claim arising out of in the same Contract is either mutually settled or determined by the arbitrator, or by competent court, as the case may be, and that the Contractor shall have no claim for interest or damages whatsoever on this account or any other account in respect of any sum of money withheld or retained under this clause and duly notified as such to the Contractor.

30. Warranty / Guarantee

30.1 The entire Solar Power Plant, including all equipment, shall be covered under warranty.

30.2 The Warranty period shall be one year, commencing from the date of issuance of the completion certificate.

30.3 During the warranty period, the contractor shall carryout Preventive Maintenance of all the equipment on quarterly basis and attend the breakdown, if any. All the spares required for the maintenance shall be provided by the contractor to maintain Solar PV Plant fully functional with maximum generation as per tender conditions.

30.4 Further, during this warranty period, the contractor shall keep his manpower at site to carry out day to day activities, maintenance, cleaning, etc. to optimize the generation. During this period, no payment shall be made to the contractor by MOIL.

30.5 PV modules used in grid connected solar power plants must be warranted for peak output wattage, **which should not be less than 90% at the end of 10 years and 80% at the end of 25 years. Further modules shall have performance warranty of more than 97% during 1st year of installation.**

30.6 The modules shall be warranted for at least 25 years for failures due to material defects and workmanship.

30.7 The mechanical structures, electrical works and overall workmanship of the grid connected solar power plant must be warranted for a minimum of 10 years.

30.8 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.

30.9 The warranty / guarantee period shall be as follows:

A. Solar PV Modules: Modules shall be warranted for a minimum period of 25 years in the Bidder's detailed Warranty / Guarantee certificate.

B. Solar Inverters: SIs shall be warranted for the minimum period of 5 years or guarantee period provided by the OEM, whichever is higher.

C. Transformers, associated switchgear and others: Bidder must furnish in detail its warranties/guarantees for these items.

30.10 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.

30.11 At the end of guarantee period, the Contractor's liability shall cease. In respect of goods not covered by the Sub Clause 30, the Employer shall be entitled to the benefit of such guarantee given to the Contractor by the original Contractor or manufacturer of such goods.

30.12 During the Operation & Maintenance and guarantee period, the Contractor shall be responsible for any defects in the work due to faulty workmanship or due to use of sub-standard materials in the work. Any defects in the work during the guarantee period shall therefore, be rectified by the Contractor without any extra cost to the Employer within a reasonable time as may be considered from the date of receipt of such intimation from the Employer failing which the Employer reserves the right to take up rectification work at the risk and cost of the Contractor.

31. Operation and Maintenance

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

A. Preventive / Routine Maintenance:

This shall be done by the Contractor regularly and shall include activities such as cleaning and checking the health of the Solar PV system, cleaning of module surface, tightening of all electrical connections, and any other activity including the associated civil works, as mentioned in Clause No. 31, 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 switchgears and transmission line also shall be included.

B. Breakdown / Corrective maintenance:

Whenever a fault occurs, the Contractor has to attend to rectify the fault & the fault must be rectified within the 48 hours from the time of occurrence of fault, failing which the Contractor will be liable for additional liquidated damages as per reference to the generation parameters accumulated in similar/ associated equipment of the plant (for eg. if a block consists of 4 inverters and one inverter is down for more than 48 hours, then the generation for faulty inverter shall be calculated as the average of accumulated generation for the other 3 inverters over the 48 hours' duration of fault as the deemed generation) and the LD shall be levied on the deemed generation as per the prevailing average tariff rate of concerned Electricity Board. The contractor must maintain all the records pertaining to all such faults and necessary measures taken.

31.2 The date of Comprehensive Operation & Maintenance Contract period shall commence from the date of Operational acceptance and completion of warrantee period of twelve months or whichever is later. However, operation of the Power Plant means operation of system as per bid and workmanship in order to keep the project trouble free covering the guarantee period. The contractor must demonstrate the committed CUF at the end of every year in accordance with commitment made in the Techno-Commercial Enclosures of the Bid.

32. Risk Purchase

If the Contractor fails, on receipt of the LOI, to take up the work within a reasonable period or leave the work Site after partial execution of the work, the Employer shall have the liberty to get the work done through other agency at the Contractor's own risk and additional cost if any has to be borne by the Contractor. If the situation, so warrants, to compel the Employer to cancel the LOI placed on the Contractor, the Contractor shall be liable to compensate the loss or damage, which the Employer may sustain due to reasons of failure on Contractor's part to execute the work in time.

33. Change in Laws and Regulations:

If, after the date seven (7) days prior to the date of Bid submission, in the country where the Site is located, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or

the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the Performance of any of its obligations under the Contract. However, these adjustments would be restricted to direct transactions between the Employer and the Contractor/assignee of Foreign Contractor (if applicable). This adjustment shall not be applicable on procurement of raw materials, intermediary components etc. by the Contractor and shall also not be applicable on bought out items dispatched directly from sub- vendor works to site. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable.

34. Extension of Time for Completion

The Time(s) for Completion specified in the clause Annexure 'D' shall be extended if the Contractor has delayed or impeded in the Performance of any of its obligations under the Contract by reason of any of the following:

A. Any occurrence of Force Majeure as provided in clause 35 Force Majeure of Chapter II, any changes in laws and regulations as provided in Clause 34 (above) (Change in Laws and Regulations) or by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Contractor.

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

35. Care of Facilities

The Contractor shall be responsible for the care and custody of the Facilities or any part thereof until the date of Completion of the Facilities pursuant to Clause 69 of Chapter II or, where the Contract provides for Completion of the Facilities in parts, until the date of Completion of the relevant part, and shall make good at its own cost any loss or damage that may occur to the Facilities or the relevant part thereof from any cause whatsoever during such period. The Contractor shall also be responsible for any loss or damage to the Facilities caused by the Contractor or its Subcontractors in the course of any work carried out, pursuant to Clause 23 (Defect Liability) of Chapter III.

36. Documents constituting the Contract

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

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

37. Fraud Prevention Policy

The Contractor along with their Associate/ Collaborator/ Sub- contractors/ Sub-vendors/ Consultants/ Service Providers shall observe the highest standard of ethics and shall not indulge or allow anybody else working in their organization to indulge in fraudulent activities during execution of the Contract. The Contractor shall immediately apprise the Employer about any fraud or suspected fraud as soon as it comes to their notice.

38. Copyright & Patent

38.1 The copyright in all drawings, documents and other materials containing data and information furnished to the Employer by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Employer directly or through the Contractor by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party. The Employer shall however be free to reproduce all drawings, documents, specification and other material furnished to the Employer for the purpose of the contract including, if required, for operation and maintenance of the facilities.

38.2 The Contractor shall indemnify the Employer against third party claims of infringement of patent, trademark or industrial design rights arising from use of goods or any part thereof in India.

39. Confidential Information

39.1 The Employer and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under the Clause 28 of Chapter II.

39.2 The Employer shall not use such documents, data and other information received from the Contractor for any purpose other than the operation and maintenance of the Facilities. Similarly, the Contractor shall not use such documents, data and other information received from the Employer for any purpose other than the design, procurement of Plant and Equipment, construction or such other work and services as are required for the Performance of the Contract.

39.3 The obligation of a party under of clause 28 Chapter II above, however, shall not apply to that information which

- **A.** Now or hereafter enters the public domain through no fault of that party
- **B.** Can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party hereto.
- **C.** Otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

39.4 The above provisions of this Clause 42 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Facilities or any part thereof.

39.5 The provisions of this Clause 42 shall survive termination, for whatever reason, of the Contract.

39.6 Geological discoveries

39.7 All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the site where the services are performed, be deem to be the absolute property of the Employer. The Contractor shall take reasonable precautions to prevent the personnel or any other persons from

removing or damaging any such article or thing and shall immediately upon the discovery thereof and, before removal, acquaint the Employer of such discovery any carry out, at the expense of the Employer, the Employer's orders as to the disposal of the same.

CHAPTER - IV

TECHNICAL SPECIFICATIONS

1. Site Description

1.1 The proposed projects are to be installed in the area of Rajgarh Khas in Madhya Pradesh. The details of the land identified for setting up of the plants are hereunder mentioned:

1.2 Proposed Land Details: 103 Acres govt. allotted at Khasra No. 803/1 & 803/2, Nesdi Gram Panchayat, Gram - Gordhapura, Tahsil Rajgarh, District Rajgarh in Madhya Pradesh.

Indicative Technical and commercial Parameters

Table-2 : Indicative technical parameters

Sr. No.	Particulars	Description
1	Capacity of the project	15 MW ac capacity Solar PV Project
2	Anticipated DC Capacity .	Minimum of 18 MWp
3	DC/AC Ratio	1.20
4	Annual Global Irradiance, GHI	1759.0 watts /Sq M
5	PV Module Make	Reputed company
6	Individual Capacity of Modules (Wp)	545 Wp or higher
7	Inverter Make and Type	Reputed make
8	Inverters - Capacity of Inverter(s) (kW)	Either String Inverters or Central Inverters (As per configuration with suitable capacity as per design)
9	Efficiency of Modules	21%
10	CUF with respect to DC capacity	Minimum 18%
11	CUF with respect to AC capacity	Minimum 21%
12	Available selected land area	103 Acres
13	Evacuation Voltage Level	33 kV
14	Evacuation Substation	220/132/33 kV Sub-Station Rajgarh
15	Substation Location	About 4.0 Km from the site
16	Metering Point	At 220/132/33 kV Sub-Station
17	Project Design Life	>= 25 years
18	Terrain	Plain with small undulations
19	Levelization degree	Almost levelled (The bidder shall visit and gather information of the site)

2. Design Philosophy

The main objective of the design philosophy is to construct the plant with in-built Quality and appropriate redundancy to achieve high availability and reliability with minimum maintenance efforts. In order to achieve this, the following principles not limited to shall be adopted while designing system.

2.1. Technology: Solar PV Mono/ multi-crystalline modules of high efficiency and the modules **should be manufactured in India**. The minimum capacity of the individual PV module should not be less than 545 Wp and all the modules must be identical. Mono Crystalline PERC Modules are preferred. which has better efficiency and higher CUF. All modules must be brand new with high efficiency of minimum 21%.

2.2 Adequate capacity of SPV modules, SIs, Junction boxes etc. to ensure generation of power as per design estimates. This to be done by applying liberal de-rating factors for the array and recognizing the efficiency parameters of SIs, 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.

2.6 Strict compliance with the approved and proven quality assurance norms and procedures during the different phases of the project.

2.7 Proper monitoring in the synchronizations which ensures the availability of power to the grid.

2.7 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 of the historical data and help in the plant maintenance people to take up the plant and equipment on preventive maintenance.

2.10 Generation voltage of 230-415V has to be stepped up to 33 kV to connect it to the grid at the point of interconnection of new 33kV Bay to be constructed by the selected Bidder at the 220/132/33 kV S/s of MPEB at Rajgarh Madhya Pradesh.

2.11 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 DISCOMS infinite system. Thus, the Solar Power Plant has to protect its equipment against any of possible fault or other disturbances from the grid.

2.12 Very fast responsive microprocessor based Directional and Reverse power flow protection should be provided to ensure isolation of the solar power plant from the grid at the time of any fault or/and any additional suitable protection. The basic and detailed engineering of the plant shall aim at achieving high standards of operational performance especially considering following:

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

2.14 High DC system voltage (1500V DC) and low current handling requirements.

2.15 Selection of Inverters / String Inverters is with proven performance and ready availability of requisite spares.

2.16 Based on the SOLAR INSOLATION data from reliable sources, the solar PV system should be so designed that it shall take into account the mean energy output after allowing for various losses, temperature corrections, on an average day for each month of the year.

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

2.18 SPV power plant should be designed to operate satisfactorily in parallel with the grid within permissible limits of high voltage and frequency fluctuation conditions, so as to export the maximum possible units generated to the grid. It is also extremely important to safeguard the system during major disturbances, like tripping / pulling out of big generating stations and sudden overloading during falling of portion of the grid loads on the power plant unit in island mode, under fault / feeder tripping conditions.

2.19 The specifications provided with this bid document are a functional one; any design provided in this document is only meant as an example.

2.20 The Bidder must submit a proposal based upon their own design. Bidder must optimize their own design for Solar Photovoltaic (SPV) system with proven technology so that it shall best meet to guarantee the performance factors as it is a part of the acceptance criteria given in this bid document. The bidders are advised to visit the site before designing the plant.

2.21 Component and equipment reliability: Each component offered by the bidder shall be of established reliability. The minimum target reliability of each equipment shall be established by the bidder considering its failure, mean time between failures and mean time to restore, such that the availability of complete system is assured. The guaranteed annual system availability shall not be less than 99.9%. Bidder recommendation of the mandatory spares shall be on the basis of established reliability. Bidder shall design the equipment and plant in order to have sustained life of 25 years with minimum maintenance efforts.

2.22. Provision must be made to add additional modules and rated capacity of inverter shall be sufficient to accommodate more Modules of same specification of the installed modules to achieve the guaranteed generation throughout the life of the plant, without affecting the protection and safety of the system.

3. Detailed Scope of Work

Scope of Supply & Work includes all design & engineering, procurement & supply of equipment and materials, testing at manufacturers works, inspection, packing and forwarding, supply, receipt, unloading and storage at site, preparation of site, reclamation work, associated civil works, services, permits, licenses, installation and incidentals, insurance at all stages, erection, testing and commissioning of 15 MW (AC) Grid Interactive Solar PV Power Plant and performance demonstration O&M for one year with associated equipment and materials on turnkey basis with 05 years comprehensive operation and maintenance from the date of performance Operational Acceptance.

The equipment and materials for the said (AC) capacity Grid Interactive Solar PV Power Plant with associated system (Typical) shall include but not be limited to the receipt, unloading, storage, erection, testing and commissioning of all supplied material for the following:

3.1 Solar PV modules of suitable rating, in array totalling minimum of the said DC capacity, mounting frames, structures, fasteners, array foundation and module interconnection.

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

3.3 DC and AC cables of appropriate sizes with adequate safety and insulation

3.4 Central Inverters / String Inverters with SCADA compatibility, common AC power evacuation panel with bus bars and circuit breakers LT & HT Power Interfacing Panels, Plant Monitoring Desk, AC & DC Distribution boards.

3.5 This project is to be designed for 1500V DC Voltage system.

3.6 Inverter Output Voltage for the Project is 690 V AC or as per inverter manufacturer which will be further stepped up to 33kV for termination

3.7 415V-690V / 33kV step up transformers in relevance with state grid code and inverter manufacturer requirements.

3.8 Stepping up of the voltage from 415V-690V to 33kV shall be separately done using Step up transformer.

3.9 All the Outdoor Equipment shall be IP65 with canopy and Indoor Equipment shall be IP42 rating or IP54 rating depending on exposure. IP rating is defined in IEC 60529.

3.10 33 kV/415V auxiliary transformer(s) indoor type of suitable rating.

3.11 Metering and protection system along with battery system.

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

3.13 Internal 415V interconnection & indoor feeder panels to cater auxiliary needs of plant.

3.14 33kV indoor panels having incoming and outgoing feeders with VCBs, CTs, PTs, Bus bars, cables terminals kits and Bus coupler having Main and transfer Bus. Each bay shall consist of VCB, CT, Isolators with earth switch, LAs and PT's etc.

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

3.16 Data acquisition system with remote monitoring facilities.

3.17 Lightning protection for entire plant area.

3.18 PVC pipes, cable conduits, covered cable trays (to avoid damages to the cable/connector/etc. from monkeys, as our sites are monkey prone area) and accessories/trenches.

3.19 Earthing of the entire plant as per relevant standards.

3.20 Control room equipment related to solar system etc.

3.21 Testing, maintenance and monitoring of equipment.

3.22 Spares & consumables, as required or recommended, for 23 years O&M period.

3.23 CCTV cameras at Main Entrance, at Main Control room, site substation and the boundary at locations prone to tress passing.

3.24 Fire protection system in buildings and relevant types of fire extinguishers designed for specific classes of fires.

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

3.26 One Solar Observatory including testing facilities. The Solar Observatory with associated systems shall include but not be limited to the following:

- Pyranometers – for horizontal and tilted plane
- Ultrasonic Anemometer (wind speed and direction)
- Temperature Sensor – Ambient and module surface
- Power source to the all sensors
- Data Logger
- Desktop and Printer

3.27 Construction of suitable infrastructures for power evacuation at 33kV from take-off point till the receipt of lines at nearest 33 kV Substation.

3.28 Design & construction of 33 kV underground cable/overhead transmission lines from plant take off point to the Nearest substation including right of way (ROW).

3.29 Design of said (AC) capacity Grid Interactive Solar Power Plant and its associated civil, structural, electrical & mechanical auxiliary systems includes preparation of single line diagrams and installation drawings, manuals, electrical layouts, erection key diagrams, electrical and physical clearance diagrams, design calculations for Earth- mat, Bus Bar & Spacers indoor and outdoor lighting/ illumination etc. design memorandum, GTP and GA drawings for the major equipment, design basis & calculation sheets, and other relevant drawings and documents required for engineering of all facilities to be provided under this contract, are covered under Bidders scope of work.

3.30 In addition to above, the Bidder is required to measure the Solar Radiation and other climatic conditions relevant to measure the plant performance. This is necessary to study Solar Level and Guaranteed Performance of the Solar Power Plant. 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.

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

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

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

3.34 Materials and accessories, which are necessary or usual for satisfactory and trouble-free operation and maintenance of the above equipment.

3.35 The items of civil design and construction work shall include all works required for solar PV project and should be performed specifically with respect to following but not limited to:

3.35.1 Conducting contour survey of the total area identified for said (AC) capacity & complete soil investigation with bore hole details.

3.35.2 Earthwork for site grading, cutting, filling, levelling & compaction of land It is necessary to do the reclamation of the site for around 1.5 m as per the requirements of site. The bidders shall judiciously decide on making the price-bid accordingly.

3.35.3 Construction and erection of perimeter fence/ boundary wall and main/ security gate(s).

3.35.4 Construction of foundation for mounting structures for SPV panels.

3.35.5 Civil foundation work of transformers, switchgears, etc.

3.35.6 Construction of internal roads 3.5m wide with 0.5m wide well compacted shoulders on each side with WBM base to carry safe and easy transportation of equipment and material at the project site during and after construction. Construction of Main Gate to nearest public road of 3.5m wide with 0.5m wide well compacted shoulders on each side with WBM, base for easy approach to plant.

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

3.35.8 Office cum stores cum control room building with Supervisor room, pantry, wash room, conference room etc. along with requisite furniture, workstations, air conditioning, internal and external illumination, other equipment as per the specifications.

3.35.9 Security cabin (s) at strategic locations inside the boundary of the plant.

3.35.10 A suitable arrangement of water 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 during entire O&M period.

3.36 Suitable Communication System for SCADA with remote monitoring capabilities.

3.37 Construction of Storm water drainage & sewage network. Rain water harvesting system should also be explored to promote water conservation.

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

3.39 Galvanized steel rigid/ high density flexible conduits and their accessories and Hume pipes for crossings.

3.40 Supply of ferrules, lugs, glands, terminal blocks, galvanized sheet steel junction boxes with powder coating paint for internal fixtures, cable fixing clamps, nuts and bolts etc. of appropriate sizes as required in the plant.

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

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

3.43 Routing of power evacuation infrastructure from take-off point at plant to the delivery point at nearest substation.

3.44 Obtaining statutory approvals /clearances on behalf of the Employer from various Government Departments, not limited to, the following-

I. Local body
II. State Nodal Agencies MPERC, if required.
III. Pollution control board clearance, if required
IV. Mining Department, if required
V. Forest Department, if required
VI. All other approval, as necessary for setting up of a solar power plant including CEIG, connectivity, power evacuation, Railways for 33kV evacuation line cross for railway line, PTCC etc. as per the suggested guidelines
VII. All other statutory approvals and permissions, not mentioned specifically but are required to carry out hassle free construction and O&M of the plant prevailing at Site.

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

3.46 Total operation & maintenance of Solar Photovoltaic Power Plant for the 6 (01+5) year's period including deployment of engineering personnel, technicians and security personnel after the commissioning till final acceptance, during this period, the responsibility of O&M shall be with contractor.

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

3.48 Any and all statutory payments required to be paid for the approvals will be made / reimbursed by the Employer.

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

3.49.1 Contour plan and soil investigation data for the area
3.49.2 GA drawings of the entire project including roads, drains, storm water drainage, sewage networks, equipment rooms, office cum control room, security gate, fire protection system etc.
3.49.3 Design basis criteria along with relevant standards (list of standards and respective clause description only)
3.49.4 Solar insolation data and basis for generation data.
3.49.5 Design calculations and sheets.
3.49.6 Detailed technical specifications of all the equipment.
3.49.7 General arrangement and assembly drawings of all major equipment.
3.49.8 Schematic diagram for entire electrical system, plant automation and communication system.

3.49.9 GTP & G.A. drawings for all types of structures/ components, 33kV switchgears & other interfacing panels.
3.49.10 Relay setting charts.
3.49.11 Quality assurance plans for manufacturing and field activities
3.49.12 Detailed site EHS plan, fire safety & evacuation plan and disaster management plan.
3.49.13 Detailed risk assessment and mitigation plan.
3.49.14 Test reports (for type, acceptance, and routine tests).
3.49.15 O&M Instruction's manuals and its drawings.
3.49.16 As-built drawings / documents and deviation list from good for construction (GFC)
3.49.17 O&M plans, schedules and operational manuals for all equipment etc. Daily/ Weekly site work progress report with catch-up plan(s), as necessary to monitor actual timelines of the project during construction period along with the real time snap shots during the time of construction.
3.49.18 Weekly/ Monthly O&M reports after commissioning of the project.

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

3.51 The contractor shall forward the following to Employer within two weeks from issue of LOI:

3.51.1 Schedule for various activities in the form of PERT Chart.
3.51.2 Detailed engineering calculations, Design basis report and complete layout of the plant
3.51.3 Equipment data sheets, guaranteed technical particular of equipment and GA drawings of major equipment like, inverter, mounting structure and transformer.

3.52 Providing a detailed training plan for all operation, maintenance procedures, which shall after approval by Employer form the basis of the training program. The contractor, shall also provide training to Employer's nominated staff.

3.53 Employ and coordinate the training of contractors' personnel who will be qualified and experienced to operate and monitor the facility and to coordinate operations of the facility with the grid system.

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

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

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

3.57 Perform or contract for and oversee the performance of periodic overhauls or maintenance required for the facility in accordance with the recommendations of the original equipment manufacturer (OEM).

3.58 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 during entire O&M period.

3.59 Handover the system to maintain an inventory of spare parts, tools, equipment, consumables and supplies for the facility's operation along-with required details of recommended spares list with all associated information regarding replacement records, supplier details, tentative cost, storage details, specifications on the basis of

replacement frequency and mean time between failures and mean time to restore at the culmination of penultimate year under O&M period.

3.60 Maintain and keep offices, roads, tool room, stores room, equipment, clean, green and in workable conditions.

3.61 Discharge obligations relating to retirement/ Superannuating benefits to employees or any other benefit accruing to them in the nature of compensation, profit in lieu / in addition to salary, etc. for the period of service with the contractor, irrespective continuance of employees with the project as employees of Contractor, after conclusion of O&M period.

3.62 Operation and Maintenance

3.62.1 The contractor shall be entrusted to carry out the total O&M activities of the 15 MW (AC) Solar Photovoltaic Power Plant for the 05 years after completion of 01-year demonstration of guaranteed performance required for operational acceptance.

