OIL INDIA LIMITED
(A Government of India Enterprises)
PO : Duliajan – 786602
Assam (India)

TELEPHONE NO. (91-374) 2808719
FAX NO: (91-374) 2800533
Email: ranjanbarman@oilindia.in; erp_mm@oilindia.in

FORWARDING LETTER

Tender No. : **SDI2280P20 DT: 23.08.2019**

Tender Fee : **NIL**

Bid Security : **Applicable**

Bidding Type : **SINGLE STAGE TWO BID SYSTEM**

Bid Closing on : **03.10.2019 (11.00 HRS IST)**

Bid Opening on : **03.10.2019 (14.00 HRS IST)**

Performance Security : **Applicable**

Integrity Pact : **Applicable**

The complete bid documents and details for purchasing bid documents, participation in e-tenders are available on OIL's e-procurement portal https://etender.srm.oilindia.in/irj/portal as well as OIL's website https://www.oil-india.com/

NOTE: All addenda, Corrigenda, time extension etc. to the tenders will be hosted on above website and e-portal only. Bidders should regularly visit above website and e-portal to keep themselves updated.

OIL invites Bids for **Supply of Solar Power Plant** through its e-Procurement site under **SINGLE STAGE TWO BID SYSTEM**. The bidding documents and other terms and conditions are available at Booklet No. MM/LOCAL/E-01/2005 for E-Procurement of Indigenous Tenders. The prescribed Bid Forms for submission of bids are available in the Technical RFx -> External Area - > Tender Documents

The general details of tender can be viewed by opening the RFx [Tender] under RFx and Auctions. The details of items tendered can be found in the Item Data and details uploaded under Technical RFX.

This Tender has been floated for participation of Indigenous bidders only. Hence, only Indigenous bidders are eligible to participate against this tender.

Consortiums/Joint venture entities are not eligible to participate against this tender.

The tender will be governed by:

a) **For technical support on various matters viz. Online registration of vendors, Resetting of Passwords, submission of online bids etc, vendors should contact OIL's ERP MM Deptt at following: Tel Nos = 0374-2807178, 0374-2807171 , 0374-2807192. Email id = erp_mm@oilindia.in.**

b) **OIL's office timings are as below:**

	Time (in IST)
Monday – Friday	**07.00 AM to 11.00 AM; 12.30 PM to 03.30 PM**
Saturday	**07.00 AM to 11.00 AM**
Sunday and Holidays	**Closed**

Vendors should contact OIL officials at above timings only.

OIL Bank Details :

	Bank Details of Beneficiary	
a	Bank Name	STATE BANK OF INDIA
b	Branch Name	Duliajan
c	Branch Address	Duliajan, Dist-Dibrugarh
d	Banker Account No.	10494832599
e	Type of Account	Current Account
f	IFSC Code	SBIN0002053
g	MICR Code	786002302
h	SWIFT Code	SBININBB479
i	Contact No.	9435554859
j	Contact Person Name	Mr. K.L.K.Banik, AGM
k	Fax No.	0374-2802729
l	Email Id	sbi.02053@sbi.co.in

c) "General Terms & Conditions" for e-Procurement as per Booklet No. MM/LOCAL/E-01/2005 for E-Procurement of Indigenous Tenders.

d) Technical specifications and Quantity as per **Annexure – 1A**.

e) The prescribed Bid Forms for submission of bids are available in the Technical RFx -> External Area - > Tender Documents.

f) Amendments to the NIT after its issue will be published on OIL's website only. Revision, clarification, addendum, corrigendum, time extension etc. to the tender will be hosted on OIL website only. No separate notification shall be issued in the press. Prospective bidders are requested to visit website regularly to keep themselves updated.

g) Any sum of money due and payable to the contractor (including Security Deposit refundable to them) under this or any other contract may be appropriated by Oil India

Limited and set-off against any claim of Oil India Limited (or such other person or persons contracting through Oil India Limited) for payment of sum of money arising out of this contract or under any other contract made by the contractor with Oil India Limited (or such other person or persons contracting through Oil India Limited).

h) Bidder are advised to fill up the Technical bid check list (**Annexure EEE**) and Response sheet (**Annexure FFF**) given in MS excel format in Technical RFx -> External Area - > Tender Documents. The above filled up document to be uploaded in the Technical Attachment. For details please refer "Vendor User Manual" / "NEW INSTRUCTIONS"]

Special Notes:

1.0

a) Bidders who do not have E-tender Login ID and Password should complete their online registration at least seven (7) days prior to the scheduled bid closing date and time of the tender. For online registration, Bidder may visit the OIL's E-tender site https://etender.srm.oilindia.in/irj/portal

b) Necessary Login ID & Password will be issued by OIL only after submitting the complete online registration by the Bidder. In the event of late registration/incomplete registration by Bidder, OIL INDIA LIMITED shall not be responsible for late allotment of User ID & Password and request for bid closing date extension on that plea shall not be entertained by Company.

c) MSE Units (Manufacturers/Service Providers only and not their dealers/distributors) who are already registered with District Industry Centers or Khadi & Village Industries Commission or Khadi & Village Industries Board or Coir Board or National Small Industries Corporation or Directorate of Handicrafts & Handloom or any other body specified by Ministry of MSME are exempted from payment of Bid Security (EMD) irrespective of their monetary limit, product category and capacity mentioned in their registration, subject to submission of valid MSE registration certificate issued by appropriate authority.

d) For availing benefits under Public Procurement Policy (Purchase preference), the interested MSE Bidders must ensure that they are the manufacturers of the tendered item(s) and registered with the appropriate authority for the said item(s). Bids without EMD shall be rejected, if the technical offer does not include a valid copy of relevant MSE Certificate issued by appropriate authority specifying the item as per tender. Therefore, it is in the interest of such MSE Vendors to furnish a copy of complete certificate to the concerned tender handling officer of OIL at least seven (7) days prior to the scheduled Bid Closing Date of the tender, seeking clarification/confirmation as to whether their MSE certificate is eligible for EMD exemption or not. Late communication in this regard and request for bid closing date extension on that plea shall not be entertained by Company.

NOTE:
In case of MSE/PSUs/ Govt. Bodies / eligible institutions etc., they must apply to concerned tender handling officer, Materials Department, Oil India Limited, P.O. Duliajan, Assam-786602 for waiver of EMD upto one week prior to the Bid closing date (or as amended in e-portal).

2.0 The tender is invited under SINGLE STAGE-TWO BID SYSTEM. The bidders are required to submit both the "TECHNO-COMMERCIAL UNPRICED BID" and "PRICED BID" through electronic format in the OIL's e-Tender portal within the Bid Closing Date and Time stipulated in the e-Tender.

2.1 Please ensure that Technical Bid / all technical related documents related to the tender are uploaded in the RFx Information > Technical Attachment only**.** The "**TECHNO-COMMERCIAL UNPRICED BID**" shall contain all techno-commercial details **except the prices**. **Please note that no price details should be uploaded in** Technical RFx Response**.**

2.2 The "**PRICE BID**" must contain the price schedule and the bidder's commercial terms and conditions. **For price upload area , please refer** "NEW INSTRUCTIONS" Please refer Annex-BB for price schedule.

2.3 Offer not complying with above submission procedure will be rejected as per Bid Rejection Criteria mentioned in Annexure-CCC.

3.0 Please note that all tender forms and supporting documents are to be submitted through OIL's e-Procurement site only except following documents which are to be submitted manually in sealed envelope super scribed with **Tender no.** and **Due date** to **DGM-Materials, Materials Department, Oil India Limited, Duliajan - 786602, Assam** on or before the Bid Closing Date and Time mentioned in the Tender.

a) **Original Bid Security**
b) **Detailed Catalogue (if any)**
c) **Any other document required to be submitted in original as per tender requirement**

All documents submitted in physical form should be signed on all pages by the authorised signatory of the bidder and to be submitted in Duplicate.

4.0 Benefits to Micro & Small Enterprises (MSEs) as per OIL's Public Procurement Policy for Micro and Small Enterprises (MSEs) shall be given. Bidders are requested to go though ANNEXURE – I of MM/LOCAL/E-01/2005 for E-Procurement of Indigenous Tenders for more details.

5.0 Bidders are requested to examine all instructions, forms, terms and specifications in the bid. Failure to furnish all information required as per the NIT or submission of offers not substantially responsive to the bid in every respect will be at the bidders risk and may result in rejection of its offer without seeking any clarifications.

6.0 Bidders must ensure that their bid is uploaded in the system before the tender closing date and time. Also, they must ensure that above documents which are to be submitted in a sealed envelope are also submitted at the above mentioned address before the bid closing date and time failing which the offer shall be rejected.