3.62.2 The Turnkey contractor shall be responsible for all the required activities for the successful running, committed energy generation & maintenance of the Solar Photovoltaic Power Plant covering:

- Deputation of qualified and experienced engineers and technicians
- Deputation of Security personnel for the complete security of plant
- Successful running of Solar Power Plant for committed energy generation.
- Co-ordination with STU/SLDC/other statutory organizations as per the requirement on behalf of Employer for Joint Metering Report (JMR), furnishing generations schedules as per requirement, revising schedules as necessary and complying with grid requirements.
- Monitoring, controlling, troubleshooting maintaining of logs & records, registers.
- Supply of all spares, consumables and fixing / application as required.
- Supply & use of consumables such as grease, oil etc. throughout the maintenance period as per recommendations of the equipment manufacturers.
- Conducting periodical checking, testing, overhauling, preventive and corrective action.
- General up keeping of all equipment, building, roads, Solar PV modules, inverter etc.
- Submission of periodical reports to Employer on the energy generation & operating conditions of the power plant.
- Furnishing generation data monthly to Employer by 1st week of every month for the previous month to enable Employer raise commercial bills on consumers.
- Periodic cleaning of solar modules as per the recommendations of OEM
- Replacement of Modules, Invertors/Solar Inverters and other equipment as and when required.
- Liaisoning with concerned DISCOM/Transco for open access, submission of generation data and follow-up for captive adjustment.

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

3.62.4 Preventive and corrective O&M of the Solar Photovoltaic Power Plant including supply of spares, consumables, wear and tear, overhauling, replacement of damaged modules, invertors, Solar Inverters and insurance covering all risks (Fire & allied perils, earth

quake, terrorists, burglary and others) as required, for a period of 05 (Five) years from the date of start of O&M of the project shall be carried out at fixed annual cost.

3.62.5 All the equipment required for Testing, Commissioning and O&M for the healthy operation of the Plant must be calibrated, time to time, from the NABL/MNRE accredited labs and the certificate of calibration must be provided prior to its deployment.

3.63 Operation and Performance Monitoring

3.63.1 Operation part consists of deputing necessary manpower 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.

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

3.64 Maintenance

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

3.64.2 Regular periodic checks of the Modules, Solar Inverter 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.

3.64.3 Maintenance of other major equipment involved in Solar Photovoltaic Power Plant are step up transformers, underground cable, indoor 33kV VCB kiosk, associated switchgears, other fixtures & components and metering panel. Particular care shall be taken for outdoor equipment to prevent corrosion. Cleaning of the insulators and applying Vaseline on insulators shall also be carried out at regular intervals. Earth resistivity of Plant as well as individual earth pit is to be measured and recorded every month. If the earth resistance is high suitable action is to be taken to bring down the same.

3.64.4 According to the recommendations stock of special tools and tackles shall be maintained for Modules, Solar Inverters, switchgears and other major electrical equipment.

3.64.5 A maintenance record is to be maintained by the operator/engineer-in-charge to record the regular maintenance work carried out as well as any breakdown maintenance along with the date of maintenance reasons for the breakdowns steps have taken to attend the breakdown duration of the breakdown etc.

3.64.6 The Schedules will be drawn such that some of the jobs other than breakdown, which may require comparatively long stoppage of the Power Plant, shall be carried out preferably during the non-sunny days. An information shall be provided to Engineer-in-charge for such operation prior to start.

3.64.7 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.

3.64.8 The Contractor will attend to any breakdown jobs immediately for repair/replacement /adjustments and complete at the earliest working round the clock. During breakdowns (not attributable to normal wear and tear) at O&M period, the Contractor shall immediately report the accidents, if any, to the Engineer In-charge showing the circumstances under which it happened and the extent of damage and or injury caused.

3.64.9 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, Employees State Insurance Act 1948, Contract Labour (Regulations & Abolishment) Act 1970, Electricity Act 2003, Grid Code, Metering Code, MNRE guidelines or any modification thereof, MPEB's Policy or any other law relating whereto and rules made there under or amended from time to time.

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

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

3.64.12 If negligence / mal operation of the contractor's operator results in failure of equipment such equipment should be repaired replaced by contractor at free of cost.

3.64.13 If any jobs covered in O&M Scope as per O&M Plan are not carried out by the contractor during the O&M period, the Engineer-In-Charge can issue a notice to the Contractor. Repetition of such instances for more than 2 times a year may lead to the Termination of the O&M Contract by the Employer.

3.65 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.

3.66 Testing Equipment, Tools and Tackles

The Contractor shall arrange for all the necessary testing equipment, tools and tackles for carrying out all the construction, operation and maintenance work covered under this contract. All the instruments are required to be calibrated from NABL accredited lab before put in use. The certificate of the same shall be submitted to Employer for verification.

3.67 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 Employer immediately. A monthly report shall be sent to Employer on the security aspects.

4. Technical Specification of Solar power plant

Bill of Material: The equipment and material for each Grid Interactive Solar Photovoltaic Power Plant with associate system (typical) shall include, but not limited to the following:

Item Details	Specification	Unit
PV Modules	Make/Model/Capacity/Quantity	Nos.
Module Mounting Structures	Drawings (As per bidder's design)	Set
Main Junction Boxes with monitoring capabilities	Drawings (As per bidder's design)	Lot
Solar module array to Junction Box Interconnection cable (Cu)	As per Bidder's Design	RM
Junction box to Inverter Interconnection Cable	As per Bidder's Design	RM
Connection accessories – lugs, ferrules, glands etc.	As per Bidder's Design	Lot
DC cables & AC (LT/ HT) Cable of appropriate sizes	As per Bidder's Design	RM
Solar Inverters	Make/Model/Capacity	Nos.
Meteorological station with sensors and data logger	As per Bidder's Design	Lot
String level monitoring system (SCADA) and ancillaries	As per Bidder's Design	Set
Transformers (Power and Auxiliary)	Make/Model/Capacity	Set
Circuit breakers, CT and PT (at 33KV) set	Make/Model/Capacity	Set
33kV Indoor/ outdoor interfacing panels with CT, VCB, PT, Relays etc.	As per Bidder's Design	Set
33kV XLPE Outgoing feeder cable and supports	As per Bidder's Design	Set
AC & DC distribution panels/ boards	As per Bidder's Design	Lot
Control and Relay Panel	As per Bidder's Design	Lot
Lightning Arresters of suitable ratings	As per Bidder's Design	Nos.
Earth mat for switch yard, DC field array and equipment	As per Bidder's Design	Lot
Control and power cables	As per Bidder's Design	Lot
Surge Protection devices and Fuses	Make/Model	Set
Earth cables, flats and earthing pits	As per Bidder's Design	Lot
Equipment and Control cum office Building	Drawing (As per bidder's design)	Lot
Rubber Mats for specific kV ratings	As per Bidder's Design	Lot
Foam type Fire extinguisher	As per Bidder's Design	Lot
CO2 Extinguisher	As per Bidder's Design	Lot
Sand Buckets	As per Bidder's Design	Lot
Discharge Rods	As per Bidder's Design	Lot

Transmission line with suitable conductor with H – poles, towers etc.	As per Bidder's Design approved by statutory authorities	Lot
Power efficient peripheral lighting arrangement for the plant safety	As per Bidder's Design	Nos.
Fire – fighting automation and signboards in buildings	As per Bidder's Design	Lot
Metering Equipment (Meters, and associated CT and PT's)	As per the state/central code/regulation	Set
Protection Equipment	Make/Model	Set
Solar Observatory with remote monitoring assistance	As per Bidder's Design	Set
Module cleaning system	As per Bidder's Design	Lot
Danger sign plates, anti-climbing, bird protection etc.	As per Bidder's Design	Lot
Type & Nos. of CCTV Cameras to be proposed	As per Bidder's Design	Nos.
Protection to avoid damages to modules, cable/connector/etc. from animals.	As per Bidder's Design	Lot

All the information shown here is indicative only and may vary as per design and planning by the bidder. The successful bidder must provide the details of BOM of the plant as per their design after award of work order.

The technical features of major equipment are described hereunder.

4.1 Photovoltaic Modules: Total capacity of PV Modules to be supplied for the 15 MW (AC) project which is the cumulative rated capacity of all solar PV module under supply as per relevant IEC standards under Standard Temperature Condition (STC) covering all losses up to power export point. The Project shall consist of Mono-crystalline silicon photovoltaic modules as per the specifications given below:

4.1.1 The solar photovoltaic modules shall be mono crystalline PERC silicon based modules or better.

4.1.2 The minimum capacity of a module should not be less than 545 Wp. All the modules should be identical.

4.1.3 The glass used to make the crystalline silicon modules shall be toughened low iron glass with a thickness of 2.0 mm or less without affecting the mechanical strength, durability and efficiency in transmittance of light. The glass used shall have transmittance of above 90% and with bending of less than 0.3% to meet the specifications.

4.1.4 The back sheet used in the crystalline silicon based modules shall be of 3 layered structure. Outer layer of fluoropolymer, middle layer of Polyester (PET) based and Inner layer of fluoropolymer or UV resistant polymer. Back sheet with additional layer of Copper also will be considered. The thickness of back sheet should be of minimum 300 microns with water vapour transmission rate less than 3g/m2/day. The Back sheet shall have voltage tolerance of more than 1000 V.

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

4.1.6 The sealant used for edge sealing of PV modules shall have excellent moisture ingress protection with good electrical insulation (Break down voltage >15 kV/mm) and with good adhesion strength.

4.1.7 The junction box used in the modules shall have protective bypass diodes to prevent hot spots in case of cell mismatch or shading. The material used for junction box shall be made with UV resistant material to avoid degradation during module life and the Junction sealing shall comply IP65 degree of protection.

4.1.8 The crystalline silicon based modules supplied should be of Potential Induced Degradation (PID) free modules and the test certificate from third party lab complying with the same shall be provided.

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

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

4.1.11 Modules shall perform satisfactorily in relative humidity up to 95% and temperature between -10°C and 85°C (module temperature).

4.1.12 PV modules must be warranted for their output peak watt capacity, which should not be less than 90% of the initial value at the end of 10 years and 80% of the initial value at the end of 25 years.

4.1.13 The modules shall be warranted for minimum of 25 years against all material/ manufacturing defects and workmanship.

4.1.14 All modules shall be certified:

- IEC 61215 2nd Ed. (Design qualification and type approval for Crystalline Si modules),
- IEC 61730 (PV module safety qualification testing @ 1000 V DC or higher)
- IEC 61701: Salt Spray test for highly corrosive environment, if applicable
- IEC 62716: Ammonia Resistant certified, if applicable
- Test certificate from NABL approved or /ILAC member body certified labs shall be provided.

4.1.15 The developer shall arrange for the details of the materials along with specifications sheets from the manufacturers of the various components used in solar modules along with those used in the modules sent for certification. The Bill of materials (BOM) used for modules shall not differ in any case from the ones submitted for certification of modules.

4.1.16 The I-V characteristics of all modules as per specifications to be used in the systems are required to be submitted at the time of supply.

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

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

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

4.1.20 SPV module shall have module safety class-II and should be highly reliable, light weight and must have a service life of more than 25 years.

4.1.21 The module frame shall be made of anodized Aluminum or corrosion resistant material, which shall be electrically compatible with the structural material used for mounting the modules. In case of metal frames for modules, it is required to have provision for earthing to connect it to the earthing grid.

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

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

4.1.24 Bidder shall provide data for Solar PV Module as per Annexure “F”, Guarantee Technical Particular as per NIT conditions.

4.1.25 The Employer or its authorized representative reserves the right to inspect the modules at the manufacturer’s site prior to dispatch.

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

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

4.2 PV Array Configurations: The Solar array shall be configured in multiple numbers of sub-arrays, providing optimum DC power to auditable number of sub arrays. The bidder shall submit their own design indicating configuration of SOLAR INVERTER and respective sub arrays and associated bill of material.

4.3 Module Mounting Structure:

4.3.1 The structure design shall be appropriate and innovative. It must follow the existing land profile.

4.3.2 The structure shall be designed to allow easy replacement of any module, suitable tilting angle and pitching must be provided to absorb optimum solar and shall be in line with the site requirements.

4.3.3 Design drawings with material selected and their standards shall be submitted for prior approval of Employer within 14 days of NTP.

4.3.4 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 250 kmph, whichever is higher, using relevant Indian wind load codes. The structures and foundations shall also conform to the seismic conditions pertaining to the zone using relevant Standards and codes.

4.3.5 The structure must be designed with considering appropriate factor of safety. The bidder must provide the detail design and calculation for the structure design.

4.3.6 The structure shall be designed for simple mechanical and electrical installation. It shall support SPV modules at a given orientation & tilt, absorb and transfer the mechanical loads to the ground properly. Welding of structure at site shall not be allowed.

4.3.7 The array structure shall be made of mild steel members of suitable sizes with weather protection coating. The coating shall be as per ASTM A792/ A792M-10 standard Al – Zn alloy with hot dip process and thickness of minimum of 80microns on each side of the structure (or) minimum 610GSM. It is to ensure that before application of this coating, the steel surface shall be thoroughly cleaned of any paint, grease, rust, scale, acid or alkali or such foreign material as are likely to interfere with the coating process. The bidder should ensure that inner side should also be coated.

4.3.8 The array structure shall be so designed that it will occupy minimum space without sacrificing the output from SPV panels at the same time.

4.3.9 **Seasonal Type**: In this configuration, MMS are designed in a way that they can be set at different angles in winter and summer. With seasonal tilt we can get 4-5 percent more generation while increasing the structure cost by 3-5 percent which is almost 0.3 percent of the project cost.

4.3.10 It is with provision of seasonal tilt to maximize the generation. Tilt is kept at 30 degrees in winter and 5 degrees in summer (or other angle which gives optimum generation) with respect to horizontal to get the optimum generation the structure shall be designed to allow easy replacement of any module and shall be in line with the site requirements. MMS shall be designed in order to withstand wind speed applicable for the zone (Site Location) using relevant Indian wind load codes. The structure is to be designed with considering appropriate factor of safety. The array structure is so designed that it will occupy minimum space without sacrificing the output from SPV panels at the same time. All fasteners shall be of stainless steel of grade SS 304 and shall sustain the adverse climatic conditions and long life.

4.3.11 Nut & bolts, washers (packing and spring) supporting structures including Module Mounting Structures shall have to be adequately protected from atmosphere and weather prevailing in the area.

4.3.12 Two numbers of anti-theft fasteners of stainless steel on two diagonally opposite corners for each module shall be provided. All the fasteners and washers for Module Mounting Structures and modules, shall be adequately protected from atmosphere and weather prevailing in the area. Fasteners and washers to be used for erection of mounting structures could be of SS 304/ UNS S 20430 or equivalent, however fasteners used for fixing modules over structures shall be of stainless steel of grade SS 316 or equivalent,

and must sustain the adverse climatic conditions to ensure the life of structure for 25 years.

4.3.13 Modules shall be clamped & bolted with the structure properly. The material of clamps shall be Al / Steel having weather resistant properties. Clamp – bolt shall use EPDM rubber and shall be designed in such a way so as not to cast any shadow on the active part of a module.

4.3.14 The array structure shall be grounded properly using maintenance free earthing kit.

4.3.15 The bidder/manufacturer shall specify installation details of the PV modules and the support structures with appropriate diagram and drawings.

4.3.16 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 higher of (i) accessed highest flood level at the site and (ii) 500 mm.

4.3.17 For multiple module mounting structures located in a single row, the alignment of all modules shall be within an error limit of maximum 10mm.

4.3.18 Civil foundation design for Module Mounting Structures (MMS) as well as control room, equipment room and power equipment shall be made in accordance with the Indian Standard Codes and prevailing soil conditions. The Successful Bidder shall submit the detailed foundation & structural design analysis along with calculations and basis/ standards duly certified by a Chartered Structural Engineer having substantial experience in similar work.

4.3.19 Cable should pass from Pipes and Cable-ties shall be used to hold and guide the Pipes (cables/wires) from the modules to junction boxes or inverters. All the cables were aesthetically tied to module mounting structure.

4.3.20 In case the string monitoring unit (SMU or JB) is mounted on the module mounting structure, bidder to take into consideration of the load thus added on the MMS. Accordingly, suitable supporting members for mounting the SMU/ JB must be designed and supplied. Separate structure for mounting of SMU can also be proposed.

4.3.21 Bidder must submit the complete quality documents i.e. test certificates for all tests conducted starting from raw material stage, in process, final testing w.r.t structure.

4.3.22 Every major Component of the Plant should be suitably named/ numbered & marked for ease of traceability, identification and maintenance.

4.4 Junction Box / Combiner Box

4.4.1 All junction/ combiner boxes including the string junction box, array junction box and main junction box/ combiner box should be equipped with appropriate functionality, safety (including fuses, grounding, contacts etc.) and protection.

4.4.2 The terminals will be connected to copper bus-bar arrangement of proper sizes to be provided. The junction boxes will have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and outgoing cables. Suitable markings shall be provided on the bus-bars for easy identification and UV resistant cable ferrules will be fitted at the cable termination points for identification.

4.4.3 The Junction Boxes shall have suitable arrangement for the followings:

i. Strings are required to be connected to the bus bar through individual fuses. However, if the bidder proposes to use a “Y” Connector; maximum of 2 (two) strings can be combined, keeping the losses within the specified limit.
ii. Provide arrangement for disconnection for each of the groups.
iii. Provide a test point for each sub-group for quick fault location and to provide group array isolation.
iv. SCADA Communication device with all necessary equipment for communicating with main SCADA Server.
v. Suitable space for workability and natural cooling.
vi. Provision of adequate number of spare terminals.
vii. The rating of all component of JB’s shall be suitable with adequate factor of safety to inter connect the Solar PV array.
viii. The junction boxes shall be dust, vermin, and waterproof and made of thermoplastic/ metallic in compliance with IEC 62208, which should be sunlight/ UV resistive as well as fire retardant & must have minimum protection to IP65 (Outdoor) and Protection Class II.
ix. The Array Junction Box will also have suitable surge protection. In addition, over voltage protection shall be provided between positive and negative conductor and earth ground such as Surge Protection Device (SPD). The maintenance free earthing shall be done as per the relevant standards.
x. If the solar PV module is not equipped with reverse blocking diode, then each Array Junction Box will have suitable Reverse Blocking Diodes of maximum DC blocking voltage of 1000V with suitable arrangement for its connecting. The bypass & reverse blocking diodes should work for temperature extremes and should have efficiency of 99.98%, confirmed by appropriate IEC standards.
xi. Adequate capacity solar DC fuses & isolating miniature circuit breakers should be provided in recommendation with the inverter manufacturer. The fuses should be so designed that it should protect the modules from the reverse current overload.
xii. Details of junction box specifications and data sheet, including all components, shall be provided with the Bid document.
xiii. Bidder shall submit all the test reports/ test certificates and compliance certificates before installation at site.

4.5 Solar Inverter (SI)

4.5.1 Solar Inverter (SI)/ Inverter shall consist of an electronic inverter along with associated control, protection and data logging devices.

4.5.2 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.

4.5.3 All SIs should consist of associated control, protection and data logging devices and remote monitoring hardware and compatible with software used for string level monitoring.

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

4.5.5 Only those SIs/ Inverters which are commissioned for more than said (AC) capacity solar PV projects till date in India shall be considered for this project. Bidder has to provide sufficient information to the satisfaction of the Employer before placing the final order for SIs/Inverters.

4.5.6 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.

4.5.7 The SI shall be tropicalized and design shall be compatible with conditions prevailing at site. Provision of exhaust fan with proper ducting for cooling of Solar Inverters should be incorporated in the Solar Inverters, keeping in mind the extreme climatic condition of the site as per the recommendations of OEM to achieve desired performance and life expectancy.

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

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

4.5.10 Grid Connectivity: Relevant CERC regulations and grid code as amended and revised from time to time shall be complied. The system shall incorporate a unidirectional inverter and should be designed to supply the AC power to the grid at load end. The Solar Inverter shall adjust the voltage & frequency levels to suit the Grid.

4.5.11 All three phases shall be supervised with respect to rise/fall in programmable threshold values of frequency.

4.5.12 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.

4.6 Operational Requirements for Solar Inverter (SI)

4.6.1 The SI must have the feature to work in tandem with other similar Solar Inverters and be able to be successively switched "ON" and "OFF" automatically based on solar radiation variations during the day. Inverters must operate in synergy and intelligently to optimize the generation at all times with minimum losses. The SI shall be capable of controlling power factor dynamically.

4.6.2 Maximum power point tracker (MPPT) shall be integrated in the power conditioner unit to maximize energy drawn from the Solar PV array. The MPPT should be microprocessor based to minimize power losses. The details of working mechanism of MPPT shall be mentioned by the Bidder in its offer. The MPPT unit shall confirm to IEC 62093 for design qualification.

4.6.3 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.

4.6.4 Sleep Mode: Automatic sleep mode shall be provided so that unnecessary losses are minimized at night. The power conditioner must also automatically re-enter standby mode when threshold of standby mode reached.

4.6.5 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.

4.6.6 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.

4.6.7 SI shall have provisions/features to allow interfacing with monitoring software and hardware devices.

4.6.8 **Protection against faults for SI:** The SI shall include appropriate self-protective and self-diagnostic feature to protect itself and the PV array from damage in the event of SI component failure or from parameters beyond the Solar Inverters safe operating range due to internal or external causes. The self-protective features shall not allow signals from the SI front panel to cause the SI to be operated in a manner which may be unsafe or damaging. Faults due to malfunctioning within the SI, including commutation failure, shall be cleared by the SI protective devices. In addition, it shall have following minimum protection against various possible faults.

4.6.9 **Grounding Leakage Faults:** The SI shall have the required protection arrangements against grounding leakage faults.

4.6.10 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).

4.6.11 Galvanic Isolation: The SI inverter shall have provision for galvanic isolation with external transformer, if required.

4.6.12 Anti-islanding (Protection against Islanding of grid): The SI shall have anti islanding protection. (IEEE 1547/UL 1741/ equivalent BIS standard)

4.6.13 Unequal Phases: The system shall tend to balance unequal phase voltage (with 3-phase systems).

4.6.14 Reactive Power: The output power factor of the SI should be of suitable range to supply or sink reactive power. The SI shall have internal protection arrangement against any sustained fault in the feeder line and against lightning in the feeder line.

4.6.15 Isolation: The SI 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 SI.

4.6.16 SI shall have arrangement for adjusting DC input current and should trip against sustainable fault downstream and shall not start till the fault is rectified.

4.6.17 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.

4.6.18 All inverters/ SIs 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.

4.6.19 **Standards & Compliances**

SI shall confirm to the following standards and appropriately certified by the labs:

- Efficiency measurement: IEC 61683
- Environmental Testing: IEC 60068-2 or IEC 62093
- EMC, harmonics, etc.: IEC 61000 series, 6-2, 6-4 and other relevant Standards.
- Electrical safety: IEC 62109 (1&2), EN 50178 or equivalent
- Recommended practice for PV – Utility interconnections: IEEE standard 929 – 2000 or equivalent
- Protection against islanding of grid: IEEE1547/ UL1741/ IEC 62116 ore equivalent
- Grid Connectivity: Relevant CEA/ CERC regulation and grid code (amended up to date)
- Reliability test standard: IEC 62093 or equivalent
- Structure tom be added

4.6.20 The Bidder should select the inverter (Central) as per its own system design so as to optimize the power output. Desired Technical Specifications of SI.

- Sinusoidal current modulation with excellent dynamic response.
- Compact and weather proof housing (indoor/ outdoor)
- Comprehensive network management functions (including the LVRT and capability to inject reactive power to the grid)
- Total Harmonic Distortion (THD) <3%
- No load loss < 1% of rated power and maximum loss in sleep mode shall be less than 0.05%
- Optional VAR control
- Power factor Control range: 0.9 (lead – lag)
- Humidity: 95% Non – Condensing
- Unit wise & integrated Data logging
- Dedicated Prefabs / Ethernet for networking

4.6.21 Inverter/ Power Condition unit must provide protection against:

- Over current
- Sync loss
- Over temperature
- DC bus over voltage
- Cooling Fan failure (If provided)
- Short circuit
- Lightning
- Earth fault
- Surge voltage induced at output due to external source
- Power regulation in the event of thermal overloading
- Set point pre-selection for VAR control
- Bus communication via -interface for integration
- Remote control via telephone modem or mini web server
- Integrated protection in the DC and three phase system

- Insulation monitoring of the PV array with sequential fault location

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

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

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

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

4.6.26 SI/inverter front panel shall be provided with display (LCD or equivalent) to monitor, but not limited to, the following:

- DC power input
- DC input voltage
- DC Current
- AC power output
- AC voltage (all the 3 phases and line)
- AC current (all the 3 phases and line)
- Power Factor

4.6.27 Documentary Requirements & Inspection

- The bill of materials associated with Solar Inverters should be clearly indicated while delivering the equipment.
- The Contractor shall provide to the Employer, data sheet containing detailed technical specifications of all the inverters and SIs, Type test reports and Operation & Maintenance manual before dispatch of SIs.
- The Employer or its authorized representative reserves the right to inspect the SIs/ Inverters at the manufacturer's site prior to dispatch.