7.0 Bid must be submitted electronically only through OIL's e-procurement portal. Bid submitted in any other form will be rejected.

8.0 **SINGLE STAGE TWO BID SYSTEM** shall be followed for this tender and only the PRICED-BIDS of the bidders whose offers are commercially and technically acceptable shall be opened for further evaluation.

9.0 **a) The Integrity Pact is applicable against this tender. Therefore, please submit the Integrity Pact document duly signed along with your quotation as per BRC. OIL shall be entering into an Integrity Pact with the bidders as per format enclosed vide Annexure DDD of the tender document. This Integrity Pact proforma has been duly signed digitally by OIL's competent signatory. The proforma has to be submitted by the bidder (along with the technical bid) duly signed (digitally) by the same signatory**

who signed the bid, i.e., who is duly authorized to sign the bid. Uploading the Integrity Pact with digital signature will be construed that all pages of the Integrity Pact has been signed by the bidder's authorized signatory who sign the Bid. If any bidder refuses to sign Integrity Pact or declines to submit Integrity Pact with the offer, their bid shall be rejected straightway.

b) The name of the OIL's Independent External Monitors at present are as under:

1. **Shri Rajiv Mathur, IPS(Retd.),**
   Ex-Director, IB, Govt. of India
   E-mail id :rajivmathur23@gmail.com

2. **Shri Jagmohan Garg**
   Ex-Vigilance Commissioner, CVC
   E-mail : jagmohan.garg@gmail.com

3. **Shri Rudhra Gangadharan, IAS (Retd.)**
   Ex-Secretary, Ministry of Agriculture
   E-mail: rudhra.gangadharan@gmail.com

10.0 The tender shall be governed by the Bid Rejection & Bid Evaluation Criteria given in enclosed **Annexure-CCC**. However, if any of the Clauses of the Bid Rejection Criteria / Bid Evaluation Criteria (as per **Annexure-CCC**) contradict the Clauses of the tender and / or "General Terms & Conditions" as per Booklet No. MM/LOCAL/E-01/2005 for E-Procurement of Indigenous Tenders elsewhere, those in the BEC / BRC shall prevail.

11.0 To ascertain the substantial responsiveness of the bid OIL reserves the right to ask the bidder for clarification in respect of clauses covered under BRC also and such clarifications fulfilling the BRC clauses in toto must be received on or before the deadline given by the company, failing which the offer will be summarily rejected.

12.0 Please do refer the User Manual provided on the portal on the procedure How to create Response for submitting offer.

13.0 If Bank Guarantee is submitted towards 'Bid Security', then bidders have to ensure that the Bank Guarantee issuing bank indicate the name and detailed address (including e-mail) of their higher office from where confirmation towards genuineness of the Bank Guarantee can be obtained.

14.0 Bidders are requested to refer to the enclosed **Annexure – BBB** for the Taxes and Duties clauses under GST regime.

15.0 Delivery/collection Instructions in cases where transportation is in OIL's scope:

(i) the suppliers shall be required to deliver the Sundry consignments of weight less than 3 (Three) Tons at the godown/office/collection point of OIL's authorized transporter in various cities.
(ii) consignments weighing more than 3(Three) Tons shall be collected from the supplier's premises/loading points by OIL's authorized transporter.
(iii) the names of OIL's current authorized transporters are:
a) M/s Western Carriers (India) Ltd.
b) M/s DARCL Logistics Limited

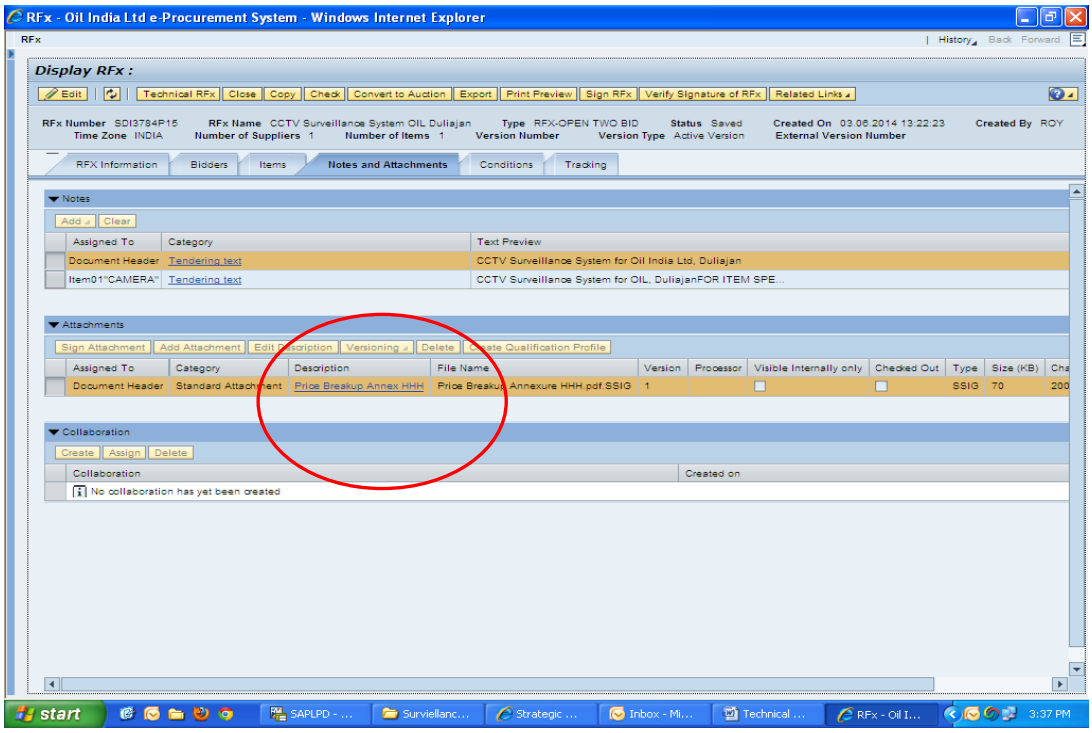
Bidder's are requested to note the above delivery/collection instructions while submitting their offers.

18.0 Bidders should fill-up and submit alongwith their bid an UNDERTAKING towards authenticity of information/documents furnished by them, as per enclosed ANNEXURE-K.

19.0 The applicable GST on the Liquidated Damage if any, shall have to be borne by the Seller. Accordingly, the Liquidated Damage shall be recovered from the seller along with applicable GST.

20.0 Price Breakup:

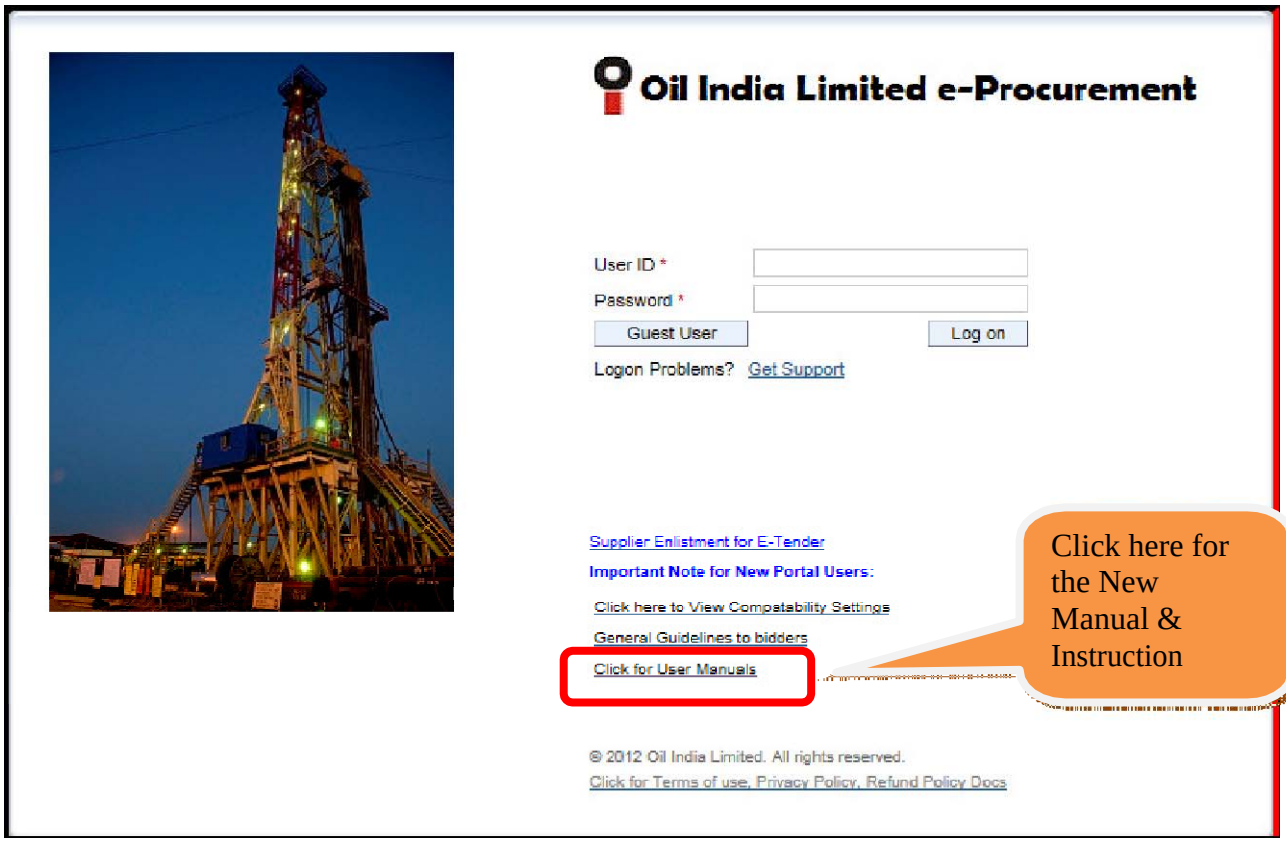
Bidders should submit the price breakup of all the items as per "**Annexure HHH**" which has been uploaded under "Notes & Attachments" > "Attachments" as shown below. The price breakup "Annexure HHH" should be filled up, signed and uploaded under "Notes & Attachments" > "Attachments" only. **The filled up price breakup of all the items should not be uploaded in Technical Attachment.**



21.0: For convenience of the qualified Bidders and to improve transparency, the rates/costs quoted by bidders against OIL's e-tenders shall be available for online viewing by such Bidders whose price bids are opened by Company. A Bidder can view item-wise rates/ costs of all other such peer bidders against the tender immediately after price bid opening, if the e-tender is floated by Company with PRICE CONDITION. In case the Price-Bid is invited by Company through attachment form under "Notes & Attachment" (i.e., NO PRICE Condition), Bidders must upload their detailed Price-Bid as per the prescribed format under "Notes & At4ichment", in addition to filling up the "Total Bid Value" Tab taking into account the cost of all individual line items and other applicable charges like freight, tax, duties, levies etc. Under NO PRICE Condition (i.e., Price Bid in attachment form), the "Total Bid Value" as calculated & quoted by the Bidder shall only be shared amongst the eligible bidders and Company will not assume any responsibility whatsoever towards calculation errors/ omissions therein, if any. Notwithstanding to sharing the "Total Bid Value" or the same is whether filled up by the Bidder or not, Company will evaluate the cost details to ascertain the inter-se-ranking of bidders strictly as per the uploaded attachment and Bid Evaluation Criteria only. Online view of prices as above shall be available to the Bidders only upto seven days from the date of Price-Bid opening of thee-tender.

22.0 DISCLAIMER: Rates/Costs shown above are as calculated/quoted by the respective Bidder. Company does not assume any responsibility and shall not be. liable for any calculation error or omissions. However, for placement of order/award of contract, Company shall evaluate the cost details to determine the inter-se-ranking of Bidders strictly as per their Price-Bids and Bid Evaluation Criteria of the Tender. OIL INDIA LTD accepts no liability of any nature resulting from mismatch of "Total Bid Value" & price submitted under "Notes & Attachment" by any bidder and no claim whatsoever shall be entertained thereof.

Please do refer "NEW INSTRUCTION TO BIDDER FOR SUBMISSION" for the above two points and also please refer " New Vendor Manual (effective 01.03.2019) " available in the login Page of the OIL's E-tender Portal.



NOTE:

Bidders should submit their bids (preferably in tabular form) explicitly mentioning compliance / non compliance to all the NIT terms and conditions of NIT.

Yours Faithfully

Sd-

(R BARMAN)
DGM (IP)
FOR GM-MATERIALS

Annexure - CCC

TENDER NO. SDI2280P20 DT: 23.08.2019

BID REJECTION CRITERIA (BRC) / BID EVALUATION CRITERIA (BEC)

The following BRC/BEC will govern the evaluation of the bids received against this tender. Bids that do not comply with stipulated BRC/BEC in full will be treated as non responsive and such bids shall prima-facie be rejected. Bid evaluation will be done only for those bids that pass through the "Bid Rejection Criteria" as stipulated in this document.

Other terms and conditions of the enquiry shall be as per General Terms and Conditions vide MM/LOCAL/E-01/2005 for E-Procurement of Indigenous Tenders. However, if any of the Clauses of the Bid Rejection Criteria / Bid Evaluation Criteria (BRC / BEC) contradict the Clauses of the tender or MM/LOCAL/E-01/2005 elsewhere, those in the BRC / BEC shall prevail.

Criteria	**Complied / Not Complied. (Remarks if any)**
1.0 BID REJECTION CRITERIA (BRC): The bid shall conform generally to the specifications, terms and conditions given in this document. Notwithstanding the general conformity of the bids to the stipulated specifications, the following requirements will have to be particularly met by the Bidders without which the same will be considered as non-responsive and rejected. **A) TECHNICAL:** 1.1 Technical Criteria: 1.1.1 Bidder must have experience of at least one SIMILAR work of value 36,00,000.00 (Rupees Thirty Six Lakhs) or above in previous 05 (Five) years reckoned from the original bid closing date with PSUs / Central Government / State Government Organization / Public Limited Company. OR Bidder must have successfully completed at least 02 (two) Nos. of SIMILAR Work in previous 05 (Five) years as reckoned from the original bid closing date with PSUs / Central Government / State Government Organization / Public Limited Company. Notes to BEC Clause No. 1.1: a. "SIMILAR work" mentioned in Clause No. 1.1.1 above means "Order for Supply and successful Installation & Commissioning of Grid interactive Solar Power Plant capacity of 20kWp or above in any Central/State Government /PSUs or public limited company in last 5 (five) years reckoned from the original bid closing date". **Note:** Documentary evidence in respect of the above should be submitted in the form of copies of relevant Purchase Orders **along with** copies of any of the documents in respect of satisfactory execution of each of those Purchase	

Orders, such as – (i) Satisfactory Inspection Report (OR) (ii) Satisfactory Supply Completion / Installation Report (OR) (iii) Consignee Receipted Delivery Challans (OR) (iv) Central Excise Gate Pass / Tax Invoices issued under relevant rules of Central Excise/VAT/GST (OR) (v) Any other documentary evidence that can substantiate the satisfactory execution of each of the purchase orders cited above. **Note:** **I) The Purchase Order date need not be within 5 (five) years preceding original bid closing date of this tender. However, the execution of supply should be within 5 (five) years preceding original bid closing date of this tender.** **II) Satisfactory supply/completion/installation report (if submitted) should be issued on client's official letterhead with signature and stamp** **B) FINANCIAL:** a) Annual Financial Turnover of the bidder during any of preceding 03 (three) financial / accounting years from the original bid closing date should be at least **Rs. 31.26 Lakhs** b) Net Worth of the firm should be Positive for preceding Financial / Accounting year (FY=2018-19). **<u>Note -For (a) & (b)</u>: Considering the time required for preparation of Financial Statements, if the last date of preceding financial / accounting year falls within the preceding six months reckoned from the original bid closing date and the Financial Statements of the preceding financial / accounting year are not available with the bidder, then the financial turnover of the previous three financial / accounting years excluding the preceding financial / accounting year will be considered. In such cases, the Net worth of the previous financial / accounting year excluding the preceding financial / accounting year will be considered. However, the bidder has to submit an affidavit/undertaking certifying that 'the balance sheet/Financial Statements for the financial year…....…… (As the case may be) has actually not been audited so far'.** **<u>Notes</u>:** **a) For proof of Annual Turnover & Net worth any one of the following document must be submitted along with the bid:-** **i) A certificate issued by a practicing Chartered Cost Accountant (with Membership Number and Firm Registration Number), certifying the Annual turnover & Net worth as per format prescribed in <u>ANNEXURE-J.</u>** **OR** **ii) Audited Balance Sheet along with Profit & Loss account.**	

b) In case the bidder is a Central Govt. Organization/PSU/State Govt. Organization/Semi-State Govt. Organization or any other Central/State Govt. Undertaking, where the auditor is appointed only after the approval of Comptroller and Auditor General of India and the Central Government, their certificates may be accepted even though FRN is not available. However, bidder to provide documentary evidence for the same.