4.7 Cable and Wires

4.7.1 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, salt, burial and attack by moss and microbes for 25 years and voltages as per latest IEC standards. (Note: DC cables for outdoor installations should comply with the TUV 2PfG 1169/09.07 for service life expectancy of 25 years).

4.7.2 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.

4.7.3 All AC/DC cables/wires etc used for Solar PV Power Project shall be solar grade copper (Cu) with XLPO insulation and rated for 1.1 kV only. Bidder shall provide the type test report for each type of cable used before dispatch of the cable.

4.7.4 Wires with sufficient ampere capacity and parameters shall be designed and 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). Successful Bidder shall provide voltage drop calculations in excel sheet.

4.7.5 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.

4.7.6 All high voltage cables connecting the inverters to the transformers should be XLP insulated grade conforming to IS 1554 and cables shall also conform to IEC 60189 for test and measuring the methods.

4.7.7 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.

4.7.8 All cable/wires shall be provided with UV resistant printed ferrules for DC side however, for HT cables, punched/ embossed copper tags are required. 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.

4.7.9 The wiring for modules interconnection could be in the weather resistant pipe of repute make. All the buried cables can be run through HD pipe/ DWC conduit. However, for crossing with road, drain and trenches etc., the cable must pass through GI pipe of appropriate size.

4.7.10 Switchboard box / DC Distribution Box (DCDB) / AC Distribution Box (ACDB) panels

4.7.11 Successful Bidder shall provide sufficient no. of switchboards / DCDB / ACDB wherever required.

4.7.12 All boxes/ panels should be equipped with appropriate functionality, safety (including fuses, grounding, etc.) and protection.

4.7.13 The terminals will be connected to bus-bar arrangement of proper sizes to be provided. The panels/ boxes will have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and outgoing cables.

4.7.14 Adequate rating fuses & isolating MCB/ MCCB should be provided.

4.7.15 The panels/ boxes shall have suitable arrangement for the followings:

- Provide arrangement for disconnection
- Provide a test point for quick fault location
- To provide isolation
- The current carrying rating of the boxes/ panels shall be suitable with adequate safety factor
- The rating of the boxes/ panels shall be suitable with adequate safety factor to inter connect to the local/ internal grid
- Thermal/ heat dissipation arrangement/ Vent for safe operation.
- Adequate number of spare terminals

4.7.16 The boxes/ panels shall be dust, vermin, and waterproof and made of thermoplastic/ metallic in compliance with IEC 62208, which should be sunlight/ UV resistive as well as fire retardant & must have minimum protection to IP 65(Outdoor)/ IP 20(indoor) and Protection Class II.

4.7.17 All panels/ boxes shall be provided with adequately rated bus-bar, incoming control, outgoing control etc. as a separate compartment inside the panel to meet the requirements of the Chief Electrical Inspector General (CEIG). All live terminals and bus bars shall be shrouded. The outgoing terminals shall be suitable to receive suitable runs and size of cables required for the Inverter/Transformer rating.

4.7.18 The boxes/ panels must be grounded properly to ensure all safety related measures for safe operation. The parts of panel, wherever applicable, must be insulated properly.

4.7.19 All the Panels to be manufactured with sufficient space for working and must have temperature suitability up to 85º C with separate cable and bus bar alley.

4.8 Lightning Protection for PV Array

4.8.1 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 safe level before it reaches the PV or other sub-system components as per NFC 17 – 102. Bidder to provide ESE type lightening arrester, placed at strategic locations to protect the plant from lightening and shall not cause any shadow on the solar modules.

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

4.8.3 The site is prone to lightning strikes and hence bidder is suggested to take utmost care while designing the lightning protection system. The Bidder shall submit the drawings, calculations and detailed specifications of the PV array lightning protection equipment to Employer for approval before installation of system.

4.8.4 The lightning conductor shall be earthed through flats and connected to the grounding mats as per applicable Indian Standards with earth pits. Three earth pits shall be provided for each lightning arrestor. Each lightning conductor shall be fitted with individual earth pit as per required Standards including accessories, and providing masonry enclosure with cast iron cover plate having locking arrangement, watering pipe using charcoal or coke and salt as required as per provisions of IS.

4.9 Solar Photovoltaic Power Plant Electrical System

The technical requirements of design & engineering, testing at works, supply, installation testing & commissioning of all electrical equipment required for the Solar Photovoltaic Power Plant starting from the local control panel of Plant and up to the Grid tie up with the State grid including all control protection, metering equipment, step up voltage transformer, 33kV indoor switchgears and balance of equipment complete in all respect shall be of high standard and quality meeting the requirement of respective Indian standard (following table). All the type test reports along with Material Dispatch Clearance Certificate (MDCC) for all equipment and cables are to be submitted by the Contractor prior to the dispatch of the same. Bidder has to provide the type test report for all the equipment used under this contract. If the equipment is not type tested, the bidder has to ensure conduction of such test and supply the type test to the Employer without any additional cost. The brief particulars and requirement of equipment is as under:

IS/ IEC Reference	Specification
IEC-298	A.C. Metal – enclosed and control gear for rated voltages above 1KV and including 72.5KV

IS-3427	A.C. Metal – enclosed and control gear for rated voltages above 1KV and including 52KV.
IS-8623	Specification for Low Voltage Switchgear and Control gear assemblies.
IS-13118/ IEC-56	Specification for High Voltage AC Circuit Breakers.
IEC-529	Degrees of Protection.
IS-5578 & 11353	Making and arrangement for switchgear bus bar main connections and auxiliary wiring.
IS-325	Specification for 3 Phase Induction motors.
IS-2629	Recommended practice for hot dip galvanizing of iron and steel.
IEC-137	Bushing for AC Voltages.
IS-3347	Porcelain Transformer Bushings.
IS-5561	Terminal Connectors
IS-3156	Voltage Transformers
IS-2705	Current Transformers
IS-3231	Electric relays for power protection.
IS-13010	Watt hour meters
IS-13779	Static Energy Meters
IS-8686	Static Protection Relays
IS-1248	Electrical measuring instruments
IS-2099	High Voltage Porcelain Bushings.
IS-10118	Minimum clearances for Outdoor Switchgear.
IEC-694	Common Clauses for High Voltage Switchgear and Control gear
IEC-60255 & IEC-61330	Numerical Relays

4.10 Step-Up Transformer

4.10.1 The transformer shall be copper wound, 3 phase, natural cooled, core type construction, and oil immersed and shall be suitable for outdoor applications.

4.10.2 The Bidder shall provide the complete turnkey design, supply, erection, testing and commissioning of transformers and transformer substation to step-up the output of the inverter to 33 kV at the location of the inverter. The power from different inverter rooms shall be collected at a common location from where it shall be transmitted to the 33 kV DISCOM substation. However, the detailed scheme of design lies with the bidder and must submit the same to Employer for approval prior to construction.

4.10.3 Power Transformers utilized shall be 3 phase, Oil Filled, 33 kV, 50 Hz and associated Switchgear of approved make. RTCC panel, as per design, will be provided in control room. It is recommended to have standard ratings of transformer used. Bidder is to provide the type test reports for the transformer (s) used. The vector group of transformer (s) must be in line with the system requirement and follow the prevailing grid codes at the location of Site.

4.10.4 All the transformers shall be suitable for outdoor installation with 3 phase 50Hz in which the neutral is effectively earthed and they should be suitable for service under fluctuations in supply voltage up to plus 10% to minus 15%.

4.10.5 General requirement for the transformers shall be as per below:

Standards	Relevance
IS: 2026 (Part 1 to 4)	Specifications for Power Transformer
IS: 2099	Bushings for alternating voltage above 1000 V
IS: 3639	Fittings and accessories for power transformer
IEC: 60076 (Part 1 to 5)	Specifications for Power Transformer
IS: 9921 Part 1 to 5	Alternating currents dis connectors (isolators) and earthing switches rating, design, construction, tests etc.
IS: 2705 Part 1 to 4 & IEC: 185	Current transformer
IS: 3156 Part 1 to 4	Voltage Transformer
IS: 3070 part 1 to 3	Lightning arrestors
IS: 2544	Porcelain insulators for system above 1000 V
IS: 5350	Part III – post insulator units for systems greater than 1000V
IS: 5621	Hollow Insulators for use in electrical equipment
IS: 5556	Serrated lock washers – specification

4.11 General Standards

4.11.1 The equipment and accessories covered by this specification shall be designed, manufactured and tested in accordance with the latest relevant standards and codes of practice published by the relevant Indian Standards (IS) as applicable.

4.11.2 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. Relevant national and international standards in this connection should be followed in order to improve the efficiency and safe operations.

4.11.3 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 spare equipment offered shall be interchangeable.

4.11.4 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.

4.11.5 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.

4.11.6 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.

4.11.7 All equipment shall be designed for operation in tropical humid climate at the required capacity. The reference parameters for which the transformers are to be designed are as under:

Particulars	Condition
Maximum ambient temperature	50°C
Maximum daily average ambient temp	40°C
Maximum yearly weighted average ambient temp	35°C
Minimum ambient air temperature (Cooling)	-5°C
Max. Relative Humidity	95%
Yearly Avg. number of thunder storms	30-50
Average Number of rainy days	60 days
Fog	In winter
Number of months during which topical monsoon prevail	3 months
Dust storms	May not occur
Average Annual rain fall	Above 100 cms.

4.12 Ratings and specifications (415V / 33 kV Transformer)

The typical rating and electrical characteristics of the 0.415kV/33kV ONAF Indoor type inverter duty transformer shall be as under however, the ratings may vary subjected to design by the bidder and relevant to the respective IS codes:

Particulars	**415V / 33kV Transformer Specs.**
Continuous kVA ratings	As per design
Type	Oil immersed
Frequency	50 Hz
Type of cooling	Oil Natural Air cooled (ONAN)
No. of phases	3 (Three)
Rating voltage H.V. side	33 kV
Highest System voltage on H.V. side	36 kV r.m.s.
Rated voltage on L.V. side	0.433 kV r.m.s.
Vector Group	As per Design
Max core windings	3
Connections:	
a. H.V. Winding	Delta
b. L.V. winding	Delta /Star with Neutral solidly earthed (as per Design). For step up Transformer at 33 KV side necessary protection as per CEAR 2023 with Latest amendment , is to be provided.
On load taps on H.V. Side (for H.V. Variation)	± 7.5 in steps of 2.5%
Tap changer type	OCTC (Manually operated off load Tap changing
Impedance voltage (%)as per IS2026	4% or as per IS
Transformer connections	LV side – Cables/ Bus Duct with weather proof enclosure as per design
	HV Side –Bushing with enclosure

4.12.1 Efficiency: The percentage loading for the maximum efficiency shall be clearly stated at unity power factor as well as 0.8 and 0.9 power factor (lead and lag).

4.12.2 Insulation: The dielectric strength of the winding, given insulation and the bushings shall conform to the values given in IS: 2026 (Part III) /1981 (or its latest amendment), IEC 60076, for highest system voltage of 36 kV, 1.1 kV and shall be suitable for the impulse test\power frequency test voltages.

4.12.3 Factory Assembly and Tests: The transformer shall be completely assembled and tested at the Factory. Routine and Acceptance tests as per specification/ standards are to be conducted and no deviation in respect of conducting these tests will be acceptable. No extra charges for these tests will be paid. Test charges shall be part of cost of the equipment. If purchaser selects to send a representative, all tests shall be carried out in his presence. Type test certificate shall be furnished before start of supply.

4.12.4 Routine Tests: Each completed transformer shall be subjected to following routine tests as per IS: 2026 Part. I & III (latest amendment). No extra charges for any of the tests shall be paid. No deviation shall be acceptable. If the supplier desires, he may not fix radiators on transformers (other than the one which is to be type tested) during routine testing. However, in that case, radiator manufacturer's test certificate shall be furnished for reference of inspecting officer with undertaking that supplier shall be responsible for proper alignment/fixing of radiator on transformer at site.

4.12.5 Measurement of resistance of each winding.

4.12.6 Measurement of turn’s ratio between HV-LV windings at each tap.

4.12.7 Checking of polarity and phase relation-ships for each winding.

4.12.8 Measurement of no load loss and no load current.

4.12.9 Positive phase sequence impedance/short circuit impedance between HV-LV windings on minimum, maximum and normal taps.

4.12.10 Separate source voltage withstand test.

4.12.11 BDV test on transformer oil.

4.12.12 Induced over voltage withstand test.

4.12.13 Measurement of neutral unbalance current.

4.12.14 Regulation at rated load at unity, 0.90 and 0.80 lagging power factor.

4.12.15 Load losses measured at rated frequency by applying voltage sufficient to produce the rated relevant current in one winding with the other winding short circuited.

4.12.16 Measurement of insulation resistance.

4.12.17 The total losses shall comprise of the No Load Losses, load losses at rated output duly converted at 75oC average winding temperature and shall also be indicated in the test report. Load losses shall be that corresponding to rated load on HV & LV winding.

4.12.18 Routine dielectric tests as per IS: 2026 (Part. I & III), 1981 and any amendments thereto.

4.12.19 Check complete transformer against approved outline drawing, provision for all fittings, finish oil level etc.

4.12.20 Tests at Site: After erection at site all transformer(s) shall be subjected to the following tests:

- Insulation resistance test.
- Ratio and polarity test.
- Dielectric test on oil.
- Physical check

4.12.21 In case the equipment is not found as per the requirements of the purchase order, all expenses incurred during site testing will be to the tenderer's account and the material shall be replaced by him at site, free of cost.

4.12.22 Further Tests: The purchaser reserves the right of having other reasonable tests carried out at his own expenses either before dispatch or during performance guarantee period from Govt. approved/ Govt. recognized lab to ensure that the transformer complies with the requirements of this specification after due intimation to the supplier. In case the equipment is not found meeting the requirement of PO / specification, all expenses incurred for such testing will be on supplier’s account and the material shall be replaced by the supplier at site free of cost.

4.12.23 Frequency and System Voltage: The transformer shall be suitable for continuous operation with a frequency variation of ± 2.5% from normal of 50Hz without exceeding the specified temperature rise. The highest system rated voltage shall be 36 kV. However, the flux density requirements shall be as per this specification.

4.12.24 Installation & Commissioning: Mainly following activities are required to be carried out before commissioning of Power Commissioning and testing of Transformers at the site shall be carried out under the supervision of service engineer / representative of supplier as per norms.

4.12.25 Assembling of Power Transformer accessories as per GA drawing.

4.12.26 Testing activities in presence of Purchaser such as

- Ratio Test
- Megger Value
- Magnetic balance.
- Oil BDV
- Earth Resistance
- Buchhloz Relay checking.
- WTI/OTI/MOLG (oil level) checking.
- Checking of points of leakage of oil from Transformer body/ Radiator/Valve
- Setting of Relays in Panel Installation shall be done.

4.13 Auxiliary transformer: The transformer used for auxiliary distribution within the plant must be in accordance with the relevant standards. The ratings of the transformer shall be suitably designed by the bidder in order to maximize the net-generation from the plant. The guaranteed technical particulars of the auxiliary transformer must be supplied along with the bid. The bidder shall also provide the list of auxiliary loads considered for the project.

4.14 Instrument Transformer:

4.14.1 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 or painted Grey colour as per RAL 9002.

4.14.2 The instrument transformers shall be oil filled hermetically sealed units. The instrument transformers shall be provided with filling and drain plugs.

4.14.3 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 kgs.

4.14.4 Current Transformer, Voltage Transformer, Circuit Breaker and Relays should match state Utility requirements.

4.15 Current Transformer (CT):

4.15.1 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.

4.15.2 Technical specifications – Current ratings, design, Temperature rise and testing etc. should be in accordance with IS: 2705 (part I to IV)

Type and Rating

4.15.3 The current transformer should be of outdoor, single phase, oil immersed, self-cooled and suitable for operation in 3 phase solidly grounded system.

4.15.4 Type test certificate for the proposed CT shall be provided to the bidder before dispatch.

4.15.5 Each current transformer should have the following particulars under the site conditions for the system under design

4.15.6 General Parameters: 33 kV CT

Particulars	Details
Highest system Voltage (Vm)	36 kV rms
Rated frequency	50 Hz
System Neutral Earthing	Effective earthed
Installation	Indoor (IP 20)
Rated dynamic current	63 kA (Peak) appropriate dynamic current as per design calculations
Rated min power frequency withstand voltage (RMS value)	28 kV
Rated lightning impulse withstand voltage (peak value)	75 kV
Partial discharge level	10 Pico coulomb max.

Temperature rise	As per IEC 60044
Type of insulation	Class A
Number of cores	Two (2) with One (1) protection core and one (1) metering core of accuracy 0.5 class
CT secondary current	Protection cores – 1 Amp. Metering Core – 1 Amp
Number of terminals in marshalling box	All terminals of control circuits wired up to marshalling box plus 20% spare terminals
CT ratio & Rated VA Burden, short time thermal rating, class of accuracy	Minimum burden required (as per design): 1. Metering core – 40 VA 2. Protection core – 10 VA

4.16 Voltage Transformer (VT/ PT)

4.16.1 Voltage transformers shall be electro-magnetic (EMU) type and shall comprise of compensating reactor, intermediate transformer, and protective and damping devices. The oil level indicator of EMU with danger level marking shall be clearly visible to maintenance personnel standing on ground.

4.16.2 The secondary shall be protected by 3A HRC cartridge type fuses for all windings. In addition, fuses shall also be provided for protection and metering windings. The secondary terminals shall be terminated on stud type non- disconnecting terminal blocks via the fuse inside the terminal box of degree of protection IP 55. The access to secondary terminals shall be without the danger of access to high voltage circuit.

4.16.3 The accuracy of metering core shall be maintained through the entire burden range up to 75 VA on all three windings without any adjustments during operations.

4.16.4 The PTs should be single phase oil immersed self -cooled type suitable for Indoor.

4.16.5 The core should be of high grade non – ageing electrical silicon laminated steel of high permeability. The PTs should be hermetically sealed to eliminate breathing and prevent air and moisture entering the tank.

4.16.6 Bidder has to provide the type test certificate for the proposed VT before dispatch.

4.16.7 Each voltage transformers should have the following particulars under the site conditions for the system under design.

4.16.8 General Parameters: 33 kV VT

Particulars	**Details**
Highest system voltage (Um)	36 kV
System neutral earthing	effective earthed
Installation	Indoor (IP 20)
System fault level	Appropriate
Rated min power frequency withstand voltage	28 kV
(rms value)	
Rated lightning impulse withstand voltage	75 kVp
Standard reference range of frequencies for which the accuracy are valid	96% to 102% for protection and 99% to 101% for measurement

Rated voltage factor	1.2 continuous & 1.5 for 30 sec
Class of Accuracy	0.5 / 3P
Stray capacitance and stray conductance of	As per IEC:358
LV terminal over entire carrier frequency	
range	
One Minute Power frequency withstand voltage for secondary winding	2 kV rms
Temp rise over an ambient temp. of 50^{o}C	As per IEC 60044
Number of terminals in control Cabinet	All terminals of control circuits wired up to marshalling box +10 terminals spare
Rated total thermal burden	350 VA (or as per design)
Partial discharge level	10 pico Coulombs max.
Number of cores	2 (two) – 1 for protection and 1 for metering with 0.5 class accuracy.
Rated Output, insulation level, transformation ratio, rated voltage factor	Should be provided by Bidder

4.17 33 kV METERING BAY (Owner Substation)

4.17.1 The current & potential transformers shall be of Outdoor type single phase, 50 Hz, oil immersed self-cooled suitable for operation in the climate conditions specified shall be complete in all respects.

4.17.2 The instrument transformers shall be hermitically sealed to eliminate breathing and entering of air and moisture in the tank. Provision of pressure releasing device is not permitted.

4.17.3 The CT core, to be used for protective relays shall be of accuracy class, specified or appropriate class suitable for back up, over current and earth fault, differential, bus bar and other protections as prescribed

4.17.4 Applicable Standards: Unless otherwise modified in this specification, 33 KV CT-PT Metering Sets shall comply with the following Indian Standard Specification (latest version):

- IS: 2705-1992 Specification for current transformers.
- IS: 3156-1992 Specification for voltage transformers.
- IS: 5621-1980 Specification for Hollow insulators and accessories
- IS: 2099-1986 Specification for insulators/ bushing
- IS: 3347-1986 Specification for the dimension of Porcelain transformer
- IS: 335-1983 Specification for new insulating oil

4.17.5 The core of instrument transformers to be used for metering and instrumentations shall have saturation factor, low enough to avoid damage to the instruments, in the event of maximum short circuit current.

4.17.6 Nuts and bolts (or screws used for fixation of interfacing porcelain bushings for taking out terminals) shall be provided on flanges, cemented to the bushing and not on the porcelain i.e. Flange type 33 KV bushing for CT/PT, shall be provided.

4.17.7 For gasket joints, wherever used, Nitrile Butyl rubber gaskets shall be used. The gasket shall be fitted properly with adequate space for accommodating the gasket under compression.

4.17.8 The metering sets shall be supplied with first filling of insulating oil conforming to IS: 335 (including latest amendment).

4.17.9 The outer surface of metal tank shall be Hot Dip Galvanised, whereas, the inner portion shall be painted with oil resistive, insoluble paint. The purchaser reserves right for stage inspection during manufacturing process of tank / CT/PT.

4.17.10 The external surfaces of tanks of CT-PT sets shall be painted with one coat of primer and two coats of synthetic enamel paint of shade No.631 of IS: 5, the internal surfaces of the tank shall be painted with two coats of suitable heat resistant oil insoluble paint.

4.17.11 The instrument transformers shall be suitable for mounting on steel structures or concrete pedestals.

4.17.12 For load shading single phasing is adopted in the 33 kV system. The offered 33 kV CTPT set shall be suitable for working under such abnormal operation condition.

4.17.13 The 33 kV CT – PT sets shall three nos. of single phase PTs. The primary winding of 3 single phase PT shall be connected in star formation in the tank with common neutral of 33 KV brought outside the tank through 3 KV bushing for earthing.

4.17.14 The secondary terminal box shall have cable gland/ flange suitable to receive two Nos. control cable of size 6x4 sq.mm and 4x2.5 sq.mm at the bottom of the secondary box for metering connections to secondary winding of 33 kV CT-PT circuits respectively.

4.17.15 The 33 kV CT – PT Set shall have 3 Nos. incoming and 3 Nos. outgoing indoor type bushing complete with 6 Nos. bimetallic terminal connectors suitable for Dog/ Panther Conductor.