C) COMMERCIAL:

i) Validity of the bid shall be minimum 120 days from the Bid Closing Date.

ii) Bid security:
The bid must be accompanied by Bid Security of **Rs 1,25,100.00** in OIL's prescribed format as Bank Guarantee in favour of OIL. The Bid Security may be submitted manually in sealed envelope superscribed with Tender no. and Bid Closing date to Head Materials, Materials Department, Oil India Limited, Duliajan- 786602, Assam on or before the Bid Closing Date and Time mentioned in the Tender. **The Bank Guarantee towards Bid Security shall be valid for 7 months from Bid closing date. (i.e. upto 31.05.2020)**

Bid Security may also be paid online on or before the Bid Closing Date and Time mentioned in the Tender.

If bid security in ORIGINAL of above mentioned Amount and Validity is not received or paid online within bid closing date and time, the bid submitted through electronic form will be rejected without any further consideration.

For exemption for submission of Bid Security, please refer Clause No. 8.16 of General Terms and Conditions vide MM/LOCAL/E-01/2005 for E-Procurement of Indigenous Tenders.

The format of Bank Guarantee towards Bid Security (Annexure – VII) has been amended to Annexure – VII (Revised) and bidders should submit Bank Guarantee towards Bid Security as per Annexure – VII (Revised) only.

iii) Bids are invited under "Single Stage Two Bid System". Bidders have to submit both the "Techno-commercial Unpriced Bids" and "Priced Bids" through electronic form in the OIL's e-Tender portal within the bid Closing date and time stipulated in the e-tender. The Techno-commercial Unpriced bid is to be submitted as per scope of works and Technical specification of the tender and the priced bid as per the online Commercial bid format. For details of submission procedure, please refer relevant para of General Terms and Conditions vide MM/LOCAL/E-01/2005 for E-Procurement of Indigenous Tenders. Any offer not complying with the above shall be rejected straightway.

iv) Performance Security:

Submission of a Performance Bank Guarantee for settlement of claims

against the Performance Guarantee Parameters stipulated in Clause 6.0, "Performance Guarantee Parameters" of the "Special Terms and Conditions" of the tender. The PBG shall be equivalent to 10% of the total Contract Price (supply of materials + installation & commissioning + AMS contract for 6 years) valid for a period of 6 years and 3 months (total 75 months) after successful commissioning of the plant. The Performance Security shall be in the following form : **A Bank Guarantee in the prescribed OIL's format as per Annexure – VIII OF General Terms & Condition.** **The validity requirement of Performance Security is assuming despatch within stipulated delivery period and confirmation to all terms and conditions of order. In case of any delay in despatch or non-confirmation to all terms and conditions of order, validity of the Performance Security is to be extended suitably as advised by OIL.** *v)* The prices offered will have to be firm through delivery and not subject to variation on any account. A bid submitted with an adjustable price will be treated as non-responsive and rejected. vi) Bids received after the bid closing date and time will be rejected. Similarly, modifications to bids received after the bid closing date & time will not be considered. vii) All the Bids must be Digitally Signed using "Class 3" digital certificate with Organisation's name *(e-commerce application)* as per Indian IT Act obtained from the licensed Certifying Authorities operating under the Root Certifying Authority of India (RCAI), Controller of Certifying Authorities (CCA) of India. The bid signed using other than "Class 3 with Organisation's Name" digital certificate, will be rejected. viii) Technical RFx Response folder is meant for Technical bid only. Therefore, No price should be given in Technical RFx Response folder, otherwise the offer will be rejected. ix) Price should be maintained in the "online price schedule" only. The price submitted other than the "online price schedule" shall not be considered. x). Integrity Pact : **OIL shall be entering into an Integrity Pact with the bidders as per format enclosed vide Annexure DDD of the tender document. This Integrity Pact proforma has been duly signed digitally by OIL's competent signatory. The proforma has to be submitted by the bidder (along with the technical bid) duly signed (digitally) by the same signatory who signed the bid, i.e., who is duly authorized to sign the bid. Uploading the Integrity Pact with digital signature will be construed that all pages of the Integrity Pact has been signed by the bidder's authorized signatory who sign the Bid. If any bidder refuses to sign**	

Integrity Pact or declines to submit Integrity Pact with the offer, their bid shall be rejected straightway.

xi). A bid shall be rejected straightway if it does not conform to any one of the following clauses:
(a) Validity of bid shorter than the validity indicated in the Tender.
(b) Original Bid Security not received within the stipulated date & time mentioned in the Tender.
(c) Bid Security with (i) Validity shorter than the validity indicated in Tender and/or (ii) Bid Security amount lesser than the amount indicated in the Tender.
(d) In case the Party refuses to sign Integrity Pact.
(e) Annual Turnover of a bidder lower than the Annual turnover mentioned in the Tender.

XII. DELIVERY: The entire work shall consists of following schedule:

a) The design, manufacture and supply part (with delivery at site)shall be completed within a period of 6 (six) months from the Award of PO/Letter of Intent including a period of 45 days of mobilization.

b) The erection, testing & commissioning and handing over part shall be completed within a period of 3 (three) months from the date of site clearance by OIL.

NOTE: FOR CLAUSE NOS. C(ii) & C(iv) OF BID SECURITY/EMD AND PBG

The bidders/successful bidders are requested to advise the Bank Guarantee issuing bank to comply with the following and ensure to submit, the receipt of the copy of SFMS message as sent by the issuing bank branch, along with the original bank guarantee in OIL's tender issuing office:

"The Bank Guarantee issuing Bank branch must ensure the following:
The Bank Guarantee issued by the Bank must be routed through SFMS platform as per following details:

(i) MT 760 / MT 760 COV for issuance of Bank Guarantee
(ii) MT 760 / MT 767 COV for amendment of Bank Guarantee

The above message / intimation shall be sent through SFMS by the BG issuing Bank branch to HDFC Bank, Duliajan Branch, IFS Code – HDFC0002118; SWIFT Code - HDFCINBBCAL.
Branch Address: HDFC Bank Limited, Duliajan Branch, Utopia Complex, BOC Gate, Jayanagar, Duliajan, Dibrugarh, PIN – 786602."

2.0 BID EVALUATION CRITERIA (BEC)
The bids conforming to the terms and conditions stipulated in the tender and considered to be responsive after subjecting to the Bid Rejection Criteria as well as verification of original of any or all documents/ documentary evidences pertaining to BRC, will be considered for further evaluation as per the Bid Evaluation Criteria given below.

A) TECHNICAL: i) The bids will be evaluated as per NIT specifications, terms & conditions. ii) All the items will be procured from the same source for the reason of compatibility and single point responsibility and evaluation will be done accordingly. **B) COMMERCIAL:** i) Priced bids of only those bidders will be opened whose offers are found technically acceptable. The technically acceptable bidders will be informed before opening of the "priced bid". ii) A job executed by a bidder for its own organization / subsidiary cannot be considered as experience for the purpose of meeting BEC. iii) To ascertain the substantial responsiveness of the bid OIL reserves the right to ask the bidder for clarification in respect of clauses covered under BRC also and such clarifications fulfilling the BRC clauses in toto must be received on or before the deadline given by the company, failing which the offer will be summarily rejected.	

NOTE:

Bidders should submit their bids (preferably in tabular form) explicitly mentioning compliance / non compliance to all the NIT terms and conditions of NIT.

-----xxxx-----

ANNEXURE-IA

TECHNICAL SPECIFICATION WITH QUANTITY

Tender No & Date: SDI2280P20 DT: 23.08.2019

	Complied/ Not Complied. (Remarks if any)
ITEM NO. 10 **SUPPLY OF GRID INTERACTIVE ROOFTOP MOUNTED SOLAR PHOTO-VOLTAIC SYSTEM – QTY = 01 NO** The scope of supply of the equipment and materials for grid interactive solar PV power plant shall include, but not limited to the following: a) Solar PV modules of composite capacity as mentioned above including mounting frames, structure, array foundation and module interconnection, Array Junction boxes b) Power Conditioning Units that are communicable on with remote sensing, DSP and sleeping mode operation c) DC power junction boxes, bus bars and circuit breakers d) AC power evacuation panel with bus bars and circuit breakers e) Metering and protection /Isolation systems. Meters to be communicable on remote sensing f) LV Power and Control Cables including end terminations and other required accessories for both AC & DC power g) Earthing system for PV Array, DC power system, PCU, AC power system for LT equipment h) Lightning protection system including surge protection devices in both DC power side and AC power side i) Tool kit j) PVC pipes and accessories k) Transportation of equipment to site The above list is indicative only; supplier has to provide all the required equipment/ items for the complete plant. ANNEXURE - TECHNICAL SPECIFICATIONS TECHNICAL SPECIFICATIONS FOR GRID INTERACTIVE ROOFTOP MOUNTED SOLAR PHOTO-VOLTAIC SYSTEM C ON T E N T S Sl.No. TOPICS 1 Introduction 2 Location 3 Site Description 4 Google Co-ordinates of the site	

5 Scope of Specification
6 Codes & Standards
7 Specific Technical Requirements
8 System documentation
9 Tests & Test Reports
10 Maintenance Requirement
11 Layout Requirements
12 Instruction and O&M Manual
13 Customer Training
14 Post Warranty Comprehensive AMS Contract

1.0 INTRODUCTION:

It has been proposed to setup a 30KWp (estimated) grid interactive solar photovoltaic power plant (without battery back-up) at the Duliajan Power House of Oil India Limited, which will be a Rooftop installation project.

The Grid interactive Rooftop Mounted Solar PhotoVoltaic (PV) plant shall consist of mainly three major components, viz. the solar photovoltaic (SPV) modules, array (including array mounting structure) and the inverter or power conditioning unit(s). The SPV array converts the solar energy into DC electrical energy. The array mounting structure holds the PV modules in required position. The DC electrical energy from the PV arrays is converted to AC power by the inverter or PCU, which is connected to the captive power grid. The AC power output of the inverter is fed to the AC distribution board through metering panel and isolation panel. The415 V 3Ø AC output of the system can be synchronized with the captive grid and the power can be exported to the grid depending upon solar power generation and local consumption.

2.0 LOCATION:

LocationDetails	
Nameof State	Assam
District	Dibrugarh
Location	Duliajan Power House of Oil India Limited (rooftop)
Latitude	27.36 deg. N
Longitude	95.32 deg. E

3.0 SITE DESCRIPTION:

Duliajan is an industrial town and one of the most developed and advanced town from all over India located in Dibrugarh District in the upper north-east corner of India. The town is situated about 45 km east of Dibrugarh City.

In Duliajan, the climate is warm and temperate. In winter there is much less rainfall than in summer. According to Köppen and Geiger, the climate is classified as Cwa. The average annual temperature in Duliajan is 23.2 °C. The average annual rainfall is 2528 mm. The driest month is December with 21 mm. Most precipitation falls in July, with an average of 489 mm. The warmest month of the year is August with an average temperature of 27.8 °C. In January, the average temperature is 16.1 °C. It is the lowest average temperature of the whole year.

However, the equipment for the plant shall be suitable for satisfactory operation under the

ambient conditions as follows:

a. Operating Environment: 10 to 50 Deg. C
b. Operating Relative Humidity: 0 to 95%
c. Storage temp.: 15 to 45 Deg. C
d. Elevation: 100 m above MSL

4.0 CO-ORDINATES OF THE SITE:

Latitude 27.36 deg. N
Longitude 95.32 deg. E

5.0 SCOPE OF SPECIFICATION:

5.1 The scope of these specifications shall cover design, engineering, manufacture, quality surveillance, testing at manufacturer's works, packing and supply, erection, testing and commissioning and performance testing of 30 KWp (estimated) grid interactive Rooftop mounted solar photovoltaic system with associated components for installation at Oil India Limited, Duliajan.

5.2 The systems shall be complete with PV modules, inverter, metering, junction boxes, AC, DC distribution boards and cables, communication interface, and any other equipment necessary for safe and efficient operation of the system.

5.3 The work shall also include interconnection of PV system with the existing OIL grid supplying power to the building.

5.4 The civil works for installation of complete system shall also be in scope of supplier.

5.5 It is not the intent of these specifications to specify completely herein all the details of design and construction of equipment. However, the equipment offered shall conform in all respects to high standards of engineering, design and workmanship and be capable of performing in commercial operation up to Bidder's guarantee in a manner acceptable to OIL, who will interpret the meaning of drawings and specifications and shall have the power to reject any work or materials, which in his judgment are not in full accordance therewith.

5.6 It shall be the responsibility of the Bidder to ensure that all the works as per scope of the specification are completed for safe and efficient working of the system.

5.7 All the necessary co-ordination with regard to sub-contracted items shall be carried out by the Bidder. The customer (OIL) will communicate only with the Bidder for all matters pertaining to this contract.

5.8 Even if all components of a system included in these specifications are not explicitly identified and /or listed herein, these shall be supplied under this contract to ensure completion of the system and facilitate proper operation and easy maintenance of the plant. All the fittings and accessories that might not have been mentioned specifically in the specification but are necessary for completeness of the plant, shall be deemed to be included in the specifications and shall be supplied and furnished by the Contractor without any extra charge.

5.9 Considering the reliability of the grid, no electrical storage batteries are envisaged as

excess electricity generated by the solar panels which is not required by the equipment/devices in the building premises shall be exported to the grid.

6.0 CODES AND STANDARDS

6.1 All Equipment and accessories shall comply with requirement of standards published by Bureau of Indian Standards (BIS).In case no BIS codes exist the equipment shall meet the requirement of international standard including IEEE for design and installation of grid connected PV system. The list of standards adopted shall be indicated in the bid.

6.2 The SPV Module must be provided with acceptable Test& Certified documents.

6.3 The quality of equipment supplied shall be generally controlled to meet the guidelines for engineering design included in the standards and codes listed in the relevant ISI and other standards, such as:

o IEEE 928: Recommended Criteria for terrestrial PV power systems.
o IEEE 929: Recommended practice for utility interface of residential and intermediate PV systems.
o IEEE 519: Guide for harmonic control and reactive compensation of Static Power Controllers.
o National Electrical NFPA 70-1990 (USA) or Equipment National standard.
o National Electrical Safety Code ANSIC2 (USA) or equipment national standard.
o IEC: 61215 (2005) - Crystalline silicon terrestrial photovoltaic (PV)modules-Design qualification and type approval
o IEC 61683 / IS 61683 - Efficiency Measurements of Power Conditioners/Inverters including MPPT and Protections
o IEC: 61730 -1, -2 Photovoltaic (PV) module safety qualification Part 2: Requirements for testing
o IEC: 60904-1(2006) Photovoltaic Devices-Part-I: Measurement of Photovoltaic current-Voltage Characteristic
o IEC: 62446 (2009)- Grid-Connected Photovoltaic Systems- Minimum Requirements for System Documentation, Commissioning Tests and Inspection
o IS 9000: Basic environmental testing procedure for Electronic and electrical items.

7.0 SPECIFIC TECHNICAL REQUIREMENTS:

a. The Solar PV power system shall be rooftop mounted, grid connected without battery back-up.

b. The PV Array shall consist of a number of individual PV modules or panels that have been wired together in a series and/ or parallel combination and shall meet the generation power capacity of 30 KW peak (estimated).

c. The DC power generated from SPV array shall be converted to AC power with Power Conditioning Unit, consisting of Grid-tie Inverter and the associated control and protection devices. The voltage level shall match the grid voltage (415 Volts AC, 3-phase & Neutral, 50 Hz).

d. Output from Power Conditioning Unit shall be connected to an existing LT power distribution panel, wherein continuous synchronization with grid power shall be automatically active through static circuitry mechanism & devices. The inter-connecting

power cable between the ACDB of the SPV Plant and the existing LT power distribution panel will be in the scope of OIL.

e. Maximum available power of Solar PV Plant will be drawn during the daytime and during any shortfall in power generated by Solar PV Plant during time then extra power required shall be drawn from the Utility Source/without interruption to serve the load requirement.

In case of any failure of grid power supply, PV Solar power supply will also automatically get disconnected immediately and the same will be restored automatically at restoration of grid power. In grid interactive systems, it has, however to be ensured that in case the grid fails, the solar power has to be fully utilized or stopped immediately feeding to the grid (if any in excess) so as to safe-guard any grid person/technician from getting shock (electrocuted) while working on the grid for maintenance etc. This feature is termed as 'Islanding Protection'.

f. Solar PV system shall consist of the following minimum equipment. The list is indicative only; bidder has to provide all the required equipment/ items for the complete plant:
o Solar PV modules consisting of required number of PV cells
o Power Conditioning Unit/Inverters
o Mounting structures
o Cables and hardware
o Junction box and distribution boxes
o Surge protection devices in both DC power side and AC power side
o Earthing kit
o Lightning arrestors
o PVC pipes and accessories
o Tool kit
o Civil pedestals

g. DUTY CYCLE: Average Hours of Operation/day: 8-10 hours per day, as per the solar insolation levels of the site.

7.1 PV ARRAYS

7.1.1 Solar PhotoVoltaic Modules shall be MONO/POLY CRYSTALLINE Silicon PV Modules. The peak power output of the PV Module shall be from 250 to 320 Wp under STC. Complete mounting structure, hardware etc. shall be suitable for Rooftop installation/mounting; the same shall be in the scope of Vendor.