4.17.16 General Parameters: 33 kV CT (Owners Bay and Metering Bay)

Particulars	**Details**
Normal system voltage (kV rms)	33kV
Highest system voltage (kV rms)	36kV
Frequency	50 Hz
Impulse withstand voltage (kVp) (on assembled CT/ PT set)	170
One minute power frequency dry withstand voltage (on assembled CT-PT set) Primary (r.m.s.) Secondary (r.m.s.)	70 kV 3 kV
Transformation ratio (CT Ratio)	400/1 A or as per requirement
Rated output (VA burden)	10 VA
Class of accuracy	0.2S
Rated continuous thermal current	1.2 times of rated primary current.
Short time thermal current rating for 1sec.	25kA for 400/1A Current density corresponding to Short Time Thermal Current should not exceed 160A/mm^2
Rated dynamic current	2.5 times of short time thermal current rating.
Number of cores	One
Instrument security factor	Not exceeding 5
Max. ratio error	As per IS:2/05/1992

4.17.17 General Parameters: 33 kV VT (Owner's Bay & Metering Bay)

Particulars	**Details**
Nominal system voltage (kV rms)	33kV
Highest system voltage (kV rms)	36kV
Nos. of phases	Three
Impulse withstand voltage (kVP) (on assembled CT-PT set)	170kVp
One minute power frequency dry withstand voltage (on assembled CT-PT set) Primary Dry secondary	70 kV r.m.s 3 kV r.m.s
Frequency	50 Hz
Transformation ratio (PT Ratio)	33 kV/ 110V
Rated output (VA burden)	30 VA per phase
Class of accuracy	0.2 (As per IS:3156/1992)
Winding connection	Star/ Star
Rated voltage factor and time	1.2 Continuous & 1.9 for 30 seconds.
Temp. Rise over max. Ambient temp.	Within limits of IS:3156/1992
Phase angle error max.	-do-
Max. Phase angle error	-do-
Ratio error (Max.)	-do-

4.18 Circuit Breaker

4.18.1 The circuit breakers shall be capable of rapid and smooth interruption of currents under all conditions completely suppressing all undesirable phenomena even under the most severe and persistent short circuit conditions or when interrupting small currents or leading or lagging reactive currents. The circuit breakers shall be 'Restrike-Free' under all operating conditions. The details of any device incorporated to limit or control the rate of rise of re-striking voltage across, the circuit breaker contacts shall be stated. The over voltage across, the circuit breaker contacts shall be stated. The over voltage caused by circuit breaker while switching inductive or capacitive loads shall not exceed 2.5 times the highest phase to neutral voltage. The actual makes and break times for the circuit breakers throughout the ranges of their operating duties shall be stated in the offer and guaranteed.

4.18.2 Applicable Standards: The materials shall conform in all respects to the relevant Indian Standard Specifications/ IEC Standards, with latest amendments indicated (reference only) below:

IS-13118/1991	General requirements for Circuit breakers for voltage above 1000 V IEC 62271-100-1/2001
IS-2705/1992	Current Transformers
IS-2099/1986	Bushings for alternating voltages above 1000 V
ISS-2633/1964	Methods of testing uniformity of coating of zinc coated articles
IS-3231/1986	Electrical relays for power system protection
IS-1248/1983	Specification for Ammeters & Voltmeters

IS-335/1983	New insulating oils Electrical IEC 71 (For oils in CTs) Clearances
IS-2147/1962	Degree of protection provided by enclosures for low voltage switchgear & control gear

4.18.3 The arc quenching chambers shall have devices to ensure almost uniform distribution of voltage across the interrupters.

4.18.4 Appropriate & adequate Capacity 415V AC indoor air Circuit Breaker as per the IEC 60898 / IEC 62271 – 100 or equivalent Indian Standards along with control circuit and protection relay circuit, fuses, annunciations and remote operating and controlling facility from the Main Control Room.

4.18.5 Circuit breaker shall be C2/Ml class under all duty conditions and shall be capable of performing their duties without opening resistor. The circuit breaker shall meet the duty requirement of any type of fault or fault location and shall be suitable for line charging and dropping when used on 6kV effectively grounded or ungrounded systems and perform make and break operations as per the stipulated duty cycles satisfactorily.

4.18.6 The circuit breaker shall be capable for breaking the steady & transient magnetizing current corresponding to 33 kV transformers. It shall also be capable of breaking line charging currents as per IEC- 62271-100 with a voltage factor of 1.4.

4.18.7 The rated transient recovery voltage for terminal fault and short line faults shall be as per IEC: 62271-100.

4.18.8 The Bidder may note that total break time of the breaker shall not be exceeded under any duty conditions specified such as with the combined variation of the trip coil voltage, pneumatic pressure etc. While furnishing the proof of the total break time of complete circuit breaker, the Bidder may specifically bring out the effect of non-simultaneity between same pole and poles and show how it is covered in the guaranteed total break time.

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

4.18.10 While furnishing particulars regarding the D.C. component of the circuit breaker, the Bidder shall note that IEC-62271-100 requires that this value should correspond to the guaranteed minimum opening time under any condition of operation.

4.18.11 The critical current which gives the longest arc duration at lock out pressure of extinguishing medium and arc duration shall be indicated.

4.18.12 Bidder has to provide the type test reports for the CB before the dispatch.

4.18.13 All the duty requirements specified above shall be provided with the support of adequate test reports.

Operating Mechanism

4.18.14 Circuit shall be vacuum type with electrically spring charged mechanism.

4.18.15 The operating mechanism shall be anti-pumping and trip free (as per IEC definition) electrically under every method of closing. The mechanism of the breaker shall be such that the position of the breaker is maintained even after the leakage of operating media

and / or gas. The circuit breaker shall be able to perform the duty cycle without any interruption.

4.18.16 Electrical tripping shall be performed by shunt trip coil. Provision shall also be made for local electrical control. 'Local / remote' selector switch and close & trip push buttons shall be provided in the breaker central control cabinet. Remote located push buttons and indicating lamps shall also be provided. The VCB coil DC supply through appropriately rated battery bank and charger to be supplied by the Bidder.

4.18.17 Operating mechanism and all accessories shall be in local control cabinet. A central control cabinet for the three poles of the breaker shall be provided along with supply of necessary tubing, cables, etc.

4.18.18 Mounting and supporting structure for Circuit Breaker: The circuit breakers should be self-supporting type. However, if necessary for the purpose of minimum ground clearance the circuit breakers should be mounted on raised steel structures which should be included in the scope of supply of circuit breaker. Bidder to obtain the necessary information and data required for design of foundations of the circuit breaker be obtained from the CB supplier.

4.18.19 Max. Impact loading in terms of equivalent static load both compression and upward due to opening/closing of the breakers. It shall be clearly stated whether these forces shall act simultaneously or at different timing.

4.18.20 Necessary connecting materials such as clamps, bolts, nuts, washers etc. and fixing bolts for mounting the equipment on the supporting structures wherever required should be obtained from the circuit breaker supplier.

4.18.21 General parameters: Vacuum type Circuit Breaker:

Particulars	**Details**
Type of circuit breaker	Vacuum type
Highest System Voltage	36 kV
Rated operating voltage	33 kV
Rated frequency	50 Hz (+3% to -5%)
Number of poles	Three (3)
Rated/ minimum power frequency Withstand voltage	70 kV
Rated lightning impulse Withstand voltage	170 kV
Rated operating duty cycle	0 -0.3 sec. -CO – 3 min. – CO
Rated line charging breaking	As per IEC
Reclosing	Single and three phase high speed auto reclosing
Maximum fault level	25 kA (r. m. s.) for 1 sec.
Auxiliary contacts	As required plus 6NO and 6NC contacts per pole as spare.
Noise level	Maximum 140dB at 50m distance from base of circuit breaker
Seismic acceleration	0.4 g horizontal

4.18.22 Co-ordination of rated voltages, short circuit breaking current and rated normal current for guidance as per IS 13118 for rated voltage 33 kV and above as commonly used are as given in bellow table.

Rated voltage (kV)	**Rated short-circuit breaking current (kA)**	**Rated normal current (A)**				
36	8	630	1250	1600	2500	4000
	16	630	1250	1600		

4.18.23 Circuit Breaker Protection against

- Over Current
- Earth fault
- Under voltage & over voltage protection
- Under frequency & over frequency
- SF6 gas pressure low (where applicable)
- DC supply failure

4.19 Isolators

4.19.1 The isolators and accessories shall conform in general to IEC 62271-102 (or equivalent Indian standard) except to the extent explicitly modified in specification.

4.19.2 Each isolating switch should have the following particulars under the site conditions for the system under design (typical values for 36 kV system are given).

4.19.3 General Parameters: 33 kV Isolators

Particulars	**Details**
Operating mechanism of Isolator and Earth Switch	Motor operated
Nominal system voltage	33 kV
Highest system voltage	36 kV
Type	Outdoor (IP 65)
Rated short time current of isolator and earth switch	40 kA (rms) for 1 sec. Or appropriate as per design
Rated dynamic short time with stand current of isolator and earth switch	80 kA (peak) Or appropriate as per design
Impulse withstand voltage with 1.2/50 micro sec. wave	325kVp to earth 195kVp across isolating distance
One minute power frequency withstand Voltage	140 kV (rms) to earth & 150 kV (rms) across isolating distance
Temperature rise	As per Table-IV of IS: 9921
Rated mechanical terminal load	As per 62271-102

4.19.4 Isolator and Isolator-cum-Earthing Switches:

4.19.5 The Isolators and Isolator-cum-Earthing 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).

4.19.6 The Isolators shall be double break, outdoor, gang operated type, with blades rotating in horizontal plane. The design shall be for upright mounting. If required, and the Isolators shall be convertible for right or left hand control with minimum labour and replacement of part. The live parts shall be so designed that as far as possible, sharp points, edges and other corona producing surface are eliminated. Except the Insulator caps and bases, all other live parts shall be non-ferrous. Bolts, Screws and Pins shall be provided with locking arrangement and shall be of the best materials.

4.19.7 Each pole shall have three Pedestal type of Insulator's stacks. Necessary arrangements shall be provided for proper alignment of the contacts. Gang operated links shall be so designed that all phases shall make and break simultaneously.

4.19.8 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, which shall be furnished under bill of material.

4.19.9 The length of the handle for manual operation shall not be more than one meter and shall be stated on the drawing. The rotating parts shall have a smooth movement.

4.19.10 The clearance of 4000 mm from live parts to ground as per provision of I.E. Rules shall be considered while manufacturing of isolators & to decide location of operating mechanism box. Height of structure of isolator from ground is to be considered as 2900 mm including 150mm for muffing.

4.19.11 **Contacts:** 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.

4.19.12 The temperature rises at 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.

4.19.13 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 Bidder shall give full details of such contacts with necessary drawings.

4.19.14 The arcing contacts, if provided shall close first and open last so that no damage is caused due to arcing whatever to the main contacts. The tender shall give full details of such contacts with necessary drawings.

4.19.15 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. The details of springs shall be furnished on the G.A. drawing.

4.20 Indicating and Integrating Meters/Instruments:

4.20.1 All indicating instruments shall be of switchboard type, back connected, suitable for flush mounting and provided with dust and vermin proof cases for tropical use and finished in suitable colour. All instruments shall have practical laboratory means for adjustment of accuracy. The limits of errors for ammeters/voltmeters shall be those permissible for class 1.5 instruments as per IS: 1248.

4.20.2 A.C. Static HT Meter should be as per specification of CERC/State Regulatory Commission/ State Utility of approved make. The meters shall be located at eye level to facilitate observations of readings correctly.

4.20.3 The ammeters and voltmeters shall be suitably scaled to indicate the current/voltage for all the rating of current/voltage transformers. A phase selector switch with four/six position shall be used to measure the current/voltage of each phase/line. The Bidder shall provide test certificate and calibration certificate along with the supply of the instrument.

4.20.4 The meters shall be located at normal eye level to facilitate observation of readings correctly.

4.21 Surge Arrestors

4.21.1 The surge arrestors (SAs) shall conform in general to IEC 60099-4 or IS: 3070 except to the extent modified in the specification. Arresters shall be of hermetically sealed units, self-supporting construction, suitable for mounting on lattice type support structures. Bidder shall furnish the technical particulars of Surge arrester.

4.21.2 The SA's shall be of heavy duty station class and gapless Metal Oxide type without any series or shunt gaps. The SAs shall be capable of discharging over-voltages occurring during switching of unloaded transformers, and long lines.

4.21.3 Arrestors shall be complete with insulating base for mounting on structure. Suitably enclosed for outdoor use and requiring no auxiliary or battery supply for operation shall be provided for each single pole unit with necessary connection.

4.21.4 The surge arrestors shall conform to type tests and shall be subjected to routine and acceptance tests in accordance with IEC-60099-4.

4.21.5 Each lightning arrestors should have the following particulars under the site conditions for the system under design.

4.21.6 Technical requirements for metal oxide (gapless) lightning arrestors

4.21.7 Typical values of surge Arresters for 36 kV system are given:

Particulars	**Details**
Rate System Voltage	36 kV
Rate Arrester Voltage	30 kV

Nominal discharge current	10 kA of 8/20 micro-sec wave
Minimum discharge capability	5 kilo joule/kV (referred to rated arrestor voltage corresponding to minimum discharge characteristics)
Class	Station class
Maximum Continuous Operating	33 kV rms
Max. residual voltage (1 kA)	30 kVp
Max. residual voltage at 10 kA nominal discharge current(8/20 micro sec wave)	170 kVp
Max. switching impulse residual Voltage at 1000 A peak	140 kVp
Max. steep current residual voltage	186 kVp at 10kA
High current short duration test Value (4/10 micro-sec-wave)	100 kAp
Current for pressure relief test	40 kA rms
One minute power frequency withstand voltage of arrestor housing (dry and wet)	140 kV (rms)
Impulse withstand voltage of arrestor housing with 1.2/50 micro sec. Wave	325 kV (Peak)
Radio interference voltage at156 kV	Not more than 1000 micro volt
Partial discharge at 1.05 MCOV (continuous operating voltage)	Not more than 50pC
Whether insulating base and discharge counter with milli-ammeter are required.	Yes

4.22 Protective Relays

4.22.1 The Solar PV system and the associated power evacuation system interconnections should be protected as per IEC 61727 Ed.2, norms. Over current relays, reverse power relays, differential protection relays and earth fault relays have to be essentially provided. All relay should be numerical type & should be remote operating and controlling facility from the control room.

4.22.2 All the relays must be solid state type and based on open access communication protocol. The numerical relays shall have RS 485 port for communication.

4.22.3 The operating voltage of the relays shall be 110 V DC/220 V DC as per battery bank rating.

4.22.4 Necessary battery bank shall also be provided in order to supply uninterrupted power to relays and control & protection circuit of the plant.

4.22.5 Detailed Design calculations shall be provided on fault power computations and the philosophy of protective relaying with respect to short circuit kA calculations. Design, drawing and model of protection relay shall be approved by Employer/ state utility.

4.22.6 The bidder must submit the relay setting chart as a part of design documents in coordination with the connecting substation.

4.23 Earthing for PV Array

4.23.1 The photovoltaic modules, BOS and other components of power plant requires adequate earthing for protecting against any serious faults as guided by IEC 60364.

4.23.2 The earthing system shall be designed with consideration of the earth resistivity of the project area. The earth resistivity values shall be measured prior to designing the earthing system. Unless otherwise specified, earthing system shall be in accordance with IS: 3043 and IEEE 80, Indian Electricity Rules, Codes of practice and regulations existing in the location where the system is being installed.

4.23.3 The permissible system fault power level at 33 kV also 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, SI, All junction boxes, ACDB & DCDB, all motors, pumps and any special earthing as required (electrical/ electronic). 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.

4.23.4 The earthing for array and LT power system shall be made of 3.0 m long 40 mm diameter perforated GI pipe / chemical compound filled, double walled earthing electrodes including accessories, and providing masonry enclosure with cast iron cover plate having pad-locking arrangement, watering pipe using charcoal or coke and salt as required as per provisions of IS: 3043.

4.23.5 Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.

4.23.6 Each string/ array and MMS of the plant shall be grounded properly.

4.23.7 For each earth pit, a necessary test point shall be provided.

4.23.8 Earthing Mesh is to prepared and installed in entire power plant.

4.23.9 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.

4.23.10 The complete earthing system shall be mechanically & electrically connected to provide independent return to earth.

4.23.11 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.

4.23.12 The Bidder should submit the earthing system design calculations along with the system layout for Owner approval. Prior to the installation of the system.

4.23.13 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 and inverter terminals and electronic earthing shall be provided using copper earthing conductor only.

4.24 Earthing Blades

4.24.1 The Isolators controlling the underground line shall be equipped with earthing blades. The Earthing blades shall be counter balanced to ensure easy operation.

4.24.2 Line earth switch shall consist of three Earthing links per Isolator which will normally rest against the frames, when the connected Isolator is in closed position. The Earthing links of all three phases shall be suitable for fitting on either side of the Isolator

4.24.3 Short time current withstand capacity of earthing blades of Isolator Earthing Switch shall be same as that of the main blades of Isolator. The material of the earthing Isolator, each earthing blade shall be provided with flexible copper connections of adequate length of not less than 60mm2 are for connection between the operating shall and the base frame.

4.24.4 The rated making capacity of earthing switches shall be as specified in the applicable standard of isolators

4.25 Insulators

4.25.1 Bushings shall be manufactured and tested in accordance with IS: 2099 & IEC: 137. Hollow column insulators shall be manufactured and tested in accordance with IEC: 60233/IS: 5261. The support insulators shall be manufactured and tested as per IS: 2544 / IEC: 600168/IEC: 600273. The insulators shall also conform to IEC 815 as applicable. Bidder shall furnish the technical particulars of all type of insulators used.

4.25.2 Porcelain insulator shall comply IS: 731-1976 or equivalent international standard and shall be homogenous, free from laminations, cavities and other flaws or imperfections that might affect the mechanical or dielectric quality and shall be thoroughly vitrified, tough and impervious to moisture. Hollow porcelain should be in one integral piece in green & fired stage.

4.25.3 Bidder may offer silicone rubber housed composite type insulator as an alternative to the above porcelain insulator with equivalent creep age distance.

4.25.4 Data sheets for the insulators with cantilever strength and compression strength, etc. shall be submitted.

4.25.5 Insulators shall be rated for not less than 6kN for bus bar supports and 4kN for isolators.

4.26 Control & Relay Panel Specifications

General Requirement:

4.26.1 The control & relay panel shall be free standing, simplex type, floor mounting type, fabricated from 2 mm thick MS sheet for main enclosure and 1.6 mm thick MS sheet for internals and partitions. The main enclosure shall be mounted on a base frame fabricated out of 100x50 ISMC mild steel section.

4.26.2 The enclosure external finish colour shade shall be decided by the Employer, the internal surface shall have a glossy white finish all over.

4.26.3 The control & relay panel shall contain the following metering and protection devices:

- Metering, Indications & Controls
- Ammeter: of suitable range
- Ammeter selector switch
- Voltmeter: of suitable range
- Voltmeter selector switch
- Load manager to display the following parameters: MW, MVA, MVArh, MVAr Cos Ø, Hz,
- Indication lamps for R, Y, B phases, Breaker 'ON' (R), Breaker 'OFF' (G), Breaker 'TRIP' (A), Spring charged (W), Trip Circuit Healthy (B)
- TNC switch, spring return to neutral position shall be provided for circuit breaker operation.
- Local / Remote selection switch for circuit breaker operation
- Semaphore indicators (LED type) for CB and Isolator 'Open' & 'Close' positions
- Mimic diagram for the 33 kV systems with aluminum strips and 'ON' 'OFF' indications for isolators

4.27 Low/ High Voltage Switchgear Panels

4.27.1 The LT/ HT switchgear panels shall be designed as per the relevant IS codes and as per the approved design for the panel. All the parts of the panels must be rated as per the relevant rated voltage level. All the panels must have multifunction meters (MFM) flushed with the surface of the panels. However, the outgoing feeder can have Tri vector meter (TVM) for the energy accounting.

4.27.2 The Power Control Centre (PCC)/ Switchgear shall be rated for the maximum output of the supply transformer feeding the system. The short circuit withstand rating (1 sec) at rated voltage of the switchgear shall be relevant to the existing electrical system short circuit ratings.

4.27.3 The configuration of the PCCs shall be as per the Single Line Diagram of the system.

4.27.4 Power Control Centres (Construction)

- Single front / compartmentalized, modular design, degree of protection IP55 with provision of extension on both sides.
- Incomer feeders: mains incomer - Electrically operated draw out type Air Circuit Breakers (ACBs)/ Vacuum Circuit breakers (VCBs), as applicable.
- Outgoing feeders: Moulded Case Circuit Breakers (MCCBs)/ electrically operated draw out type Air Circuit Breakers (ACBs) / Vacuum Circuit Breakers (VCBs), as applicable.
- 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 Employer, the same shall be intimated to the supplier.
- The PCC shall be fabricated out of CRGO sheet steel; 2 mm thick for the outer shall all round. The internal walls and separators shall be of 1.6 mm thick CRGO sheet steel
- The gland plates shall be 3 mm thick

4.28 Control Circuit

- Control supply for breaker closing / tripping - 110V DC
- Air Circuit Breaker spring charge motor – 240 V AC, 1 phase
- Moulded Case Circuit Breakers – 240 V AC, 1 phase
- Indications, annunciation – 110V DC
- Space heater, sockets, etc. – 240 V AC, 1 phase

4.29 Bus Bar & Cable Cavity:

- The material for main bus bars and tap off bus bars shall be electrolytic grade copper with properly colour coded HR PVC sleeved insulation.
- Bus bars shall be suitable for short circuit rating and current suitable for all connected load.
- Cable entry for incoming and outgoing cables shall be from Bottom.
- A suitable gland plate shall be supplied for termination of power, control and instrumentation cables.
- Whenever feeders are housed in multi-tier configuration, these tiers shall be segregated by sheet metal barriers.
- 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. All the non-current carrying parts of the panels, e.g., enclosure, must be connected to earth as per the regulations.

4.30 Terminals:

- CT circuit - Isolating link type terminals with shorting facility.
- PT circuit – clip on type terminals.
- Spare contacts shall be wired up to terminal block. 10% spare terminals shall be provided for each module

4.31 Specific Requirement

4.31.1 All ACBs/ VCBs, as applicable, shall be 4 pole, electrically operated, draw-out type, 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.

4.31.2 ACBs/ VCBs, as applicable, shall be complete with microprocessor release and shall be provided with over current, short circuit and earth fault protections.

4.31.3 Minimum 10% spare feeders of each rating shall be provided in the switchgear.

4.31.4 All current transformers shall have 5/1A secondary and all meters shall be suitable for 5/1A operation.

4.31.5 All indicating lamps shall be of LED cluster type. ACB feeders shall be provided with ON, OFF, AUTOTRIP, SPRING CHARGED, TEST, SERVICE, TRIP CIRCUIT HEALTHY indications.

4.31.6 All indicating instruments, including MFM, shall be flush mounting, Digital type and of standard size.

4.31.7 Window annunciator with hooter and accept, test, reset button shall be provided. Necessary auxiliary relays for contact multiplication shall be provided in the panel.

4.31.8 The maximum temperature of the bus bars, droppers and contacts at continuous current rating under site reference ambient temperature of 50º C shall not exceed 105º C.

4.31.9 Instrumentation: Switchgear instrumentation shall be provided as follows:

- Mains Incomer – Voltmeter with selector switch
- Ammeter with selector switch
- Power Factor meter
- Frequency meter
- TVM + MD meter
- Potential indicating lamps
- Outgoing Feeders
- Ammeter with selector switch on all feeders

4.32 General Technical Specifications (LT / HT Switch Gear Panel)

4.32.1 The panel shall be self-supporting, free standing, floor mounted, modular type with construction having degree of protection of IP 55 as per IS 2147.

4.32.2 The panel shall be fabricated from 14 SWG CRCA sheet steel for frame & load bearing surfaces. Partitions may be fabricated from 16 SWG CRCA if no components are mounted on them.

4.32.3 The panel shall be painted with 2 coats of primer after pre-treatment and 2 coats of Polyurethane / epoxy paint with shade as decided by the Owner.

4.32.4 Stiffeners shall be provided at corners & between modules to make panel rugged. The stiffeners will necessarily be required for relay compartments or doors where heavy components are mounted.

4.32.5 The openable covers will be provided with lift off type hinges, quarter turn door locks and flexible copper wire for earth connection.

4.32.6 The panel shall be dust and vermin proof. Synthetic or neoprene gaskets shall be provided at all openings.

4.32.7 The panel shall be of dead front construction suitable for front operated and back maintained functioning.

4.32.8 Panel shall be provided with fluorescent lamp of 20W capacity operated by door operated limit switch. Panel shall also have space heaters and thermostat arrangement.