7.1.2 The Solar PV module should meet the minimum requirement of MNRE.

7.1.3 SPV modules shall be designed and manufactured to meet the same recognized standard which must have been used extensively throughout the world for more than a decade with an excellent track record of performance. Each module should have two separate interconnected strings with proper by-pass diode(s). Minimum dimension of the SPV module shall be preferred. Bidders should submit the technical literature with detailed technical specifications of the modules as well as the drawings & manuals. Modules should have an efficiency of not less than 15% and the fill factor should be 75%.

7.2 Statutory Approvals and Minimum Technical Requirement

Modules should fulfill the following conditions:

a) The offered PV modules must be tested and approved by Govt. MNRE Authorized test center or equivalent International Labs.

b) The module shall meet IEC 61215 (for Crystalline) along with IEC61730 Part I and Part II (for safety) and IEC 61701 for salt mist corrosion. These shall be Class A only.

c) Each solar PV module shall be warranted by the manufacturer with free replacement if the output under standard light condition falls more than 10% in first 10 (ten) years and 20% in next 15 (fifteen)years.

d) Photo electrical conversion efficiency of the module shall not be less than 15%. The bidder shall indicate minimum module efficiency.

e) Fill factor of the module shall not be less than 0.70.

f) The bidder shall provide the sample solar PV module electrical characteristics including current-voltage (I-V) performance curves and temperature coefficients of power, voltage and current. However, the tabulated document with all the relevant data like voltage, current, power output for all the modules also to be provided.

g) The PV modules shall be suitable for continuous outdoor use.

h) The PV module shall be made of high quality laminated in ultraviolet stabilized polymer material such as Ethyl Vinyl Accelerate (EVA), Tedler, and toughened glass. The size of single crystalline silicon PV cells shall be so chosen so as to maximize energy density and align with economies of scale.

i) PV module shall be provided with frame of anodized channels for size and simplicity in installation offered as a single module or series parallel combination of modules. The PV module shall be provided with screw-less frame with solar cable and connector.

j) The PV modules shall be equipped with by-pass diode to minimize power drop caused by shade.

k) The PV modules shall be made of lightweight cells, resistant to abrasion, hail impact, rain, water and environmental pollution. The PV modules shall be provided with anti-reflection coating and back surface field (BSF) structure to increase conversion efficiency.

l) The PV module shall use lead wire with weatherproof connector for output terminal.

m) The power output of the PV system under Standard Test Conditions (STC) should be 100% kWp of module size depending upon manufacturer's prudent practice, with nominal output voltage of 24 V. The number of modules to be supplied shall be worked out accordingly.

n) The operating voltage corresponding to the power output mentioned above should be >32.0 V for 24V system.

o) The terminal box on the module should have a provision for opening for replacing the

cable, if required.

p) Each PV module must use a RF identification tag (RFID), which must contain the following information:
o Name, monogram or symbol of the manufacturer of PV Module
o Name, monogram or symbol of the Manufacturer of Solar cells
o Type or model number of the module
o Month and year of the manufacture (separately for solar cells and module)
o Polarity of terminals or leads (colour coding is permissible)
o Maximum system voltage for which the module is suitable
o I-V curve for the module
o Peak Wattage, Im, Vm and FF for the module
o Unique Serial No and Model No of the module
o Date and year of obtaining IEC PV module qualification certificate
o Country of origin (separately for solar cells and module)
o Name of the test laboratory issuing IEC certificate
o Other relevant information on traceability of solar cells and module as per
o ISO 9000 series

q) The systems shall perform satisfactorily in relative humidity up to 95% and temperature between 10ºC to +55ºC.

7.3 SUPPLY & INSTALLATION OF DC COMBINER BOX /ARRAY JUNCTION BOX:

7.3.1 Enclosure: The array junction boxes shall be made of PC-GFS (Polycarbonate-Glass fiber substance) thermoplastic having minimum IP65/66 protection in accordance with IEC 60 529 with the help of internally embedded polyurethane gasket.

7.3.2 The enclosure should be double insulated with protection class II. In view of the same, IEC60439/ IEC61439 (new revision) comes as an important standard as it fulfills this requirement of enclosure to be double insulated. (Test certification is required for IP65/ IP 66 degree of protection.) The lid shall be of transparent polycarbonate.

7.3.3 Fuse Protection on Strings: DC fuses rated from 2A to 25A from leading manufacturers to be used in the combiner box to provide over-current protection.

7.3.4 Surge Protection Device: Surge Protection devices or SPD to be provided to protect the combiner/junction box from any power surge and voltage spike. SPD to be used should meet Type 2 regulations, and to be typically rated between 600 to 1000V.

7.3.5 Input Glands/Connectors: The combiner/array junction box offered is to be provided with IP67 rated Cable Glands or MC 4 connectors at the input side to lead the array strings into the box. Suitable markings should be provided for easy identification and cable ferrules shall be fitted at the cable termination points for identification.

7.3.6 Burning Behavior:
Glow wire test in accordance with IEC 60695-2-UL Subject 94at960C, flame retardant & self-extinguishing.
o Base part of Polycarbonate Enclosure should have V-0 as flammability standard.
o Lid part of PC Enclosure should have V-2 as a flammability standard.

7.3.7 Degree of protection against mechanical load: IK 08 (5 Joule)

7.3.8 Toxic behavior: Halogen/Silicon free, conform to RoHS directive 2002/95/EC

7.3.9 Temperature Tolerance range: -40 deg C to +120 deg C

7.3.10 Chemical Resistance: Acid, Lye, Petrol, Mineral Oil & partially resistant from Benzene.

7.3.11 UV behavior: UV stabilized, even after many years there should be no sign of brittleness.

7.4 INVERTER

7.4.1 As SPV array produce direct current electricity, it is necessary to convert this direct current into alternating current and adjust he voltage levels to match the grid voltage. Conversion shall be achieved using an electronic Inverter and the associated control and protection devices. All these components of the system are termed the "Power Conditioning Unit (PCU)". In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array & the Inverter, to maximize Solar PV array energy input into the System.

7.4.2 Each PCU shall be compliant with IEEE Standard 929-200 or equivalent and should be at least IP54.

7.4.3 The DC power produced is to be fed to inverter for conversion into AC. In a grid interactive system AC power shall be fed to the grid at three phase 415AC bus. Power generated from the solar system during the daytime shall be utilized fully by powering the building loads and feeding excess power to the grid as long as grid is available. In cases, where solar power is not sufficient due to more demand or cloud cover etc. the building loads shall be served by drawing power from the grid. The inverter should always give preference to the Solar Power and will use Captive Grid power only when the Solar Power is insufficient to meet the load requirement.

7.4.4 The output of the inverter must synchronize automatically its AC output to the exact AC voltage and frequency of the captive grid.

7.4.5 Inverter shall continuously monitor the condition of the captive grid and in the event of captive grid failure, the inverter should automatically switch to off-grid supply within 20-50 milliseconds. The solar system should then be resynchronized with the captive grid within two minutes after the restoration of grid.

7.4.6 Captive Grid voltage shall also be continuously monitored and in the event of voltage going below a preset value and above a preset value, the solar system shall be disconnected from the grid within the set time. Both overvoltage and undervoltage relays shall have adjustable voltage (50% to 130%) and time settings (0 to 5 seconds).

7.4.7 Metal Oxide Varistors (MOVs) shall be provided on DC and AC side of the inverter.

7.4.8 The inverter control unit shall be so designed so as to operate the PV system near its maximum Power Point (MPP), the operating point where the combined values of the current and voltage of the solar modules result in a maximum power output.

7.4.9 The inverter shall be a true sine wave inverter for a grid interactive PV system. It shall be an efficient and reliable solid-state device (IGBT type).

7.4.10 Each Sub-Array Junction Box will have Suitable Reverse Blocking Diodes of maximum DC blocking voltage of1000 V with suitable arrangement for its connection.

7.4.11 The degree of protection of the outdoor inverter panel shall be at least IP-55.
7.4.12 Typical technical features of the inverter shall be as follows:

Continuous output power rating : >= 30 kWp
Maximum input voltage : 1000 V
Nominal AC output voltage : 415V, 3 Phase
Accuracy of AC Voltage control : ± 1%
Output frequency : 50 Hz
Accuracy of frequency control : ± 0.5%
Ambient temperature : 10 deg C to 55 deg C
Captive grid voltage tolerance : -20 % and + 15 %
Power factor control : 0.95 inductive to 0.95 capacitive
No-load losses : < 1% of rated power
Inverter efficiency (minimum) : 96%
Maximum efficiency/ European efficiency : 98% minimum
Power Control : MPPT
Surge Protection Device (SPD) : Required (Type I & 2)
Overload behavior : Current limitation; power limitation
Total Harmonic distortion (TDH) :< 3 % @ nominal apparent power
Protection required
:DC reverse-polarity/AC short-circuit current capability/ galvanic isolation
Anti-islanding protection / Grid regulation : As per EN, VDE standard

7.4.13 Liquid crystal display shall at least be provided on the inverters front panel or on separate data logging/display device to display following:
o DC Input Voltage
o DC Input current
o AC Power output(kW)
o Current time and date
o Time active
o Time disabled
o Time Idle
o Temperatures(C)
o Converter status

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

7.4.15 All doors, covers, panels and cable exits shall be gasketed or otherwise designed to limit the entry of dust and moisture. All doors shall be equipped with locks.