4.32.9 Panel shall be provided with 3 pin switch socket combined unit of 5 Amp capacity.

4.32.10 Lifting hooks shall be provided at the top of the panel.

4.32.11 The hardware components used in the panel shall be hot dipped galvanized.

4.32.12 The control components shall be fixed on mounting plate by drilling & tapping.

4.32.13 Copper anodized legend plates shall be provided for all the components. For components mounted on front face, legend plate from inside shall also be provided.

4.32.14 Pre-treatment by 7 tank process shall be done before painting / powder coating the panel.

4.32.15 Panel shall have provision of drawing pocket.

4.32.16 The panel shall be designed to ensure maximum safety during operation inspection, connection of cables and maintenance. Inside panel, checking and removal of components shall be possible without disturbing other units.

4.32.17 Cable entries will be from bottom. The opening of cable entry shall be covered by 3 mm thick gland plates.

4.32.18 The panel shall be provided with all necessary components / devices and instruments as per the recommended schematic diagram and functional requirements.

4.32.19 The components such as protective relays, auxiliary relays, push buttons, switches, instruments shall be flush mounted on the front side of a panel.

4.32.20 The control wiring shall be done with PVC insulated flexible copper wire. For CT secondary circuits 2.5 sq.mm wire shall be used. For control wiring 1.5 sq.mm wire will be used.

4.32.21 Earthing bus bar of suitable cross section shall be provided throughout the length of panel.

4.32.22 The panel shall be fully wired all the terminals shall be brought out for cable connections. 10% spare terminals shall be provided on each terminal block. Separate terminal block shall be provided for different voltages. All wire shall have P.V.C. ferrules as per wiring diagram.

4.32.23 Proper shrouding to incoming and outgoing terminals shall be provided to ensure safety during operation, inspection and maintenance.

4.32.24 Indicating lamps shall be with multiple LEDs & shall be suitable for the voltage specified.

4.32.25 All the components in the panel shall be properly labelled. The labels shall be made of nonrusting metal or engraved PVC material properly fixed by screws.

4.32.26 The panel layout shall be made in such a way that it will always facilitate easy removal and reconnection of control cables without disturbing other wiring.

4.32.27 Centre lines of control switches, push buttons and indicating lamps shall be matched so as to give neat appearance. Similarly, top lines of indicating instruments and relays shall also be matched.

4.32.28 The panel shall be provided with electrolytic grade copper bus bar of suitable cross section so as to maintain max current density of 0.8 AMP/ Sq.mm.

4.32.29 Bus bars shall be provided with colour coded heat shrinkable insulating sleeves.

4.32.30 Bus bars shall be supported by high quality epoxy insulators provided at specified distances so as to withstand to the given fault level.

4.32.31 The bus bar chambers shall be provided with suitable ventilation arrangements so as to limit the maximum temperature of 85°C while carrying rated current.

4.32.32 Proper clearance of minimum 25 mm shall be maintained between phase bus bars and between bus bars.

4.32.33 The panel shall be inspected at manufactures works before dispatch to site at the discretion of Employer.

4.32.34 All routine tests shall be carried out on the panel in presence of Employer or their representative or its representative. These tests shall include following:

- Verification of components ratings and operation.
- High voltage measurement test.
- Insulation Resistance measurement.
- Control testing

4.32.35 Approval on following drawings shall be obtained before manufacturing the panels:

- General arrangement drawing
- Wiring Diagram.
- Detail bill of material

4.32.36 Bidder shall provide 33kV power evacuation with bay and metering on Turnkey basis as per Port requirement.

4.32.37 In case, the bidder is using bus duct at the incoming/ outgoing terminals, appropriate arrangement has to be made in the LT/HT panel for the incorporation. Construction of bus ducts shall be as per relevant IS standards. Bus ducts must be provided with the space heaters and silica gel as recommended.

4.33 Metering System

4.33.1 ABT energy meter shall be provided as approved by state Utility under the metering scheme, to measure the delivered quantum of energy to the grid ~~for sale~~. The responsibility of arranging for the meter, its inspection /calibration / testing charges etc. rests with the Bidder. All charges incurred on Meter testing, shall be borne by the Bidder. ABT energy metering system is to be approved by state utility.

4.33.2 Meter must be provided with the necessary data cables.

4.33.3 Separate metering system has to be provided for L.T. (incoming) and H.T. (outgoing) supply.

4.33.4 The Bidder shall provide ABT compliant meters at the interface points.

4.33.5 Interface metering shall conform to the Central Electricity Authority (Installation and Operation Meters) Regulation 2006 and amendment thereof Commercial settlement of solar Photovoltaic Grid Interactive based power project.

4.33.6 Meter shall be suitable for interfacing for synchronizing the built-in clock of the meter by GPS time synchronization equipment existing at the station either through a synchronization pulse received from the time synchronization equipment or through a remote PC synchronized to GPS clock shall also be in the scope of Bidder.

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

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

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

b. Meters shall carry out measurement of active energy (both import and export) and reactive energy (import) by 3-phase, 4 wire principle suitable for balanced/ unbalanced 3 phase load.

c. Meters shall have an accuracy of energy measurement of at least Class 0.2 for active energy and at least Class 0.5 for reactive energy according to IEC 60687, and shall be connected to Class 0.2 CT cores and Class 0.2 VT windings or as per state grid regulations.

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

e. Meters shall compute the net MWh and MVArh during each successive 15- minute block metering interval along with a plus/minus sign, instantaneous net MWh, instantaneous net MVARh, average frequency of each 15 minutes, net active energy at midnight, net reactive energy for voltage low and high conditions at each midnight.

f. Each energy meter shall have a display unit with a seven digit display unit. It shall display the net MWh and MVARh with a plus/minus sign and average frequency during the previous metering interval; peak MW demand since the last demand reset; accumulated total (instantaneous) MWh and MVARh with a plus/minus sign, date and time; and instantaneous current and voltage on each phases.

g. 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.

h. At least the following data shall be stored before being over-written for the following parameters.

S. No.	Parameters	Details	Min No. of days
1	Net MWh	15 min. block	90 days in meter
2	Average Frequency	15 min. block	90 days in meter
3	Net MVARh for > 103%	15 min. block	90 days in meter

4	Cumulative net MWh	At every mid night	30 days in meter/ 90 days in PC
5	Cumulative net MVARh for >103%	At every mid night	30 days in meter/ 90 days in PC
6	Date & time blocks for VT failure on any phase		

i. Shall have a built in clock and calendar with an accuracy of less than15 seconds per month drift without assistance of external time synchronizing pulse.

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

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

l. The power supply to the meter shall be healthy even with a single- phase VT supply. An automatic backup, in the event of non-availability of voltage in all the phases, shall be provided by a built in long life battery and shall not need replacement for at least 10 years with a continuous VT interruption of at least 2 years. Date and time of VT interruption and restoration shall be automatically stored in a non-volatile memory.

m. Even under the absence of VT input, energy meter display shall be available and it shall be possible to download data from the energy meters.

n. Meters shall have an optical port on the front of the meter for data collection from either a hand held meter reading instrument (MRI) having a display for energy readings or from a notebook computer with suitable software.

o. 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.

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

4.34 SCADA and Remote Monitoring System

4.34.1 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.

4.34.2 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.

4.34.3 The SCADA shall be string level monitoring compatible and shall have features of remote access to the real time data. SCADA shall have features for generating the day ahead schedule of generation based on historical data/ suitable logic. Also, system must be capable of sending the telemetry data to the local SLDC via GPRS/ GSM/ suitable mode.

4.34.4 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.

4.34.5 Reliable sensors for solar insolation, temperature, and other weather and electrical parameters are to be supplied with the data logger unit.

4.34.6 The Bill of Materials associated with the equipment must clearly indicate especially the details about the PC and Printers, etc.

4.34.7 The Data Acquisition System should be housed in a desk made of steel sheet.

4.34.8 All data shall be recorded chronologically date wise. The data file should be MS Excel/ CSV compatible. The data, if needed, can be accessible remotely through authorized access. 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. Provision should be available for Remote Monitoring.

4.34.9 SCADA shall measure and continuously record electrical parameters and provide following data (but not limited to) at a 5-15-minute interval.

- Energy export to grid at 33kV
- Main combiner box parameters
- Inverter level parameters
- Parameters at LV terminal (415V)
- Power characteristics of HT side
- Ambient temperature near array field
- Module surface temperature
- Wind Speed and direction
- Solar irradiation/insolation
- Any other parameter considered necessary by supplier based on current prudent practice
- SCADA shall provide 15 minute daily, monthly and annual average of following parameters:
- Exported Energy to grid at 33 kV
- Energy, DC and AC voltage, power and pf of each inverter
- Solar Radiation (horizontal and tilted plane)
- Temperature (ambient and module surface)

4.34.9 SCADA shall have feature to be integrated with the local system as well remotely via the web using either a standard modem or a GSM/WIFI modem. The Bidder shall provide compatible software and hardware so that data can be transmitted via. Standard modem.

4.34.10 SCADA shall be provided with reliable power supply along with backup supply for at least one hour to cater to outage of grid.

4.34.11 The SCADA shall be compatible to the requirements for measuring and reporting the performance-ratio (PR) of the power plant.

4.34.12 The Contractor shall provide all administrative rights/ privileges/passwords of the SCADA system to the Employer. The Employer have rights over the data generated in the plant.

4.34.13 The Bidder shall submit the data sheet with technical specifications of the SCADA system.

4.34.14 The PC/ workstation shall be of Industrial type, rugged & robust in nature to operate in a hostile environment. The PC will have minimum Intel processor (4th generation) having 2 X 1TB HDD with 4 GB RAM. The PC shall also have 17" TFT Colour monitor, DVD Drive with Writer, USB drive, Scroll Mouse and UPS for 4 hours Power back up. The bidder can suggest the workstation best used for the purpose.

4.34.15 The printer shall be of industrial type, rugged & robust in nature and of reputed make. The printer shall be equipped for printing, colour scanning, copying and fax.

4.35 DC Battery & Charger

4.35.1 Adequate capacity DC battery Bank should be provided for control supply of inverters, control / protection system & emergency lighting at buildings. A appropriate capacity battery charger (float cum boost charger – FCBC) with relevant IS/IEC standards & protection and automatic change over system should be provided to charge the battery bank along with relay circuit, fuses, annunciations and remote operating and controlling facility from the Main Control Room.

4.35.2 A DC power supply Distribution panel/board should be supplied along with the Charger (FCBC) as per relevant IS standards. Control room DC Battery Bank & DC supply system theoretical design, calculations and detailed explanations along with drawing shall be provided and approved by the Employer.

4.35.3 DC Batteries the batteries will have the following specifications:

- Type: VRLA/ MF Stationary, sealed type, storage battery.
- Rating: 110 V D.C., Minimum 80 Ah at 8 Hour rate of discharge (or as per design)
- Standard : IS 1651 – 1979; performance as per IS 8702
- Container : Plastic Resin, ABS or PP
- Terminal Posts: Designed suitably to accommodate external bolted connections.

4.35.4 The battery shall be provided with epoxy paint coated exhaust fan for removal of gasses released from the battery cells.

4.35.5 The design of the battery bank and loads considered along with the data sheet for the battery and battery charger shall be submitted for approval.

4.36 Power and Control Cables specifications: Only Copper Cable shall be used in Solar Power Plant.

4.36.1 The size of each type of cable selected shall be based on minimum voltage drop; however, the maximum drop shall be limited to 2%. 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.

4.36.2 All cables shall be supplied in the single largest length to restrict the straight- through joints to the minimum number.

4.36.3 PV Modules should be connected with USE-2/RHW-2 cables array to junction box conductors and junction box to photovoltaic dis-connector with the THHN/THWN-2 sunlight resistant with 90ºC wet rated insulation cable.

4.36.4 Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted. All cable/wires shall be marked with good quality letter and number ferrules of proper sizes so that the cables can be identified easily. The ferrules used must be UV resistant. However, for HT cables, embossed ferrules can be used.

4.36.5 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.

4.36.6 All high voltage cables should be XLPE insulated grade conforming to IS 7098 PART-3 and IEC -60287 with latest amendments.

4.36.7 Irrespective of utilization voltage and current rating all type of power cables shall be minimum of 1100 V grade PVC insulated conforming to IS 1554 / IS 694 for working voltage less than 150 V control cable shall be of minimum 500 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 Shall confirm IS: 7098 PART-3 & IEC -60287, IEC-60332.

4.36.8 The cables shall be adequately insulated for the voltage required and shall be suitably colour coded for the required service. Bending radii for cables shall be as per manufacturer's recommendations and IS: 1255.

4.36.9 Cables inside the equipment room, 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 sidewalls or bricks sidewalls and provided with removable RCC covers.

4.36.10 All the communication cables (RS 485, fibre optics etc.) must be supplied with type test reports and shall laid in accordance with the relevant IS codes. It must be laid so that there is no interference with the power cables.

4.36.11 Type test reports and Data sheets of individual cable sizes (HT, LT & DC) shall be submitted for approval by Employer. Drum numbers and drum length details shall be submitted with each consignment.

4.37 Power Evacuation and Hardware

4.37.1 The power from the plant shall be evacuated to nearby connecting substation through overhead transmission line with suitably rated ACSR conductor as per prevailing conditions at site, fulfilling the existing statutory requirements as per CEAR 2023 with latest amendment. The power evacuation system must be reliable, redundant and have low maintenance.

4.37.2 The design and arrangement for routing overhead line shall be in bidder’s scope. Bidder has to take necessary precautions for easy maintenance, in line with the existing norms prescribed by MPEB/statutory authority.

4.37.3 The transmission line routing and tower installation shall suit site condition in all respect. The scope of attaining ROW lies with the bidder.

4.37.4 Metal fittings of specified material for string hardware meant for power conductor and earth wire shall have excellent mechanical properties such as strength, toughness and high corrosion resistance. The suspension and tension clamps shall be made from copper alloy having high mechanical strength. Suspension and tension clamps offered shall be suitable for cable/ conductor as per design.

4.37.5 All hooks, eyes, pins, bolts, suspension clamps and other fittings for attaching insulators to the tower or to the power conductor shall be so designed as to reduce (to a minimum) the damage to the conductor, insulator or the fitting arising from conductor vibration.

4.37.6 All drop-forged parts shall be free-from flaws, cracks, or other defects and shall be smooth, close-grained and of true forms and dimensions. All machined surfaces shall be true, smooth and well-finished.

4.37.7 All ferrous parts of hardware shall be galvanized in accordance with IS 2629.

4.37.8 The galvanization shall withstand four dips of 1-minute duration each in copper-sulphate solution as per the test procedure laid down in the relevant IS Standards.

4.37.9 The threads in nuts and tapped holes shall be cut after galvanizing, and shall be well lubricated/ greased. All other threads shall be cut before galvanizing.

4.37.10 Both the suspension and the tension hardware shall be of ball and socket type, and shall be with `R' and `W' type security clip of stainless steel or phosphor Bronze conforming to IS 2486. The tension clamps of both compression type and bolted type as shown in the relevant drawings shall be offered. Arcing horns shall be provided on the line side for both the suspension type and compression type hardware.

4.38 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 signal red colour on front side as required. The inscriptions shall be in Hindi and English.

4.39 Fire alarm and protection System

4.39.1 Buildings shall have fire detection and alarm system installed as per relevant standards and regulations. The installation shall meet all applicable statutory requirements, safety regulations in terms of fire protection.

4.39.2 Liquefied CO2/ Foam/ ABC type fire extinguisher shall be upright type of capacity 5/10 kg having IS: 2171. 7 IS: 10658 marked. The fire extinguisher shall be suitable for fighting fire of Oils, Solvents, Gases, Paints, Varnishes, Electrical Wiring, Live Machinery Fires, and all Flammable Liquid & Gas. Bidder shall provide portable fire extinguisher as per the recommendation by relevant fire safety authority.

4.39.3 The minimum 2 no. of fire extinguishers (CO2 and Foam type each) shall be provided at every building.

4.39.4 Sand bucket should be wall mounted made from at least 24 SWG sheet with bracket fixing on wall conforming to IS 2546 at strategic locations.

4.39.5 The plan for fire extinguishing must be provided by the bidder to Employer for the approval.

4.40 CCTV cameras

4.40.1 CCTV cameras must be installed at main entry gate, control room and plant premises. Bidder may propose the locations as required to provide security for the entire plant. Bidder has to propose the locations and number of cameras required for the plant during bidding. However, Employer decision on number of cameras shall be final.

4.40.2 The CCTV system shall be designed as a standalone IP based network architecture. System shall use video signals from different cameras at defined locations, process the video signals for viewing on monitors at control room and simultaneously record all video streams using latest compression techniques.

4.40.3 Camera shall be colour, suitable for day and night surveillance (even under complete darkness) and network compatible.

4.40.4 It shall be possible to control all cameras i.e., PTZ auto/ manual focus, selection of pre-sets, video tour selection etc. The software shall support flexible windows split screen display mode or scroll mode on the display monitor for live video.

4.40.5 The system shall support video analytics in respect of the following:

- Video motion detection
- Object tracking
- Camera server shall be provided with sufficient storage space to storage recordings of all cameras at HD mode for a period of 30 days. All recordings shall have camera ID, location, date and time of recording.

4.41 Testing Instruments for Electrical & Electronic: Bidder shall also provide required set of onsite testing instruments/equipment viz. earth resistance tester, rheostats, insulation tester, multi-meters, clamp meters, CRO, Function Generator, Transformer oil BDV kit, Relay testing kit, infra-red thermal imaging hand held temperature meter, inverter testing kit etc. All testing equipment shall possess valid calibration certificate issued from approved NABL labs.

4.42 General Guidelines

4.42.1 Any civil or electrical work which is not mentioned or included in this tender document but necessary for the plant shall be borne by the Bidder.

4.42.2 Successful Bidder shall prepare all designs / drawings based on the specifications given in the tender and in light of relevant BIS/IS/ equivalent standards.

4.42.3 The bidder shall provide type test reports and datasheet/ GTP for all equipment used for the project.

4.42.4 The Employer reserves the right to modify the design at any stage, to meet local site conditions / project requirements.

4.42.5 All work shall be carried out in accordance with the latest edition of the Indian Electricity Act and rules formed there under and as amended from time to time.

4.43 Specification of Weather Monitoring System: As a part of weather monitoring system, Bidder shall provide the following measuring instrument with all necessary software and hardware required to integrate with SCADA.

4.43.1 **Pyranometer:** Bidder shall provide minimum 2 (two) number of Thermopile pyranometers for measuring the incidental solar radiation at horizontal and inclined plane of array.

- Specification of the pyranometer shall be as follows:

Details	Values
Spectral Response.	0.31to2.8micron
Sensitivity	Min7micro-volt/w/m2
Time response (95%):	Max15s
Nonlinearity:	±0.5%
Temperature Response:	±2%
Tilt error:	<±0.5%.
Zero offset thermal radiation:	±7w/m2
Zero offset temperature change	±2w/m2
Operating temperature range:	0 deg to+80 deg.
Uncertainty(95%confidence Level):	Hourly-Max-3%, Daily-Max-2%
Non stability:	Max±0.8%
Resolution:	Min+/-1W/m2
Input Power for Instrument & Peripherals:	230V a.c.(If required)

- 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.
- The specification shown above is indicative and if there is any variation / addition required to be made as per latest rules and regulations, the same is to be included by the bidder.

4.43.2 **Thermometer:** Bidder 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 arranged of 0°C to 80°C. The instrument shall have valid calibration certificate.

4.43.3 **Anemometer:** Bidder shall provide minimum one no. anemometer with wind vane of rotating cup type:

Details	Values
Velocity range with accuracy	± 0.11m/s upto10.1 m/s
limit	±1.1% of true when more than10.1 m/s
Wind direction range with accuracy limit	0 to 360° with accuracy ± 4°

4.44 Specification of Lighting in Solar Power Plant

4.44.1 This specification covers design of Array yard and sub-station, street light using suitable LED luminaires (to meet the required lux levels), 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 street light shall work on the auxiliary supply and same shall be incorporated in auxiliary loads. 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. The Bidder shall furnish Guaranteed Technical Particulars. 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.

4.44.2 **General Technical Requirements:** The lighting system for outdoor and indoor areas of Solar Power Plant shall be designed in such a way that uniform illumination is achieved. In outdoor yard equipment /bus bar areas and the peripheral wall are to be illuminated and luminaires shall be aimed for clear view.

4.44.3 **Lighting Levels:**

- 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.

- Lighting in other areas such as control room, office rooms and battery room & other areas (i.e. street light) shall be such that the minimum LUX level to be maintained shall be as under:

S. No	Area	LUX
1.	Control Room and equipment rooms	300
2.	Office	300
3.	Battery & other rooms	150
4.	Other areas including periphery wall	10
5.	Transformer yard	20
6.	H – pole and metering point	10

4.44.4 Emergency Light Points:

- Light points using LED lamps of 15-20 W (at 240 V) shall also be provided as given below:
- Control room and equipment room 4 Nos.
- Battery room 1 Nos.
- Office 1 Nos.
- Corridor 1 Nos.
- These lights shall operate on AC/DC changeover supply from the DC distribution Board. Separate wiring and distribution board shall be provided from these lights.
- 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.
- LED luminaires shall meet the following parameters

PARAMETER	**SPECIFIED VALUE**
Input voltage	170-260 V

Input Frequency	50 HZ +/-1 HZ
Power Factor	0.95 (Minimum)
Power Efficiency	>96%
LED efficacy	>130 lumens per watt
Dispersion Angle	Minimum 120°
Usage hours	Dusk to dawn
Total Harmonic Distortion	< 15 %
Working Temperature	-5° to +50° C
Working Humidity	10% -90% RH (Preferably Hermetically sealed unit)
Index of Protection Level	Minimum IP 65
Lamp Casing	Powder coated metal / Copper.
Life	> 50000 Hrs.
LED Type	Power LEDS from reputed makes.
Colour Temperature	2800° K/3000o K
Colour Rendering	>75
Junction Temperature	< 60° C
Electrical Connector	Lead wire with 2-meter-long or as required by the customer at site.
Expected Life of components	Passive electronic components life greater than >100,000 hours
Moisture protection in case of casing damage	IP 65 (preferably Totally encapsulated)

- Luminaire Compliances: As per relevant IS standard.
- Luminaire Specification: conform to relevant latest IS standard
- Control gear specification:
- EN 61347-2-13 : Particular requirements for D.C. or A.C. supplied electronic control gear for LED modules
- EN 62384: D.C. or A.C. supplied electronic control gear for LED modules.
- Luminaire EMC specification:

- EN 61000-3-2 : Electromagnetic compatibility (EMC). Limits for harmonic current emissions (Equipment input current < 16 A per phase)
- EN 61000-3-3 : Limitation of voltage fluctuation and flicker in low voltage supply systems for equipment with rated current < = 16 A

Additional information:

- The LED luminaire housing, heat sink, pole mounting bracket, individual LED reflectors and front heat resistant tempered glass should be provided.
- The LED luminaire housing should be made of non-corrosive high pressure die cast copper and the housing should be power coated grey, so as to ensure good wether ability.
- 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.

- 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.

- 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).

4.45 Performance Ratio Test Procedure

4.45.1 PR - Provisional Acceptance Test Verification Procedure

A. The Performance ratio test aims at the comparison of the actual PV plant energy production with the guaranteed value for a limited operation time of the PV plant of 30 consecutive days.

B. After Commissioning of the Plant and after receiving all the satisfactory results regarding the correct operation of the plant, there will be continuous monitoring of the performance for 30 days. This monitoring will be performed on the site under the supervision of the Employer / Employer's engineer.

C. The final tests to prove the guaranteed performance parameters shall be conducted at site by the Contractor in presence of the Employer. The Contractor's commissioning / start-up Engineer shall make the plant ready to conduct such tests. The Performance Guarantee Tests (PG tests) shall be commenced, within a period of one (1) month after successful Commissioning. Any extension of time beyond the above one (1) month shall be mutually agreed upon. These tests shall be binding on both the parties to the contract to determine compliance of the equipment with the guaranteed performance parameters.

D. The test will consist of guaranteeing the correct operation of plant over 30 days, by the way of the efficiency rate (performance ratio) based on the reading of the energy produced and delivered to the grid and the average incident solar radiation.

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

Performance Ratio (PR) = {**YA / YR**} ***** [1 – α * (TCell avg. – TCell)]

Where;

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

Or

YA = Eac / Pnom

YR = 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

YR = IR Site/ IR STC

Eac = AC energy injected into the grid during a clearly specified amount of Time (kWh)

Pnom = 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)

Tcellavg = Average cell/ module temperature (°C)

Tcell = STC cell/ module temperature (°C)

A = temperature coefficient of power (negative in sign) corresponds to the Installed Module (%/°C)

4.45.2 **Monitoring System for PR Verification:** The following instrumentation will be used to determine the Solar Plant Performance:

- Power Meter at the delivery point.
- Power Meter for each inverter/ LT panel incomer for reference only.
- One nos. calibrated pyranometer to determine irradiance on the plane of array (with a target measurement uncertainty of ± 2).
- One nos. calibrated pyranometer to determine irradiance on horizontal plane (with a target measurement uncertainty of ± 2)
- Two nos. thermocouples to measure module temperature with a measurement uncertainty of ±1 °C.
- Shielded ventilated thermocouple with a measurement accuracy of ±1°C.
- An anemometer mounted on a 10m mast to measure wind speed (without additional shadowing on modules).

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

4.45.4 The bidder shall show the specified PR for Operational Acceptance and committed CUF for Final Acceptance (i.e. Yearwise, For Six Years from the date of commissioning including warrantee period).

4.45.5 Capacity Utilization Factor (CUF) shall be calculated as per the following formula:

CUF = EN / (8760*Pnom)

EN = No. of units recorded at the ABT meter excluding the auxiliary consumption

Pnom = Installed DC capacity

5. CIVIL WORKS

5.1 Detailed Contour Survey & Soil Investigation of the Site: The turnkey contractor shall be responsible for detailed soil investigation and contour survey at required location for the

purposes of foundation design and other design/ planning required for the successful completion of the project. The contractor must submit the detailed reports for soil investigation, bore log records, ERT reports, contour survey, etc. to Employer.

5.2 **Topographical survey:** Topographical survey shall have to be done by the Successful Bidder of the proposed site at 10m 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. Accordingly, a detailed drawing for levelling and grading (if necessary) shall be submitted. The volume of cutting and filling of earth shall also be mentioned in the drawings. The filled earth must be well compacted as per relevant IS standards.

5.3 **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 Employer 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, weather effect, soil characteristics etc.

5.4 **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 for each bore hole and submission of detail reports along with recommendation regarding suitable type of foundations including module mounting structure, equipment and buildings along with recommendation for soil improvement where necessary.

5.5 **Other investigations**" Successful Bidder shall obtain and study earthquake and wind velocity data for design of module mounting structure, equipment and building foundations after considering all parameters related to the weathers conditions like Temperature, humidity, flood, rainfall, ambient air etc. The Successful Bidder shall carry out Shadow Analysis at the site and accordingly design strings and arrays layout considering optimal use of space, material and man-power and submit all the details / design to Employer for its review / suggestions / approval.

5.6 **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/ borrowed from outside the plant, the contractor shall provide the necessary challans. On the other hand, excess earth, if any, must be disposed of properly. Bidder shall take reasonable care to ensure that the plant is aesthetically

designed. It is necessary to do the reclamation of the site. The bidders shall judiciously decide on making the price-bid accordingly

5.7 Foundations: The contractor is responsible for the detailed soil investigation and subsequent foundation design of all the structures in the plant. The foundation of the module mounting structures, equipment, buildings and other important structures must be approved by Employer prior to construction. The contractor must provide the detailed design and calculations of the foundation. The foundation designs must be approved by Charted Structural Engineer.

I. MMS Foundation: The MMS Pile Foundation shall be designed confirming to IS:2921. The MMS Pile shall be RCC type, dia. and length of pile shall be as per the calculation during detailed engineering and recommendations of Geotechnical investigation report corresponding to prevalent soil characteristics at site. However, the min. dia. & depth of the pile shall be 300mm and 1200mm respectively except when very hard strata/ rock (N>100) is encountered at a higher level, the pile shall be extended into the hard strata minimum 1.0 times the diameter of the pile with total depth of the pile not less than 1200mm below cut-off level. The MMS support shall project minimum 200mm above FGL (Finished grade level) to avoid any damage to the MMS column/sub support due to direct contact of rainwater/ surface run-off.

II. The foundations should be designed considering the weight and distribution of the structure and assembly, and a maximum wind speed of 250 km per hour. Seismic factors for the site have to be considered while making the design of the foundation. Successful Bidder shall also plan for transport and storage of materials at site.

5.8 Switch yard civil works: Switchyard civil work includes transformer plinth, HT Switchgear kiosk plinth, 2 pole/ 4 pole structure foundation, earth pits and surrounding masonry work, metal spreading curb wall in and around switchyard, plinth protection, trenches & precast covers and fencing. The transformer/ HT switchgear kiosk plinth shall be made of RCC/ brickwork/ Random Rubble masonry, as required and approved, conforming to relevant standards. The height of transformer /HT Switchgear kiosk plinth shall be decided based on 33 kV ground clearance. Earth pit construction shall be of brickwork covered with RCC (1:2:4) slabs. Switchyard/ double/ four 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. All the trenches shall be made up of precast sections/ brick work with plaster. The trenches must be covered with precast slabs with handles of suitable sizes.

5.9 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. Security houses/ cabins shall also be required at strategic locations to secure the plant from any theft/ burglary. The building shall be constructed with conventional RCC framed structure with brick partition walls. Equipment room shall be designed as per the OEM recommendations to ensure desired life of equipment. Bidder shall furnish the drawing of the proposed buildings to the Employer for approval, prior to construction. The construction of the same shall be as under-

a. 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.

b. 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.

c. Doors & Windows: Steel framed doors, Windows and ventilators shall conform to IS – 1081 with necessary float glass panels including of all fixtures and painting etc. complete. Doors and windows shall be made of Aluminium sections. All sections shall be 20 microns anodized. Sections of door frame and window frame shall be adopted as per industrial standards. Door shutters shall be made of Aluminium sections and combination of compact sheet and clear float/ wired glass. The control room shall require a number of windows/ louvers to provide ventilation/ fresh air circulations.

d. 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.

e. Flooring (as per relevant IS codes for selection and laying)

Store area: Cement flooring in concrete mix (1:2:4) using 10 mm aggregates as per IS 2571: 1970
Control Room cum supervisor room: Heavy Duty Vitrified tiles 8 mm thickness

SCADA Room:	: Heavy Duty Vitrified tiles 8 mm thickness
Equipment room:	: Heavy Duty Vitrified tiles 8 mm thickness
Battery Room:	: Acid/ Alkali resistant tiles of suitable thickness
Toilets:	: Ceramic tiles 8 mm thickness
Lobby:	: Vitrified Tiles 8 mm thickness

The floor finishing must include skirting up to a suitable height. The wall tiles, if proposed, shall be glazed tiles of 6 mm thickness and provided up to lintel level.

f. Roofing: The roof of the building shall be insulated and waterproofing shall be done as per relevant IS standard.

g. Plinth Protection: Plinth protection 1000mm wide shall be provided around all the buildings as per relevant standards using brick bats.

h. White washing & colour washing: White washing and colour washing work shall conform to relevant IS codes. The right of selection of colour/ shades shall lies with the Employer. Bidder has to follow respective and relevant IS codes of practice for the finishing process.
   - Internal walls: Acrylic distempering
   - External walls: Heat reflective synthetic enamel
   - MMS foundations and Earth pit enclosures: Cement painting
   - Steel/ Al doors, windows and ventilators: Powder coated paint

i. Rolling Shutters: Rolling shutters made of cold rolled strips shall be conforming to IS 4030 with approved gauge thickness shall be provided with all fixtures, accessories, painting etc. complete with locking facility.

j. Water supply: GI pipes of Medium quality conforming to IS 1239 (Part I) and IS 1795 for Mild Steel pipes shall be used for all water supply and plumbing works.

k. 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.

l. Electrification of Building: Electrification of buildings shall be carried out as per relevant IS standards. The lighting design of the buildings shall be carried out as per

IS 3646. The building shall be provided with adequate quantity of light fittings, 5A/ 15A 1 phase sockets, fans etc., controlled by required ratings of MCBs and MCB, DBs. 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.

m. Toilet: Toilet shall be designed for 15 persons; and constructed with following finish
   - Floor: Vitrified tiles/ ceramic tiles
   - Door: made out of Aluminium sections/ PVC
   - Ventilators: Mechanical exhaust facility
   - Plumbing fixtures: Repute make
   - Sanitary ware: Repute make
   - EWC: 390 mm high with health facet, toilet paper roll holder and all fittings
   - Urinal (430 x 260 x 350 mm size) with all fittings.
   - Wash basin (550 x 400 mm) with all fittings.
   - Bathroom mirror (600 x 450 x 6 mm thick) hard board backing
   - CP brass towel rail (600 x 20 mm) with C.P. brass brackets
   - Soap holder and liquid soap dispenser.
   - GI pipes (B class) of reputed makes
   - Overhead water tank equivalent of 1,000 litre capacity

n. Drainage for Toilets; Drainage pipes shall be of PVC (6 kg/cm2) of repute make. Gully trap, inspection chambers, septic tank for 15 person and soak well to be constructed for above mentioned requirement.

o. Air Conditioner for Control Room: The control room shall be equipped with appropriate numbers of fans for effective heat dissipation. The supervisor room and SCADA cabin shall have split type air conditioning units.

p. Fire Extinguishers: Liquefied CO2 / foam/ ABC type fire extinguisher shall be upright type of capacity 10 kg having IS: 2171. 7, IS: 10658 marked. The fire extinguisher shall be suitable for fighting fire of Oils, Solvents, Gases, Paints, Varnishes, Electrical Wiring, Live Machinery Fires, and all Flammable Liquid & Gas.

q. 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.

r. Sign Boards: The sign board containing brief description of major components of the power plant as well as the complete power plant in general shall be installed at appropriate locations of the power plant as approved by Employer.
   - The Signboard shall be made of steel plate of not less than 3 mm. Letters on the board shall be with appropriate illumination arrangements.
   - Safety signs, building evacuation plan and direction signs, assembly points shall also be placed at strategic locations.
   - The Contractor shall provide to the Employer, detailed specifications of the sign boards.

5.10 Water supply & Cleaning

a. Water used for cleaning purpose shall be fit for cleaning the PV modules, cleaning procedure and pressure requirement shall be as per the recommendation of PV module manufacturer.
b. A suitable arrangement of water shall be ensured to cater the day-to-day requirement of drinking water and needs of Solar Photovoltaic plant during entire O&M period.
c. The Bidder shall estimate the water requirements for cleaning the photovoltaic modules at least once in every week or as per the soiling conditions prevailing at site,

in order to operate the plant at its guaranteed plant performance. Also, bidder is required to plan the water storage accordingly.

d. All necessary arrangement for wet cleaning of the solar panels shall be in the scope of the bidders and accordingly the agency has to provide all the necessary equipment, accessories, tool & tackles, pumps, tankers, tractors and piping arrangement pertaining to module cleaning system.
e. Bidder has to plan and install the effective module cleaning system as per the prevailing conditions at Site. The system may include the storage water tanks, pumps, laying of GI/ HDPE/ UPVC pipes, flexible pipes, taps/ valves, pressure gauges etc. as per the planning by the bidder. Bidder has to submit the drawing/ plan for the proposed module cleaning system.
f. All the pipes thus laid must be buried in ground at least 150mm below FGL. Road crossings and drain crossings, the pipes must be passed through GI/ Hume pipes as applicable.

5.11 Roads within Solar Power Plant

a. Suitable approach road and internal roads (Solar Photovoltaic plant area) to carry safe and easy transportation of equipment and material at the project site shall be made. The road should provide easy and fast approach to each location of the plant. These roads are to be designed optimally to carry the crane load with all necessary chambers, gradients, super elevation, and radius of curvatures for the easy movement of cranes, trucks and public transport.
b. Roads are to be constructed with sufficient width (minimum 3.5m) followed by 0.5m well compacted shoulders on each side. The road must be well compacted as per the relevant IS standards updated till date.
c. All peripheral roads and pathways from central road to Inverter room road shall be WBM road. Also, all cable crossings and other crossings shall be provided with GI/ Hume pipes.

5.12 Peripheral Boundary/ peripheral fencing:

a. The objective to provide a peripheral fencing is to demarcate the boundary and to keep away the unauthorized access to plant. The contractor shall provide GI chain link/ RCC pre cast/ Brick Masonry wall for 0.6 m from GL. all around the periphery of the plant. The fencing height must be minimum of 2 meter from the GL. The boundary wall must be provided with a rugged main entry gate (s). The construction of peripheral fencing/wall and the main entry gate must conform to the relevant IS standards and practice.

b. All the drawings/ specifications for the peripheral fencing/wall and main entry gate design/ planning must be submitted to Employer for approval prior to construction for their accord.

5.13 Drainage

a. The storm water drainage shall be planned for the plant to ensure no water stagnation in the plant. The drains must be constructed with brickwork/ RCC/ RR masonry as suitable for the site conditions. The drains outfall must be connected to the nearest drain outside the plant premises. It is advised that the drainage for the plant must be designed keeping the natural flow of water to the nearest exit point. Rain water harvesting possibility should also be explored to suit site terrain.

b. Bidder is to provide RCC Hume pipe of appropriate size at the crossing of road and drains and at required locations. The peripheral drain may be of brick pitching which is backed up by cement mortar bed and all joints are filled up with cement mortar in

C.M. 1:4, no pointing and plastering is required. Alternate suitable drain can also be explored. Drains are required to provide weep holes with PVC pipes at an interval of 2m. Bidder shall submit the drain plan and drain section details for the complete plot as required for the effective water evacuation to nearest outfall point for suggestion/ approval.

5.14 Painting & Finish:

a. All metal surfaces and support structures shall be thoroughly cleaned of rust, scale, oil, grease, dirt etc. Fabricated structures shall be pickled and then rinsed to remove any trace of acid. The under surface shall be made free from all imperfections before undertaking the finishing coat.

b. After Phosphate treatment, two (2) coats of yellow zinc chromate primer will be applied followed by two (2) coats of epoxy based synthetic enamelled paint. Shade shall be Siemens Grey RAL- 7032. Thickness of paint shall be not less than 75 microns.

c. All unpainted steel parts shall be cadmium plated or suitably treated to prevent rust formation. If these parts are moving elements, then they shall be greased.

5.15 Watchmen / Security Cabin: Contractor shall provide adequate numbers of prefabricated Watchman's portable cabin at strategic locations within the plant. The Minimum size of watchmen's (Security Cabin) cabin is 1.2 metre x 1.8 metre size and height of 2.4 m with appropriate roof at the top. Location of the watch Cabin (Security Cabin) will be as directed by the Employer. The Prefabricated Security Cabin of size 3 metre x 3 metre at the main entrance gate shall be designed and constructed by the Successful Bidder keeping in view the safety and security of the power plant.

5.16 Underground RCC water Tank: Contractor has to estimate the water requirement for cleaning the modules with a frequency of at least once a week or as per the soiling conditions prevailing at site. The frequency of cleaning shall be mutually agreed and approved during the detail engineering in order to achieve the guaranteed performance. The bidder is required to construct overhead PVC water tank/ underground RCC water tank with silting chamber for filtration of the water before the inlet which will match with invert level of Storm water drain. Suitable sized pump shall also be installed to maintain the water pressure at the extreme ends. Design of RCC water tank shall be such that it shall resist Earth pressure and Water pressure and satisfy all IS codes. The design shall be as per relevant IS codes, bidder to take approval from Employer before the construction of water storage tank and module cleaning system.

6. INSPECTION & TESTING: Employer shall have free access to Bidder's manufacturer's works to inspect, expedite and witness shop floor tests. Any materials or work found to be defective or which does not meet the requirements of the specification will be rejected and shall be replaced at Bidder's cost. Employer reserves the right to carry out stage wise inspection of fabrication and components. The Bidder shall furnish a detailed quality assurance plan (QAP) for review by the Employer.

a. The test & inspection shall be carried out at manufacturer's work and at the site with the Bidders obligation. The test and Inspection shall be done in accordance with the relevant standards and the Manufacturer's standard before the delivery to site as well as after the erection and commission at site. The bidders shall give the list of tests that they will carry out at site to show the performance of plant.

b. A detailed 'QAP' for Manufacturing and Inspection shall be submitted by the Bidder for Employer's approval. The data of each test and inspection shall be recorded and

submitted as soon as the test/ trials are conducted and will also be a part of final documentation.

c. 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.

d. The Employer will nominate its representatives (max. of 2 nos.) for inspection of stage manufacturing and testing at works & 7 days training at premises of SPV module and SI manufacturer. The notice of such inspection shall be given 30 days in advance in case of countries outside India and 15 days in India.

e. Manufacturer has to submit procedure for Test carried out at their Factory:
   - Start Up Trials
   - Load Test
   - Records & Measurements
   - Safety Device List
   - Setting values for all sensors for Pressure and Temperature
   - Dimensional Check-up, Overall Inspection, Completeness of Scope of Supply

6.1 Load Trials & Reliability test at Site

a. 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.

b. All the tests which are mentioned in the load test of Solar Power Plant will be carried out in presence of Employers' Representative at Site under site conditions and the parameters checked in accordance with the data sheet and guaranteed parameters given by the Contractor.

c. All the equipment supplied by the vendor will be tested as per relevant standard/ Quality assurance plan at site conditions and the performance monitored.

6.2 Quality Considerations: Contractor will submit and get finalized detailed comprehensive Standard Field Quality Plan (SFQP) within 30 days from date of issue of the order for bought out items and items manufactured by them. The Standard Field Quality Plan shall relate to the specific and objective erection practices right from storage of equipment till final inspection and testing to be followed for bought out items and items manufactured by Contractor. Accordingly, the Manufacturing Quality Plan shall be submitted broadly under following sub-heads: -

- Raw material/Bought Out items and Components.
- In process inspection and test/checks to establish successful completion/ accomplishment of the process.
- Final tests/checks in accordance with relevant national/ international standards/ specification.
- The quantum of check for each and every inspection/test items shall be based on an established sampling method and the quantum of check indicated in the SFQP should be designed adequate quality protection.

- In case reference documents/acceptance norms are indicated as per plant standards then the same shall be duly substantiated/properly explained by well-established and proven engineering practices. All submissions will be in English/Hindi language only.

- Bidder to allow Employer to carry out Quality/Audit/Quality surveillance on bidders and their sub-vendor's work with reference to contractual obligations to ensure that the quality management practices/norms as detailed out in the Quality Manual are adhered to. To facilitate this activity, contractor shall keep Employer informed all progress of work in this contract on monthly basis.

- Contractor will associate/fully witness in each inspection being carried out at their/their subvendor's works by Employer authorized inspection engineer(s).

- Employer shall also carry out quality audit and quality surveillance contractor systems, procedures and quality control activities. However, this shall not relive the contractor of any of his contractual responsibilities under the contract.

6.3 Performance and Functional Warranty / Guarantees

6.3.1 PV modules used in grid connected solar power plants must be warranted for peak output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.

6.3.2 The modules shall be warranted for at least 25 years for failures due to material defects and workmanship.

6.3.3 The mechanical structures, electrical works and overall workmanship of the grid connected solar power plant must be warranted for a minimum of 10 years.

6.3.4 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.

6.3.5 The warranty / guarantee period shall be as follows:

- Solar PV Modules: Modules shall be warranted for a minimum period of 25 years in the Bidder's detailed Warranty / Guarantee certificate.

- Solar Inverters (SI): SIs shall be warranted for a period of minimum 5 years or guarantee period provided by the OEM, whichever is higher.

- Transformers, associated switch gear and others: Bidder must furnish in detail its warranties / guarantees for these items.

- All other associated equipment, not mentioned, but otherwise included in the scope of the contract must be warrantied for minimum 5 years against its performance and workmanship.

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

6.3.7 At the end of guarantee period, the Contractor's liability shall cease. In respect of goods not covered by the first paragraph of this clause, the Employer shall be entitled

to the benefit of such guarantee given to the Contractor by the original Contractor or manufacturer of such goods.

6.3.8 The performance of the plant will be determined by the performance ratio (PR). The same shall be measured and recorded for a period of one month for issuance of completion certificate of the plant as mentioned under performance ratio test procedure (Clause No.4.45 of Chapter IV).

6.3.9 During the first one year of assured performance demonstration and Operation & Maintenance thereafter, the Contractor shall be responsible for any defects in the work due to faulty workmanship or due to use of sub-standard materials in the work. Any defects in the work during the guarantee period shall therefore, be rectified by the Contractor without any extra cost to the Employer within a reasonable time as may be considered from the date of receipt of such intimation from the Employer failing which the Employer shall take up rectification work at the risk and cost of the Contractor.

6.3.10 During the O&M period, the bidder, in concurrence with the Employer, is encouraged to carry out the PR test in similar fashion for a period of 7 days, at regular intervals, in order to check the continued performance of the plant and to determine the necessary steps to meet the CUF commitment. However, for the O&M period committed CUF shall only be considered. CUF shall be determined for every year for the performance obligations of the Contract.

CHAPTER - V

ANNEXURES AND FORMATS

ANNEXURE "D"

Special Conditions of Contract

1. **Project description:** The main objective of this project is to Design, engineering, manufacture, procure, supply, erection, testing and commissioning of Grid-Connected Solar Photovoltaic Power Plant with all associated infrastructure and with 5 (five) years' comprehensive operation & maintenance after the one-year performance demonstration period of the same with effect from date of commissioning on turnkey basis at Project Site.

2. **Appointing Authority:** Appointing Authority of arbitrator is "The Chairman cum Managing Director, MOIL LTD., Nagpur".

3. **Training of Employer's Personnel:** On successful commissioning of the plant, the Bidder shall provide training on Plant operations and maintenance to a team of 5-6 personnel (Engineers and Technician/Operators) as nominated by MOIL.

4. **Performance Guarantee**

4.1 The plant performance will be evaluated through Performance Ratio (PR) test as per IEC 61724 and Capacity Utilization Factor (CUF) calculation as per the formulas and procedures mentioned under Clause No.4.45 of Chapter IV.

4.2 The minimum acceptable Performance Ratio (PR) of the plant is 0.75 and CUF shall be 18% against installed rated DC capacity at STC and 21% of the rated output AC capacity of 15 MW with a DC / AC ratio of 1.2

4.3 The performance of plant will be evaluated based on minimum CUF demonstrated at the end of every year from the date of commissioning till the culmination of the O&M period. During this period, the contractor shall operate and maintain the plant with full reliability and up keep.

4.4 During O&M contract, the plant performance will be evaluated based on annual Capacity Utilization Factor. Second year onwards linear degradation of the module output (i.e.0.75% per year) shall be considered for the calculated CUF every year.

4.5 During the O&M period, the bidders need to maintain 99% uptime of the plant to achieve the proposed CUF at the end of each year. Any repair, replacement, overhauling, etc. are to be performed during night times so that no generation loss will be there in day time.

4.6 Bidders are expected to make their own study of solar radiation profile and other related parameters of the area & make sound commercial judgment about the Performance Ratio and CUF. It shall be the responsibility of the Bidder to access the corresponding solar insolation values and related factors of solar plant along with expected grid availability. The Bidder should access all related factors about the selected Site for the Project before giving commitments of PR and CUF of the proposed Project.

4.7 The bidders are free to install additional DC capacity any time during O&M period, with proper consent by the Employer, to meet the desired performance parameters with no additional cost to the Employer.

4.8 The Contractor shall be responsible for achieving PR and CUF. For any shortfall in achieving PR and CUF, compensation shall be recovered from the Contractor as per chapter V, Clause 15 of Annexure - D.