7.4.16 Operation Mode:

o Night or sleep mode: Where the Inverter is almost completely turned off, with just the timer and control systems till in operation, losses shall be less than 2W per 5 kW.

o Standby mode: Where the control system continuously monitors the output of the solar generator until pre-set value is exceeded (typically 10W).

o Operational of MPP tracking mode: the control system shall continuously adjust the voltage of the generator to optimize the power available. The power conditioner shall automatically re-enter standby mode when input power reduces.

o Below the standby mode threshold: Front panel shall provide display of status of the inverter.

7.5 PROTECTIONS AND CONTROL

7.5.1 PV system software and control system shall be equipped with islanding protection as described above. In addition to disconnection from the grid (islanding protection) i.e. on no supply), under and overvoltage conditions, PV systems shall be provided with adequate rating fuses, fuses on inverter input side (DC) as well as output side (AC) side for overload and short circuit protection and disconnecting switches to isolate the DC and AC system for maintenance are needed. Fuses of adequate rating shall also be provided in each solar array module to protect them against short circuit.

7.5.2 A manual disconnect switch beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility personal to carry out any maintenance. This switch shall be locked by the utility personal.

7.6 METERING SCHEME

7.6.1 Metering is required to measure the Solar Gross Generation on continuous basis and register cumulative energy based on 15 minute interval basis, daily, monthly and yearly energy generation.

7.6.2 The average voltage and power factor based on 15 minute interval must also be recorded.

7.6.3 Meter must also display on demand, instantaneous, AC system voltages and currents, frequency, reactive power with sign, total harmonics current and voltage distortion etc.

7.6.4 Meters shall comply with the requirements of CEA Regulations on "Installation and Operation of Meters" and in conformity with IS 13779 or IS 14679.

7.6.5 An integrating pyranometer (class II or better) is to be provided with the sensor mounted in the plane of the array. Readout shall be integrated with data logging.

7.7 POWER QUALITY REQUIREMENTS:

7.7.1 DC Injection in to the grid: The injection of DC power into the grid shall be avoided by using an isolation transformer at the output of the inverter. It is proposed to limit DC injection within 1% of the rated current of the inverter as per IEC 61727.

7.7.2 Harmonics on AC side:
Harmonic distortion is caused principally by non-linear loads such as rectifiers and arc furnaces and can affect the operation of a supply system and can cause overloading of equipment such as capacitors, or even resonance with the system leading to overstressing (excessive voltage & current). Other effects are interference with telephone circuits and

broadcasting, metering errors, overheating of rotating machines due to increased iron losses (eddy current effects), overheating of delta connected winding of transformer due to excessive third harmonics or excessive exciting current.

7.7.3 The limits for harmonics shall be as stipulated in the CEA Regulations on grid connectivity which are as follows:
o Total Voltage harmonic Distortion= 5%
o Individual Voltage harmonics Distortion=3%
o Total Current harmonic Distortion=8%

7.7.4 Voltage Unbalance-The Voltage Unbalance in the grid shall not exceed 3.0%.

7.7.5 Voltage Fluctuations:
The permissible limit of voltage fluctuation for step changes which may occur repetitively is 1.5%.
For occasional fluctuations other than step changes the maximum permissible limits is 3%.

7.8 COMMUNICATION INTERFACE:

7.8.1 The project envisages a communication interface which shall be able to support
o Real time data logging
o Event logging
o Supervisory control
o Operational modes
o Set point editing

7.8.2 The following parameters shall also be measured and displayed continuously.
o Solar system temperature
o Ambient temperature
o Solar irradiation/insolation
o DC current and Voltages
o DC injection into the grid (one time measurement at
o Efficiency of the inverter
o Solar system efficiency
o Display of I-V curve of the solar system
o Any other parameter considered necessary by supplier of the solar PV system based on prudent practice

7.8.3 Data logger/PC based monitoring system must record these parameters for study of effect of various environmental & grid parameters on energy generated by the solar system and various analysis would be required to be provided through bar charts, curves, tables, which shall be finalized during approval of drawings.

7.8.4 The communication interface shall be an integral part of inverter and shall be suitable to be connected to local computer and also remotely via the Web using either a standard modem or a GSM/WIFI modem.

7.9 WEATHER MONITORING STATION:

7.9.1 An integrating PYRANOMETER for measuring the Solar Irradiance is to be provided, with the sensor mounted in the plane of the array. Readout is to be integrated with the data logging system.

7.9.2 In addition, temperature probes for recording the Solar panel temperature and ambient temperature are to be provided.

7.10 MOUNTING STRUCTURES:

7.10.1 Module mounting structure should be as per MNRE specifications and supply & installation shall be in scope of Vendor.

7.10.2 The mounting structure shall be of anodised aluminium/ hot dip galvanized MS angles of proper size (minimum35 mm x 35 mm x 5 mm) and shall withstand wind speeds of150 KM/hour (horizontal). The minimum thickness of galvanization shall be at least 70 microns. All fixing fasteners shall be of stainless steel grade SS 304. Legs assembly shall be of MS Hot Dip galvanized pipes after fabrication/ anodised aluminium.

7.10.3 The structure shall be designed in accordance with the latitude of the place of installation. The array mounting structure shall be designed to allow easy replacement of any module and shall be in line with site requirement. Structure shall be designed for simple mechanical and electrical installation. It shall support SPV modules at a given orientation, absorb and transfer the mechanical loads to the Rooftop properly.

7.10.4 The mounting structures must be suitable to mount the SPV modules/panels/arrays on the Rooftop at an angle for optimum tilt. The module alignment & tilt angle shall be calculated to provide the maximum annual energy output. This shall be decided based on the location of array installation.

7.10.5 The support structure design & foundation shall be designed to withstand wind speed up to 200 kmph using relevant Indian wind load codes.

7.10.6 The minimum clearance of the lowest part of the module/module structure and the developed Rooftop level shall not be less than 300mm.

7.10.7 The legs of the structures shall be fixed suitable angle nosing (in scope of vendor). While making foundation design, due consideration shall be given to the weight of module assembly and maximum wind speed.

7.10.8 The foundation pedestals wherever necessary shall be concrete.

7.10.9 The mounting of solar modules shall be done on rooftop and entire Fabrication of elevated structure and the structure atop sloping roofs shall be done by the Bidder.

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

7.11 POWER AND CONTROL CABLES:

7.11.1 Power Cables of adequate rating shall be required for interconnection of:
o Modules/panels within array
o Array & Charge Controller
o Charge controller & Loads Including Inverter

7.11.2 The cable shall be1.1 kV grade, heavy duty, stranded copper conductor, PVC type

A insulated, galvanized steel wire/strip armored, flame retardant low smoke (FRLS) extruded PVC type ST-1 outer sheathed. The cables shall, in general conform to IS-1554 Part I & other relevant standards.

7.11.3 The minimum size of 1.1 kV power cables shall be chosen taking into account fault level contribution to the system and full load current. However, power cables size for 415 V systems shall be chosen taking into account the full load current & voltage drop. The allowable voltage drop at terminal of the connected equipment shall be max. 2.5% at full load. The de-rating factors viz. group deration, temp. deration shall also be considered while choosing the conductor size.

7.11.4 The permissible voltage drop from the SPV Generator to the Charge controller shall not be more than 2% of peak power voltage of the SPV power source (generating system). In the light of this fact the cross-sectional area of the cable chosen should be such that the voltage drop introduced by it shall be within 2% of the system voltage at peak power.

7.11.5 All connections should be properly terminated, soldered and/or sealed from outdoor and indoor elements. Relevant codes and operating manuals must be followed. Extensive wiring and terminations (connection points) for all PV components is needed along with electrical connection to lighting loads.

7.12 LIGHTNING PROTECTION AND EARTHING:

7.12.1 Required numbers of suitable lightning arrestors should be installed in the array area.
Lightning protection shall be provided by the use of suitable earthing conductors and electrodes so that any lightning strike may find an alternate route to earth. Protection shall meet requirements of Central Electricity Regulations, 2010, and IS 2309:1969 (Protection of Buildings and allied structures from lighting).