5 Project Time lines: The time lines for execution of the contract is 150 days from the date of award of LOI and the bidder shall submit the indicative milestones as per below format.

Timelines for Scope of work

No.	Stage	Reference from D
1	Issue of LOI/ NTP	Zero Date (D)
2	Site Development Work	
3	Approval of Major drawings	
4	Completion of Civil work	
5	Completion of supply of major equipment like SPV Modules (including structure for the above), Solar Inverters, transformers etc.	
6	Installation of all major equipment	
7	Interconnection of all major equipment and completion of installation	
8	Completion, testing and commissioning of Solar PV power plant	
9	Operational Acceptance (PR test demonstration)	
10	Assured Performance Guarantee from OA	

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

7 Starting of Work: The Contractor shall be required to start the work within 20 days from the date of issue of Letter of Intent (LOI) and shall thereof, report to the MOIL accordingly.

8 Site Inspection & Basis of Bid: The volume and quantity of work indicated in schedule of works may vary. The Contractor should visit the Site before quoting rate for civil works. After taking in to consideration all aspects of the site, condition of soil etc., the Contractor should quote for civil works. No extra claim will be entertained at post bidding stage. The foundation design of module structure and the building shall have to be approved by the Employer. In case of any defects arising in the building during guarantee period, the Contractor shall have to rectify the same at its own cost.

9 Procurement of Materials: The Contractor shall procure all necessary material required for the project work and arrange to store them properly. Test certificate in accordance with the specifications are to be furnished by the Contractor to the Employer for approval in respect of the materials procured by the Contractor. Contractor shall

furnish all the documents related including GR/LR/RR along with the supplier invoices as a proof of the purchase along with the bill / invoice raised by the contractor.

10 **Notice of Operation:** The Contractor shall not carry out important operation, (during construction/commissioning/ trial run etc.) commissioning without the consent in writing of the Employer or his representative. For carrying out such important activity, the Contractor shall intimate to the Employer at least 72 hours before starting of the job.

11 **Rejection of Materials:** The Project Manager's decision in regard to the quality of the material and workmanship will be final. The Contractor at its own cost and risk without any compensation shall immediately remove any material rejected by the Project Manager from the Site of work.

12 **Labour Engagement:** The Contractor shall be responsible to provide all wages and allied benefits to its labours engaged for execution of the project work and also to carry out Operation & Maintenance service. The Contractor shall remain liable to the authorities concerned for compliance of the respective existing rules and regulations of the government for this purpose and shall remain liable for any contravention thereof. The contractor is encouraged to use local manpower as per the local statutory (labour) requirement, if any.

13 **Handing Over –Taking Over:** The work shall be taken over by the Employer upon successful completion of all tasks to be performed at Site(s) on equipment supplied, installed, erected and commissioned by the contractor in accordance with provision of NIT. During handing over complete project work, the Contractor shall submit the following for considering final payment:

a) All as- Built Drawings and documents as per the contract coordination procedure set out for the successful completion of the project.
b) Detailed Engineering Document with detailed specification, schematic drawing, circuit drawing, cable routing plans and test results, manuals for all deliverable items, Operation, Maintenance & Safety Instruction Manual and other information about the project.
c) Bill of material.
d) Inventory of recommended and mandatory spares at project Site.
e) Immediately after taking over of complete facilities (s), the same will be handed over to the Contractor for Operation & Maintenance for the period as mentioned in the bidding document.

15. Liquidated Damages (LD) for PR and CUF deviations

a) During the Operational Acceptance any shortfall in the Performance Ratio (PR) as determined through the PR Test Procedure specified in Clause No.4.45 of Chapter IV of Technical Specification, will attract imposition of liquidated damages. For every 0.01 shortfall in PR below 0.75 by the bidder, a LD of 1% of the total Contract Value shall be levied. In case the Plant PR result is 0.05 below 0.75, i.e., 0.70 or lower, the total performance bank guarantee submitted by the bidder will be encashed. In case the Performance guarantee has already been encashed on account of delays, the due amount will be recovered from the Final Instalment of the EPC payable at the end of warrantee period (as per the Terms of Payment specified in Clause 55 of Chapter II).

b) In case of any defect in the system after commissioning, the Contractor shall repair it within 48 hours. Otherwise, LD shall be charged for shortfall in generated units beyond 48 hours' as per (Average prevailing tariff of MPPKVVCL/ MPEB of

Electricity Board), shall be deducted from their payments due / Bank guarantee submitted to the Employer.

c) Liquidity Damages for committed CUF during one year's assured performance guarantee and O&M period of 5 years shall be charged at a rate of Difference in units derived from committed and achieved CUF x Rs. per unit (Average prevailing tariff of MPPKVVCL/ MPEB of Electricity Board), for period after commissioning till the O&M contract closure on annual basis. However, LD so calculated shall be restricted to 50% of annual COMC charges of the corresponding year. The CUF shall be evaluated as per the formula mentioned at Clause 15 of Chapter III of this NIT.

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

16 Miscellaneous

16.1 Based on reviewing the Project, if the progress is below expectation as demanded by the Employer, then, the employer reserves right to reduce the Scope of the Contractor in part or full and assign the same to other contractor(s) and get the work done at the risk and cost of the existing Contractor.

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

16.3 All the temporary facilities constructed for the purpose of execution of the contract shall be removed after taking necessary permissions from the Employer immediately after Operational Acceptance.

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

FORMATS

1. FORMAT OF EXPERIENCE OF SIMILAR WORK

TABLE – I

(TO BE FILLED & UPLOADED ALONG WITH PART-I BY BIDDER)

DETAILS OF PREVIOUS EXPERIENCE OF SIMILAR WORK

Sr. No	Organization	Quantum of Work (MT.)	Value of work (Rs.)	Duration of work	Whether completed or in progress	Delay, if any from schedule completion date	Penalty / Bonus if any	Name, Postal address Tel. No. Fax-No. e-mail, website:

Responsibility	Design & Construction	
	Operation & Maintenance	
License of registration		
Bankers name & address		

Turnover (in……)	FY 2021-22	FY 2022-23	FY 2023-24

Authorized signatory of the Contractor

Full Address

Dated:

2. FORMAT OF INTEGRITY PACT

INTEGRITY PACT

This pre-bid pre-contract Agreement (hereinafter called the Integrity Pact) is made **on day of bid submission**, between on one hand, MOIL Limited (hereinafter called the "BUYER / Principal", which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns) of the First Part **and Undersigned who is authorized to sign the bid** (hereinafter called the "BIDDER/Seller/Contractor" which expression shall mean and include, unless the context otherwise requires, his successors and permitted assigns) of the Second Part.

WHEREAS the BUYER proposes to procure the tendered Stores/Equipment / Items / Goods and the BIDDER / Seller is willing to offer/has offered the stores and

WHEREAS the BIDDER is a private company / public company / GoV. undertaking / partnership/registered export agency, constituted in accordance with the relevant law in the matter and the BUYER is a Central Public Sector Unit.

The Pact essentially envisages an agreement between the prospective bidders and the buyer, committing the persons/officials of both sides, not to resort to any corrupt practices in any aspect/stage of the contract. Only those bidders, who commit themselves to such a Pact with the buyer, would be considered competent to participate in the bidding process. In other words, entering into this Pact would be a preliminary qualification.

The parties hereto hereby agree to enter into this Integrity Pact and agree as follows:

Section 1 – Commitments of the Principal:

i. Not to seek or accept any benefit, which is not legally available;

ii. Principal to treat all bidders with equity and reason;

Section 2 - Commitments of the Bidder(s)/ Contractor(s):

i. Not to offer any benefit to the employees of the principal not available legally;

ii. Bidders not to enter into any undisclosed agreement or understanding with other bidders with respect to prices, specifications, certifications, subsidiary contracts, etc.

iii. Bidders not to pass any information provided by Principal as part of business relationship to others and not to commit any offence under PC/ IPC Act;

iv. Foreign bidders to disclose the name and address of agents and representatives in India and Indian Bidders to disclose their foreign principals or associates;

v. Bidders to disclose the payments to be made by them to agents / brokers or any other intermediary;

vi. Bidders to disclose any transgressions with any other public/government organization that may impinge on the anti-corruption principle. The date of such transgression, for the purpose of disclosure by the bidders in this regard, would be the date on which cognizance of the said transgression was taken by the

competent authority. The period for which such transgression(s) is/are to be reported by the bidders shall be the last three years to be reckoned from date of bid submission. The transgression(s), for which cognizance was taken even before the said period of three years, but are pending conclusion, shall also be reported by the bidders.

Section 3 - Disqualification from tender process and exclusion from future contracts

1) Any violation of Integrity Pact would entail disqualification of the bidders and exclusion from future business dealings, as per the existing provisions of GFR, 2017, PC Act, 1988 and other Financial Rules/Guidelines etc. as may be applicable to the organization concerned.

2) If the Bidder, before contract award, has committed a transgression through a violation of Section2 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 tender process or to terminate the contract, if already signed, for such reason.

3) If the Bidder/Contractor/Supplier has committed a transgression through a violation of Section2such as to put his reliability or credibility into question, the Principal is also entitled toexclude the Bidder / Contractor / Supplier 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 and the amount of the damage. The exclusion will be imposed for a minimum of 6 months and maximum of 3 years.

4) A transgression is considered to have occurred if the principal, after due consideration of available facts and evidences within his / her knowledge concludes that there is a reasonable ground to suspect violation of any commitment listed under Section 2 i.e. “Commitments of Bidder(s) /Contractor(s).

5) The Bidder accepts and undertakes to respect and uphold the principal’s absolute right to resort to and impose such exclusion and further accepts and undertakes not to challenge or question such exclusion on any ground, including the lack of any hearing before the decision to resort to such exclusion is taken. This undertaking is given freely and after obtaining independent legal advice.

6) If the Bidder / Contractor / Supplier 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 prematurely.”

Section 4 - Compensation for Damages

1) If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.

2) If the Principal has terminated the contract according to Section 3, or if the principal isentitled to terminate the contract according to Section 3, the principal shall be entitled to demand and recover from the Contractor liquidated damages of the Contract value of the amount equivalent to Performance Bank Guarantee.

Section 5 - Previous transgression

1) The Bidder declares that no previous transgressions occurred in the last three years with any other Company in any country conforming to the anti-corruption approach or with any Public Sector Enterprise in India that could justify his exclusion from the tender process.

2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action can be taken as per the procedure mentioned in "Guidelines on Banning of business dealings".

Section 6 - Equal treatment in case of Joint venture / Subcontractors

1) In case of Joint venture, all the partners of the joint venture should sign the integrity pact.

2) In case of Sub-contracting, the Principal Contractor shall take the responsibility of the adoptionof Integrity Pact by the Sub-contractor.

3) It is to be ensured that all subcontractors also sign the IP. The IP will be a tripartite arrangement to be signed by the organization, the contractors and the subcontractors.

Section 7 - Independent External Monitor

1) IP would be implemented through a panel of 2 (two) Independent External Monitors appointed by MOIL Limited as per the nomination received from CVC from the IEMs panel maintained by it. The IEM would review independently and objectively, whether and to what extent parties have complied with their obligations under the Pact on receipt of any complaint by them from the bidder(s).

2) The IEMs shall examine all the representations/grievances/complaints received by them from the bidders or their authorized representative related to any discrimination on account of lack of fair play in modes of procurement and binding systems, tendering method, eligibility conditions, bid evaluation criteria, commercial terms & conditions, choice of technology/specifications etc.

3) For ensuring the desired transparency and objectivity in dealing with the complaints arising out of the tendering process, the matter would be examined by both IEMs jointly, who would look into the records, conduct an examination, and submit their joint recommendations to the Management. In case the both IEMs are not available due to some unavoidable reasons, the available IEM will conduct examination of the complaints. Consent of other IEM(s), who may not be available, shall be taken on record.

4) The role of IEM is advisory and the advice of IEM is non-binding on the organization.

5) The IEMs would be provided access to all documents/records pertaining to the tender for which a complaint or issue is raised before them, as and when warranted.

6) In the event of any dispute between the management and the contractor relating to those contracts where Integrity Pact is applicable, in case, both the parties are

agreeable, they may try to settle dispute through mediation before the panel of IEMs in a time bound manner. If required, the organizations may adopt any mediation rules for this purpose. However, not more than five meetings shall be held for a particular dispute resolution. The fees/expenses on dispute resolution shall be equally shared by both the parties.

In case, the dispute remains unresolved even after mediation by the panel of IEMs, the organization may take further action as per the terms & conditions of the contract.

7) The IEMs would also be required to sign a declaration of absence of conflict of interest. A person acting as an IEM shall not be debarred from taking up other assignments such as consultancy with other organizations or agencies subject to his declaring that his / her additional assignment does not involve any conflict of interest with existing assignment, and it is not a full time assignment. In case of any conflict of interest arising at a later date from an entity wherein he is or has been a consultant, the IEM should inform CMD/MOIL and recuse himself/herself from that case,

Section 8 - Pact Duration

Integrity Pact, in respect of a particular contract, shall be operative from the date IP is signed by both the parties. It expires for the Contractor 12 months after the last payment under the contract, and for all other Bidders 6 months after the contract has been awarded. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings. If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged / determined by CMD, MOIL Limited.

Section 9 - Other provisions

i. Integrity Pact is Pact of the contract and both bidder and the principal and bound by its provisions

ii. In the event of any contradiction between the Integrity Pact and its Annexure, the Clause in the Integrity Pact will prevail.

iii. A person signing IP shall not approach the Courts while representing the matters to IEMS and he / she will await their decision in the matter.

Section 10- Facilitation of Investigation

The IEMs would be provided access to all documents/records pertaining to the tender for which a complaint or issue is raised before them, as and when warranted.

Section 11- Law and Place of Jurisdiction

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the BUYER.

Section 12 - Other Legal Actions.

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil orcriminal proceedings.

(For & On behalf of Bidder/Contractor)

For the BUYER	For the BIDDER
Name of the Officer_____	Name of the Officer_____
Designation_____ _	Designation_____ _
MOIL Limited	Name of the Company_____
Witness:	Witness:
Name_____ __	Name_____ __
Designation_____ _	Designation_____ _
Name of the Company_____	Name of the Company_____

3. FORMAT FOR COVERING LETTER

LETTER WITH TENDER

To,
The Jt. General Manager (Elect),
MOIL LIMITED,
MOIL Bhawan, 1-A, Katol Road,
Nagpur - 440013 (Maharashtra).

Dear Sir,

Sub: Tender for Design, Engineering, Procurement & Supply, Construction, Erection, Testing & Commissioning of Ground Mounted and Comprehensive Operation & Maintenance for 5 Years of Solar PV Project of Capacity 15 MW(AC) at Rajgarh Khas in Madhya Pradesh.

I / We offer to execute the works of Design, Engineering, Procurement & Supply, Construction, Erection, Testing & Commissioning of Ground Mounted and Comprehensive Operation & Maintenance for 5 Years of Solar PV Project of Capacity 15 MW(AC) at Rajgarh Khas in Madhya Pradesh, indicated in the Tender Notice at the rates quoted and hereby bind myself / ourselves to complete the work as per completion time stipulated in the Tender Notice.

I / We …… ……... ……. ……... .. . ……. have read all the conditions of N.I.T. attached hereto and agreed to abide by such conditions.

I / We bind myself / ourselves to furnish the required security deposit within two weeks and execute an agreement in the Proforma of Company and commence the work in one month of acceptance of the Tender by the Company failing which, I / We shall have no objection to forfeiture of the earnest money amount of Rs. ……. .. . .. …… (Rupees … ……. ……. ...) deposited with the Company.

Contractor's Address: Signature of Contractor

Date : …… …….

Signature of Witness.

a. …….. …….

b. ……

DECLARATION:

1. I / We certify that I / We did not retire as an employee (s) MOIL or any Public Sector Undertaking during the last two years. I/We also certify that I/We have neither such a person under my / our employment nor shall I / We employ any such person within two years of his retirement from MOIL or any other Public Sector Undertakings except with the prior permission of MOIL.

2. I / We Certify that none of the Partner / Directors retired as an employee of MOIL or any other Public Sector Undertakings during the last two years. I /We also certify that in case of any such person is proposed to be inducted by us as Partner / Directors prior permission of MOIL will be obtained.

3. I / We also certify that we do not have in our employment any person, dismissed from service, by MOIL or any other Public Sector Undertakings. In case such a person is proposed to be employed by me/us in future, prior permission of MOIL would be obtained.

4. I/We declare that I or none of our partners are relatives of any Executive working in MOIL.

5. I have read the above instructions as well as the contents of part I of the tender and understood the same. In acceptance thereof, I sign hereunder.

Authorized signatory

4. FORMAT FOR UNDERTAKING TO BE SUBMITTED/UPLOADED BY BIDDER ALONG WITH THE TENDER DOCUMENTS

I …… (Name and Designation) appointed as the attorney/ authorized signatory of the bidder (including its constituents) M/s. …… (hereinafter called the bidder) the purpose of the Tender Documents for ……...as per the tender No……..…… of ……. (MOIL), do hereby solemnly affirm and state on the behalf of the bidder including its constituents as under:

1. I/We the bidder(s) am/are signing this document after carefully reading the contents of the above-mentioned tender.

2. I/We declare and certify that I/we have not made any misleading or false representation anywhere in the tender submitted including the annexures thereto.

3. I/We also understand that my/ our offer will be evaluated based on the documents/ credentials submitted along with the offer and same shall be binding upon me/us.

4. I/We declare that the information and documents submitted along with the tender documents by me/ us are complete and correct and I/we are fully responsible for the authenticity and correctness or the information and documents, submitted by us.

5. I/We understand that at any time during process for evaluation of tenders, if any information / document submitted by me / us are found to be suppressing facts / forged / false / fabricated / fudged or incorrect, it shall lead to forfeiture of the EMD, if submitted, besides banning under the extant Guidelines for Banning of Business Dealings of MOIL and initiating any legal action as deemed fit the MOIL. Further, I/we..... (Name of the Bidder) and all my/ our constituents understand that my/ our offer shall be summarily rejected.

6. I/We also understand that at any time after award of contract, if the certificate(s) submitted by me / us are found to be suppressing facts / false/ forged/ fabricated / fudged or incorrect, it may lead to termination of the contract, along with forfeiture of EMD / SD and Performance Guarantee if submitted, besides any other action provided in the contract including banning under the extant Guidelines for Banning of Business Dealings of MOIL and initiating any legal action as deemed fit by MOIL.

SEAL AND SIGNATURE OF THE BIDDER

Place & Date:

5. FORMAT OF NON-COLLUSIVE TENDERING CERTIFICATE

(To be signed by an authorized person on the Tenderer's behalf)

To,

MOIL Limited,

Nagpur

Dear Sir/ Madam,

Non-Collusive Tendering Certificate for (RFQ/ Tender No. ……... Date ……)

1. We, (name(s) of the tenderer(s)) of (address (es) of the tenderer(s)) refer to the bid/ offer against (the "Tender").

2. **Non-collusion**

   We represent and warrant that in relation to the Tender:

   (a) Our bid was developed genuinely, independently and made with the intention to accept the Contract it awarded;

   (b) Our bid was not prepared with any agreement, arrangement, communication, understanding, promise of undertaking with any person (including any other tenderer or competitor) regarding:

   i) prices;
   ii) methods, factors or formulas used to calculate prices;
   iii) an intention or decision to submit a bid;
   iv) an intention or decision to withdraw a bid;
   v) the submission of bid that does not conform with the requirements of the tender;
   vi) the quality, quantity, specifications or delivery particulars of the products or services to which this tender relates; and
   vii) the terms of the bid, and we undertake that we will not, prior to the award of the Contract, enter into or engage in any of the foregoing.

3. **Disclosure of in case of Job/ Project Contracts:**

   We understand that we are required to disclose all intended sub-contracting arrangements relating to the Tender to the proposed site --------, of MOIL Limited, Place ----------, including those which are entered into after the Contract is awarded. We warrant that we have duly disclosed and will continue to disclose such arrangements to the proposed site --------, of MOIL Limited, Place --.

4. **Consequences of breach or non-compliance:**

   We understand that in the event of any breach or non-compliance with any warranties or undertakings in this certificate, the proposed site, of MOIL Limited, Place may, at its discretion, invalidate our bid, exclude us

   in future tenders, pursue damages or other forms of redress from us (including but not limited to damages for delay, costs and expenses of re-tendering and other costs incurred), and /or (in the event that we are awarded the Contract) terminate the Contract.

Signed for and on behalf of the (tenderer)

Signature:

Name:

Position:

Date:

Note:

Para 2 (b) is not applicable to Agreements, arrangements, communications, understandings, promises or undertakings with:

a) the proposed site, of MOIL Limited, Place - _____;

b) consultants provided that the communications are held in strict confidence and limited to the information required to facilitate that particular consultancy arrangement or sub-contract;

c) professional advisers, provided that the communications are held in strict confidence and limited to the information required for the adviser to render their professional advice in relation to the Tender;

d) insurers or brokers for the purpose of obtaining an insurance quote, provided that the communications are held in strict confidence and limited to the information required to facilitate that particular insurance arrangement; and

e) Banks for the purpose of obtaining financing for the contract, provided that the communications are held in strict confidence and limited to the information required facilitating that financing.

ANNEXURES

Appendix 1:	Details of qualified technical staff
Appendix 2:	Undertaking for Compliance of Adhar Number
Appendix 3:	Format of Bank Guarantee for EMD
Appendix 4:	Format of Bank Guarantee for Security Deposit
Appendix 5:	Format of Bank Guarantee for Performance of Project works
Appendix 6:	Format of Bank Guarantee for Performance of O&M
Appendix 7:	Contract Agreement
Appendix 8:	Price Bid Format (Annexure – ‘F’)

Appendix 1: Details of qualified technical staff

S. No.	*Name*	Relevant Qualification	Additional Certifications	Total Years of relevant Experience	Remarks
1.					
2.					
3.					
4.					

Signature: **Designation:**

Name: **Organization:**

Address: **Phone:**

Email: **Seal of the Company**

Appendix 2:

UNDERTAKING FOR COMPLIANCE OF ADHAR NUMBER

I /We / M/s (Name of contractor)----------, the proprietor / owner / partner / Director of the firm / Company (Name of the firm / company)---------- do hereby confirm that after the award of the work in our favour against the subject NIT, we will mandatorily implement / observe and follow that while employing the labours / employees for the awarded work of the work order against the NIT No.---------- Date---------- , we will give preference to those employees who either have Adhar Number or have applied for Adhar Card or have agreed to apply for Adhar Card, so as to establish their genuineness and enable payments directly through Adhar Payment Bridge.

I /We / am / are aware that non-submission of this undertaking will result in rejection of my offer. Further the company will be at liberty to take appropriate action including suspension of work of the contractor / termination of the contract at any stage of the work in the event of non-compliance with the NIT condition.

Signature

Name of the tenderer / firm

Seal

Date

Appendix 3: Format of Bank Guarantee

(BANK GUARANTEE ON NON-JUDICIAL STAMP PAPER OF APPROPRIATE VALUE)

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

Ref._____Bank Guarantee No._____Date:_____

BID BOND BANK GUARANTEE FORMAT FOR TENDER /NIT No.

In consideration of the ----------[Insert name of the Bidder] (hereinafter referred to as 'Bidder') submitting the response to NIT inter alia for Engineering, Procurement, Construction, Commissioning, _____ Power Plants coming at the Rajgarh Khas in Madhya Pradesh, in response to the NIT No._____dated ____ issued by MOIL Limited (hereinafter referred to as MOIL) and MOIL considering such response to the NIT of ……[insert the name of the Bidder] as per the terms of the NIT, the _____ [insert name & address of bank] hereby agrees unequivocally, irrevocably and unconditionally to pay to MOIL at [Insert Name of the Place from the address of MOIL] forthwith on demand in writing from MOIL or any Officer authorized by it in this behalf, any amount up to and not exceeding Rupees ---------- only, on behalf of M/s. _____[*Insert name of the Bidder*]

This guarantee shall be valid and binding on this Bank up to and including _____ [insert last date of validity i.e. 210 days] and shall not be terminable by notice or any change in the constitution of the Bank or the term of contract or by any other reasons whatsoever and our liability hereunder shall not be impaired or discharged by any extension of time or variations or alternations made, given, or agreed with or without our knowledge or consent, by or between parties to the respective agreement.

Our liability under this Guarantee is restricted to Rs._____ (Rs._____ only). Our Guarantee shall remain in force until _____ [insert date of validity].

MOIL shall be entitled to invoke this Guarantee till _____ [Insert date which is 30 days after the date in the preceding sentence].

The Guarantor Bank hereby agrees and acknowledges that the MOIL shall have a right to invoke this BANK GUARANTEE in part or in full, as it may deem fit.

The Guarantor Bank hereby expressly agrees that it shall not require any proof in addition to the written demand by MOIL, made in any format, raised at the above-mentioned address of the Guarantor Bank, in order to make the said payment to MOIL.

The Guarantor Bank shall make payment hereunder on first demand without restriction or conditions and notwithstanding any objection by ---------- [Insert name of the selected Contractor] and/or any other person. The Guarantor Bank shall not require MOIL to justify the invocation of this BANK GUARANTEE, nor shall the Guarantor Bank have any recourse against MOIL in respect of any payment made hereunder

This BANK GUARANTEE shall be interpreted in accordance with the laws of India and the courts at Nagpur shall have exclusive jurisdiction.

The Guarantor Bank represents that this BANK GUARANTEE has been established in such form and with such content that it is fully enforceable in accordance with its terms as against the
Guarantor Bank in the manner provided herein.

This BANK GUARANTEE shall not be affected in any manner by reason of merger, amalgamation, restructuring or any other change in the constitution of the Guarantor Bank.

This BANK GUARANTEE shall be a primary obligation of the Guarantor Bank and accordingly MOIL 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 MOIL or to exercise, levy or enforce any distress, diligence or other process against the selected Contractor.

The Guarantor Bank acknowledges that this BANK GUARANTEE is not personal to MOIL and may be assigned, in whole or in part, (whether absolutely or by way of security) by MOIL to any entity to whom MOIL is entitled to assign its rights and obligations.

Notwithstanding anything contained hereinabove, our liability under this Guarantee is restricted to Rs. _____ (Rs. _____ only) and it shall remain in force until …….... We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if MOIL serves upon us a written claim or demand.

INSTRUCTIONS FOR FURNISHING BANK GUARANTEE

- The Bank Guarantee by Bidders will be given on non-judicial stamp paper as per stamp duty applicable at the place where the tender has emanated. The non-judicial stamp paper should be in name of the issuing bank.

- The Bank Guarantee by Bidder will be given from bank as per Schedule 1: List of Banks only.

- This bank guarantee/ all further communication relating to the bank guarantee should be forwarded to **Senior Jt.GM (CMC), MOIL Limited, MOIL Bhawan, A-, Katol Road, Nagpur – 440013** only.

- The full address along with the Telex/Fax No. and email address of the issuing bank to be mentioned.

Appendix 4: Format of Bank Guarantee for Security Deposit

BANK GUARANTEE FOR SECURITY DEPOSIT

……. (name & address of the Purchaser Company)

Re: Bank Guarantee in respect of Agreement dated …… Day of …….20……. between ……. (Name of Purchaser Company) and..... (Name of Supplier Company)

Messrs, ……... a Company / Firm having its office at No. ……hereinafter called the Contractor has entered into an agreement dated …… (hereinafter called 'the said agreement') with ……. (Name of Purchaser Company) hereinafter called ('the Company') to supply ……. stores/materials amounting to Rs. …….. on the terms and conditions contained in the said agreement.

It has been agreed that ……..……... (..... percent) payment or the value of the stores/materials will be made to the Contractor in terms of the said agreement on the contractors furnishing to the company a bank guarantee for the sum or Rs. ……...as security for due repayment of the said sum in terms or the said agreement, and also interest as therein provided.

The ……. (Name of the Bank) having its Office at ……... has at the request of the Contractor agreed to give the guarantee as hereinafter contained.

We ……. (Name of the Bank) hereinafter called 'the Bank') do hereby unconditionally agree with the Company that if the Contractor shall in any way fail to observe or perform the terms and condition of the said agreement regarding repayment of the said sum of Rs. ..... or any of them including the term for payment of interest for delay in deliveries or shall commit any breach of its obligations thereunder, the Bank shall on demand and without any objection or demur pay to the Company the said sum of Rs. …… or such portion as shall then remain unpaid with interest without requiring the company to have recourse to any legal remedy that may be available to it to compel the Bank to pay the same, or calling on the company to compel such payment by the contractor.

Any such demand shall be conclusive as regards the liability of the Contractor to the company and as regards the amount payable by the Bank under this guarantee. The Bank shall not be entitled to withhold, payment on the ground that the contractor has disputed its liability to pay or has disputed the quantum of the amount or that any arbitration proceeding or legal proceeding is pending between the Company and the contractor regarding the claim.

We, the Bank-further agree that the guarantee shall come into force from the date hereof and shall remain in full force and effect till the period that will be taken for the performance of the said agreement which is likely to be the..... day of……..... but if the period of agreement is extended either pursuant to the provisions in the said agreement or by mutual agreement between the contractor and the Company the Bank shall renew the period of the guarantee failing which it shall pay to the Company the said sum of Rs. ..... or such lesser amount out of the said sum of Rs. ..... as may be due to the Company and as the Company may

demand. This guarantee shall remain in force until the dues of the Company in respect of the said sum of Rs. …….. and interest are fully satisfied and the company certifies that the agreement regarding re-payment of the said sum of Rs. ……. has been fully carried out by the contractor and discharges the guarantee.

The Bank further agrees with the Company that the Company shall have the fullest liberty without the consent of the Bank and without affecting in any way the obligations hereunder to vary any of the terms and conditions of the said agreement or to extend the time for performance of the said agreement from time to time or to postpone for any time or from time to time any of the powers exercisable by the Company against the contractor and to forbear to enforce any of the terms and conditions relating to the said agreement and the Bank shall not be relieved from its liability by reason of such failure or extension being granted to the contractor or through any forbearance, act or omission on the part of the Company or any indulgence by the Company to the contractor or any other matter or thing whatsoever which under the law relating to sureties would but for this provisions have the effect of relieving or discharging the Guarantor.

The Bank further agrees that in case this guarantee is required for a longer period and it is not extended by the Bank beyond the period specified above the Bank shall pay to the Company the said sum of Rs. …….. or such lesser sum as may then be due to the Company out of the said advance of Rs. …… and as the Company may require. Notwithstanding anything herein contained the liability of the Bank under this guarantee is restricted to Rs..... only. The guarantee shall remain in force till the ……day of .....and unless the guarantee is renewed or a claim is preferred against the Bank within 6 months from the said date all rights of the company under this guarantee shall cease and the Bank shall be released and discharged from all liability hereunder except as provided in the preceding clause.

The Bank has under its constitution power to give this guarantee and …… (Name of the person) who has signed it on behalf of the Bank has authority to do so.

The details of beneficiary bank for sending details of BG under SFMS Platform is furnished below

Name of the Bank: -……

Branch: - ……

IFSC: - ……

A/c No: - ……

Customer ID: - ……

Dated this.....Day of……. 20……...

Place..... Signature of the authorized person
For and on behalf of the Bank

Appendix 5: Format of Performance Bank Guarantee

Performance Bank Guarantee Format

……. (name & address of the Purchaser Company)

Re: Bank Guarantee in respect of Agreement dated …… Day of …….20……. between ……... (Name of Purchaser Company) and..... (Name of Supplier Company)

Messrs, ……... a Company / Firm having its office at No. ……..……hereinafter called the Contractor has entered into an agreement dated …… (hereinafter called 'the said agreement') with …… (Name of Purchaser Company) hereinafter called ('the Company') to supply ……..……. stores/materials amounting to Rs. …….. on the terms and conditions contained in the said agreement.

It has been agreed that ……..……. (..... percent) payment or the value of the stores/materials will be made to the Contractor in terms of the said agreement on the contractors furnishing to the company a bank guarantee for the sum or Rs. ……as security for due repayment of the said sum in terms or the said agreement, and also interest as therein provided.

The ……. (Name of the Bank) having its Office at ……... has at the request of the Contractor agreed to give the guarantee as hereinafter contained.

We ……. (Name of the Bank) hereinafter called 'the Bank' do hereby unconditionally agree with the Company that if the Contractor shall in any way fail to observe or perform the terms and condition of the said agreement regarding repayment of the said sum of Rs. ..... or any of them including the term for payment of interest for delay in deliveries or shall commit any breach of its obligations thereunder, the Bank shall on demand and without any objection or demur pay to the Company the said sum of Rs. …… or such portion as shall then remain unpaid with interest without requiring the company to have recourse to any legal remedy that may be available to it to compel the Bank to pay the same, or calling on the company to compel such payment by the contractor.

Any such demand shall be conclusive as regards the liability of the Contractor to the company and as regards the amount payable by the Bank under this guarantee. The Bank shall not be entitled to withhold, payment on the ground that the contractor has disputed its liability to pay or has disputed the quantum of the amount or that any arbitration proceeding or legal proceeding is pending between the Company and the contractor regarding the claim.

We, the Bank-further agree that the guarantee shall come into force from the date hereof and shall remain in full force and effect till the period that will be taken for the performance of the said agreement which is likely to be the..... day of……..... but if the period of agreement is extended either pursuant to the provisions in the said agreement or by mutual agreement between the contractor and the Company the Bank shall renew the period of the

guarantee failing which it shall pay to the Company the said sum of Rs. ..... or such lesser amount out of the said sum of Rs. ..... as may be due to the Company and as the Company may demand. This guarantee shall remain in force until the dues of the Company in respect of the said sum of Rs. …….. and interest are fully satisfied and the company certifies that the agreement regarding re-payment of the said sum of Rs. ……. has been fully carried out by the contractor and discharges the guarantee.

The Bank further agrees with the Company that the Company shall have the fullest liberty without the consent of the Bank and without affecting in any way the obligations hereunder to vary any of the terms and conditions of the said agreement or to extend the time for performance of the said agreement from time to time or to postpone for any time or from time to time any of the powers exercisable by the Company against the contractor and to forbear to enforce any of the terms and conditions relating to the said agreement and the Bank shall not be relieved from its liability by reason of such failure or extension being granted to the contractor or through any forbearance, act or omission on the part of the Company or any indulgence by the Company to the contractor or any other matter or thing whatsoever which under the law relating to sureties would but for this provisions have the effect of relieving or discharging the Guarantor.

The Bank further agrees that in case this guarantee is required for a longer period and it is not extended by the Bank beyond the period specified above the Bank shall pay to the Company the said sum of Rs. …….. or such lesser sum as may then be due to the Company out of the said advance of Rs. ……. and as the Company may require. Notwithstanding anything herein contained the liability of the Bank under this guarantee is restricted to Rs..... only. The guarantee shall remain in force till the ……day of .....and unless the guarantee is renewed or a claim is preferred against the Bank within 6 months from the said date all rights of the company under this guarantee shall cease and the Bank shall be released and discharged from all liability hereunder except as provided in the preceding clause.

The Bank has under its constitution power to give this guarantee and ……. (Name of the person) who has signed it on behalf of the Bank has authority to do so.

The details of beneficiary bank for sending details of BG under SFMS Platform is furnished below

Name of the Bank: -……

Branch: - ……

IFSC: - ……

A/c No: - ……

Customer ID: - ……

Dated this.....Day of……. 20……...

Place.....

Signature of the authorized person For and on behalf of the Bank

Appendix 6: Format of Bank Guarantee for Performance of O&M

[To be on non-judicial stamp paper of Rupees One Hundred Only (INR 100/-) or appropriate value as per Stamp Act relevant to place of execution, duly signed on each page. Foreign entities submitting Bid are required to follow the applicable law in their country]

Reference No. ……. Bank Guarantee No. ……. Dated: ……. To:

WHEREAS ……. *[Insert name of the Contractor]* with address ……. *[Insert address of the Contractor]* having its registered office at ……. *[Insert address of the Contractor]* (hereinafter, the "Bidder") wishes to participate in NIT document No. _____ issued by MOIL Limited ("MOIL") (hereinafter, the "Beneficiary") for Operation and Management of Performance of 15 MW Solar Power Project.

And WHEREAS a Bank Guarantee for Rupees *[……..]* valid till ……. *[Insert date till the date of Final Acceptance]* is required to be submitted by the Contractor as per the terms and conditions of the NIT.

We, ……. [Insert name of the Bank and address of the Branch giving the Bank Guarantee] having our registered office at ……. [Insert address of the registered office of the Bank] hereby give this Bank Guarantee No. ……. [Insert Bank Guarantee number] dated ……. [Insert the date of the Bank Guarantee], and hereby agree unequivocally and unconditionally to pay immediately on demand in writing from the Beneficiary any officer authorized by it in this behalf any amount not exceeding Rupees [……] to the said Beneficiary on behalf of the Bidder.

We ……. *[Insert name of the Bank]* also agree that withdrawal of the Bid or part thereof by the Bidder within its validity or non-submission of further O&M Performance Bank Guarantee by the Bidder within the stipulated time of the Letter of Intent to the Bidder or any violation to the relevant terms stipulated in the NIT would constitute a default on the part of the Bidder and that this Bank Guarantee is liable to be invoked and encashed within its validity by the Beneficiary in case of any occurrence of a default on the part of the Bidder and that the encashed amount is liable to be forfeited by the Beneficiary.

This agreement shall be valid and binding on this Bank up to and inclusive of ……. *[Insert the date of validity of the Bank]* and shall not be terminable by notice or by Guarantor change in the constitution of the Bank or the firm of the Bidder or by any reason whatsoever and our liability hereunder shall not be impaired or discharged by any extension of time or variations or alternations made, given, conceded with or without our knowledge or consent by or between the Bidder and the Beneficiary.

NOTWITHSTANDING anything contained hereinbefore, our liability under this guarantee is restricted to Rupees ……. (*Insert the Amount*). Our Guarantee shall remain in force till ……. *[Insert date]*. Unless demands or claims under this Bank Guarantee are made to us in writing on or before ……. *[Insert date]*, all rights of the Beneficiary under this Bank Guarantee shall be forfeited and we shall be released and discharged from all liabilities there under.

[Insert the address of the Bank with complete postal branch code, telephone and fax numbers, and official round seal of the Bank]

[Insert signature of the Bank's Authorized Signatory]

Attested:

……. [Signature] (Notary Public)

Place: …….
Date: …….

INSTRUCTIONS FOR FURNISHING BANK GUARANTEE

- The Bank Guarantee by Bidders will be given on non-judicial stamp paper as per stamp duty applicable at the place where the tender has emanated. The non-judicial stamp paper should be in name of the issuing bank.

- The Bank Guarantee by Bidder will be given from bank as per Schedule 1: List of Banks only.

- This bank guarantee/ all further communication relating to the bank guarantee should be forwarded to **Jt.GM (CMC), MOIL Limited, MOIL Bhawan, A-, Katol Road, Nagpur – 440013** only.

- The full address along with the Telex/Fax No. and email address of the issuing bank to be mentioned.

Appendix 7: Format of Agreement

AGREEMENT FORMAT (ON MINIMUM Rs.100 NON-JUDICIAL STAMP PAPER)

This Agreement is made on …… ….... …… ……... …….

One between M/s MOIL LIMITED., (A Government of India undertaking.) incorporated under the Company's act 1956 and having its registered office at MOIL Bhawan, 1-A, Katol Road, Nagpur – 440 013 (Maharastra) acting through the Executive Director (Technical), MOIL herein called "The Company " which expression shall unless repugnant to the subject or context includes its successors, or assigns on one part and M/s. …… herein called "The Contractor" which expression shall unless repugnant to the subject or the context, include its administrators, successors, assignee, legal representative on the other part.

WHEREAS, the Company being desirous of works of Design, Engineering, Procurement & Supply, Construction, Erection, Testing & Commissioning of Ground Mounted and Comprehensive Operation & Maintenance for 5 Years of Solar PV Project of Capacity 15 MW(AC) at Rajgarh Khas in Madhya Pradesh, to be executed**,** invited the offer vide Notice Inviting Tender No. …… ……. ……

WHEREAS, the Contractor's submitted offer in form Part - I (Terms and Conditions and Part - II (Price offer) and was opened on …… (Part – I) and on ……... (Part – II) respectively and the Company and the Contractor had held discussions, obtained clarifications, held negotiations and Company requested the Contractor to submit revised offer and confirmations thereof.

And WHEREAS, the revised offers were opened on ….. ……. ….. ……. And subsequently Company obtained clarifications, modifications and confirmations, accepted the revised offer vide letter No. …….. dated …… including modifications agreed upon.

And WHEREAS, the Company issued "Letter of Intent"/ "Letter of Acceptance" to the Contractor vide letter No. …….. ……. dated ……. and subsequently issued "Work Order" vide letter No. ……. dated ……. (hereinafter to as "WO") requesting the Contractor to enter into an agreement to execute the work of Design, Engineering, Procurement & Supply, Construction, Erection, Testing & Commissioning of Ground Mounted and Comprehensive Operation & Maintenance for 5 Years of Solar PV Project of Capacity 15 MW(AC) at Rajgarh Khas in Madhya Pradesh, on the Terms and Conditions hereinafter enumerated.

NOW THIS AGREEMENT IS WITNESSED AND IT IS HEREBY AGREED BY AND BETWEEN PARTIES HERE TO AS FOLLOWS:

The Company and the Contractor agrees and declare that this agreement shall govern the terms and conditions of the Contract in relation to and in respect of Design, Engineering, Procurement & Supply, Construction, Erection, Testing & Commissioning of Ground Mounted and Comprehensive Operation & Maintenance for 5 Years of Solar PV Project of Capacity 15 MW(AC) at Rajgarh Khas in Madhya Pradesh, work is awarded under this Contract and shall be deemed to be final agreement between the parties here to:

1. In this agreement, words and expressions shall have the same meaning as are respectively assigned to them in the conditions of Notice Inviting Tender Document hereinafter referred to.

2. It is specifically distinctly and expressly understood and agreed between the parties hereto that except as provided hereinafter and to the extent varied, modified and altered by subsequent correspondence and conditions, schedules appended to the work order, the work shall be executed on the terms and conditions as stated in the NIT document. In the event of any doubt (s) regarding terms and conditions as stated in work order, other documents such as Contractor's offer etc., as listed in article –3 below shall be referred to. A document of later dates shall always supersede all previous documents.

3. The following Contract documents only shall be deemed to constitute and be read as a part of the agreement. Every other document / negotiation or agreement shall be null and void.

3.1 Company's work order No. …. …….. ….. …….. dated ……. .and job no. along with its Schedule "A", "B", "C", "D" and "E".

3.2 Company's Notice Inviting Tender Document (N.I.T. document) No…. ……. ……. …dated …… ….... ….... consisting of following including all clauses sub-clauses and Annexure therein.

a. Tender Notice.
b. Tender Form
c. Chapter – I. Definition and Interpretations.
d. Chapter – II Conditions of contract
e. Chapter – III Scope of Work and Technical Specifications
f. Chapter – IV Formats

3.3 Contractor's original offer, Company's correspondence, Contractor's revised offer, negotiations, clarifications and conformations as given below: -

b. ……..…
c. …….. …… ……
d. ……. ……. ..
e. …… ……
f. ……..

4.0 In consideration of the payments to be made by the Company to the Contractor as per the terms of the agreement the Contractor hereby, covenants with the Company to execute and complete the works awarded in conformity with the provisions of the said agreement.

5.0 The Company hereby covenants to pay the Contractor, in consideration of the execution and completion of the works awarded under the said agreement and in the manner prescribed by the said agreement and also subject to the terms thereof. In witness whereof the parties hereto, have set their respective hands, the day, the month and the year, first above written in the presence of the witness named hereunder at MOIL LIMITED., Nagpur, Maharashtra.

Signed Sealed and Delivered by: -

(……..…...) **(……..)**

Contractor For MOIL LIMITED,

Witness:

1. ……..

2. ……..

PART II

PRICE BID FORMAT

MOIL LIMITED								
PRICE BID FORMAT								
Name of Bidder :								
15 MW (AC) SPV Power Plant at Rajgarh Khas in Madhya Pradesh								
Lot. No	Description	Unit of Measurement UoM	Quantity	Basic Cost Per UoM (Rs.)	Total Basic Cost (Rs.)	Applicable GST (%)	GST Amount (Rs.)	Total Cost including GST
A	**B**	**C**	**D**	**E**	**F= (D x E)**	**G**	**H = (F x G)**	**I = (F + H)**
1	Supply of PV Modules up to site.	MW	15			5%		
2	Supply of Inverters	MW	15			5%		
3	Supply of Balance of System includes all equipment, materials, spares, accessories, MMS, transmission line, power evacuation etc. excluding 1 & 2 above up to site as per detailed design along with tender document submitted	MW	15			5%		
4	Erection Works General works including erection, commissioning, testing etc. of entire plant including transmission line, MMS with foundations, excluding 5 below	MW	15			18%		
5	Civil and allied Works: Civil and allied works including construction of buildings, perimeter fencing etc.	LS	1			18%		
	Total Cost for Lot No.1 to 5							
6	**Total COMC Cost for 5 years @10.58% of total quoted basic cost of lot no. 1 to 5.**					18%		
Grand Total for Lot No.1 to 6								

Important Notes:

1. The bidder agrees to meet all the terms & conditions mentioned in the Bid Document technically & financially.

2. The total cost towards COMC (Comprehensive Operation and Maintenance) shall be fixed @10.58% of total quoted/negotiated basic price of Lot No.1 to Lot No.5, which shall be in addition to the total price for Lot No.1 to Lot No.5.

3. For the purpose of bid evaluation, the Goods and Services Tax (GST) rates applicable for Lot No. 1 to 3 is 5% and on Lot No. 4 to 6 is 18%. However, GST shall be paid as per the prevailing applicable rates and shall be governed as per applicable laws at the time of invoicing.

4. The Evaluation shall be done on the overall lowest bid received for 15 MW AC Solar Power Project including COMC for 5 years (i.e. Lot no. 1 to 6).

5. Tenderers are requested to quote the per unit basic Rate only (in all lots), as per unit of Measurement and without GST. GST will be paid extra by MOIL, as per the prevailing rate.

DOCUMENTS TO BE SUBMITTED WITH TENDER

With PART -I

Sl. No.	Documents	Tick
1	Earnest Money Deposit (EMD)	
2.	Covering letter as per format 3 of Chapter V.	
3.	Format For UNDERTAKING to be Submitted / Uploaded	
4.	Previous Experience information as per Format 1 of Chapter V.	
5.	Signed photocopies of work orders and completion certificates from the employers proving technical eligibility criteria.	
6.	Signed photocopies of balance sheet and annual report proving financial eligibility requirement	
7.	Signed photocopy of the documents containing particulars of incorporation / registration of the bidder.	
8.	Declaration as per Annexure II Appendix 2 of Chapter V	
9.	Declaration from the bidder that they have not been banned or delisted by any Government or quasi-Government agencies or PSUs	
10.	Copy of PAN card or equivalent document for foreign bidder.	
11.	Copy of latest Income tax return filed or equivalent document for foreign bidder.	
12.	Integrity Pact as per format 2 of Chapter V.	
13.	Any other document submitted by the bidder - please specify	
14.	Technical specification of all deliverable P&M as per technical data sheets given in Clauses of Chapter IV.	
15	Detailed time schedule	
16	Duly signed tender document issued / downloaded	
17	Performance Bank Guarantee for EMD, Security Deposit, Performance of Project works, Performance of O&M	

Location plan for Rajgarh Khas in Madhya Pradesh

20 MW MOIL
23.97816, 76.7052, 361.4m
28/08/2024 11:43:34 am

20 MW MOIL
23.98261, 76.70488, 364.8m
28/08/2024 12:32:18 pm