7.12.2 Each array structure of the PV system should be grounded properly as per IS: 3043-1987. Provision should be kept for shorting and grounding of the PV array at the time of maintenance work. All metal casing/shielding of the plant should be thoroughly grounded in accordance with Indian Electricity Rules 1956. Earth resistance should be tested in a dry weather in presence of the representative of customer, after earthing work is complete, with a calibrated earth tester and should have a value not more than the value specified in the relevant Code/Rules.

7.12.3 In case the SPV Array cannot be installed close to the equipment to be powered & a separate earth has been provided for SPV System, it shall be ensured that all the earth connections are bonded together to prevent the development of potential difference between any two earths.

7.13 CIVIL WORKS:

7.13.1 Embedment of structures suitable for mounting PV modules.

7.13.2 All the machinery such as hydra, JCBs, fork-lifts, for unloading of materials at site, movement of materials, foundation, erection of structures, module mounting, etc. shall be in the scope of Vendor.

8.0 SYSTEM DOCUMENTATION:

Complete documentation on the system must be provided to OIL. System documentation should include an owner's manual and copies of relevant drawings for whatever system maintenance might be required in the future.

9.0 TESTS AND TEST REPORTS:

Final acceptance tests for the PV plant shall include, but not limited to, the following:

9.1 Visual inspection

9.2.1 Verification that all required system and equipment labels, markings and placards are correct and in the proper locations. This includes ensuring that all equipment is properly listed, identified and labelled, suitable for the conditions of use, and installed according to the listed product instructions.
9.2.2 Wiring & cabling
9.2.3 Earthing connections
9.2.4 Mounting and support structures
9.2.5 Modules
9.2.6 Lightning protection including surge protection

9.2 Insulation Resistance Measurement

9.2.1 Importance of PV system wire insulation for safety and performance
9.2.2 Measurement methods for ac and dc circuits
9.2.3 Interpretation of insulation test data and application of the results
9.2.4 Test equipment selection

9.3 Array Performance Measurement

Electrical measurement, including calculating circuit voltages and currents to verify that the PV array and system operating parameters are within specifications.

9.3.1 I-V Curve Tracing and discrete voltage and current measurement
9.3.2 PV system performance verification, correction and measurement using capacity test
9.3.3 Interpreting I-V curves for performance troubleshooting
9.3.4 Power performance Index and Energy performance index
9.3.5 Calculations of energy yield
9.3.6 Power rating, inverter efficiency, module temperature, array yield, system losses, etc.

a. Type test certificates for all the tests specified for the factory built Solar PV modules, and the component parts shall be submitted by the Bidder along with the bid.
b. Six sets of copies of the compiled and approved test certificates shall be submitted to the Purchaser.

10.0 MAINTENANCE REQUIREMENT:

a. Easy access shall be provided for all components in the SPV plant and grid connecting equipment. Maintenance platform shall be provided for easy inspection of all the equipment.

b. If special tools are required for installation and maintenance, the bidder shall indicate the same and to be supplied free of cost.

c. The Bidder shall furnish operating and maintenance instruction manual to enable the purchaser to carry out maintenance of equipment effectively and safely.

d. Washing / cleaning of SPV panels would be carried out as per the prudent practice of the supplier.

11.0 LAYOUT REQUIREMENT:

The overall dimensions of the SPV Plant shall suit the Rooftop space provided for the layout requirements. The arrangement to suit this space shall be intimated at the time of approving the general arrangement drawing of the equipment.

12.0 INSTRUCTION AND O&M MANUALS:

12.1 Six copies of Instruction and Operation and Maintenance Manual in English should be provided with the system.

12.2 The manual shall be furnished at the time of dispatch of the equipment and shall include the following aspects:

o Erection drawings with written assembly instructions that would enable the Purchaser to carryout erection with his own personnel if opted by him.
o Detailed instructions and procedures for the installation operation and maintenance.
o About solar PV system- its components and expected performance.
o Clear instructions about mounting of PV module (s)
o About the electronics
o DO's and DONT's
o Principles of Operation of various equipment
o Safety and reliability aspects
o Metering scheme
o About power conditioning unit software and controls
o Clear instructions on regular maintenance and troubleshooting of solar power plant
o Name and address of the person or service center to be contacted in case of failure or complaint.
o Rated voltages, current and all other technical information which may be necessary for correct operation of the SV plant.
o Catalogue numbers of all the components which are liable to be replaced during life of the SV plant and all the component parts.
o Trouble shooting and diagnostic procedure

13.0 CUSTOMER TRAINING:

13.1 Bidder shall provide necessary onsite-training and demonstration on the system related today to day operation & maintenance of the system including basic troubleshooting.

13.2 On-site training shall be considered by the Vendors and costs towards this, if any, shall be deemed to have been included in the overall quoted costs of the system. No additional costs towards to & fro travel, boarding &loading shall be made on this account.

14.0 Makes of Components:

Only indigenous brands of components will be used in the solar cell/panel system. Makes of various items will be as under:

14.1 Mono- crystalline solar panel: Maxsolar/ Moserbaer/Indo Solar/SSL/ Euro Multivision/UPV Solar/KL Solar/Goldi Green/Powertrac Solar/ Maglare Technologies/ SunFuel/IB Solar/ HHV Solar Technologies or any other make approved by MNRE(Govt of India)
14.2 Poly-crystalline solar panel: SSL/SunFuel/Evolve India Group/Sirius Solar Energy/Empire Solar/HHV Solar Technologies/Jain Irrigation Systems or any other make approved by MNRE(Govt of India)
14.3 Mono- crystalline solar cell: SSL/Euro Multivision/UPV Solar/KL Solar/CEL or any other make approved by MNRE(Govt of India)
14.4 Poly-crystalline solar cell: SSL/Euro Multivision/UPV Solar/KL Solar/Jupiter Solar or any other make approved by MNRE(Govt of India)
14.5 Inverter/filter on-grid: Evolve India Group/Power One Microsystems/reputed Indian or any other make approved by MNRE(Govt of India)
14.6 EVA film: RenewSys/Allied Glasses/SSL/Dugar Polymers/BrijEncapsulants or any other make approved by MNRE(Govt of India)
14.7 Modular mounting structure: NEPC/RN Solar/reputed Indian or any other make approved by MNRE(Govt of India)

15. DRAWINGS AND DOCUMENTS:

15.1 The supplier shall obtain approval for the following drawings / documents:
a) Detailed design data
b) Verification of site and DNI data
c) GA and layout drawings of the PV arrays, inclination of panels
d) Structural drawing along with foundation details for the structure
e) Electrical Single line diagram, block diagram, wiring diagram, cable route drawing etc.
f) Bill of Materials and datasheets/catalogues of all the components to be used in the system, viz., invertersystem, PCU, MPPT, MCB DB, DCDB, ACDB, meters etc.
g) Spares list and prices of spares for all the items separately.

15.2 Six sets of the following documents ("as-built") shall be submitted with the supply:
a) Approved GA and layout drawings of the PV arrays, inclination of panels
b) Approved Structural drawing along with foundation details for the structure
c) Approved Electrical Single line diagram, block diagram, component layout diagram, wiring diagram,cable route drawing etc.
d) Approved Bill of Materials and datasheets/catalogues of all the components to be used in the system,viz., inverter system, PCU, MPPT, MCB DB, DCDB, ACDB, meters etc.
e) Approvedspares list and prices of spares along with probable sources for all the BoM items
f) Operation and Maintenance manuals of items and complete plant
g) Type test and routine test certificates for all the tests specified for the factory built Solar PV modules and the component parts Test certificates
h) Type test and routine test certificates of the inverter system from OEM from CPRI or any govt. approved NABLaccredited test laboratory
i) Guarantee Certificate (separate) for all items viz. panels, PCU, mounting structures etc.

The Supplier shall submit all finaldocuments in 6 copies along with one soft copy, and "as built" documents in 6 copies along with 1 soft copy &1 re-producible. 16. SPARES: 16.1 Supplier shall submit a list of commissioning spares along with the supply. All such spares shall be supplied along with the main equipment. The Supplier shall return to OIL all unused and left over commissioning spares, after successful commissioning of the plant. 16.2 Supplier shall, in addition, provide a list of recommended spares along with prices, quantity and sources. However, the prices shall remain firm for a period of six years after successful commissioning and handing over of the entire plant. 16.3 Supplier has to provide all spares against routine and breakdown maintenance required for the plant during the AMC period.	
ITEM NO. 20 **INSTALLATION AND COMMISSIONING FOR ITEM NO. 10: QTY = 01 AU** Installation and Commissioning of the Grid Interactive Solar Rooftop Power Plant: The erection, installation and commissioning part shall include, but not limited to, the following: a) Erection of civil foundations on rooftop for mounting of arrays (after discussion and analysis of building data with Civil Engineering department of OIL) b) Unloading and erection of all supplied equipment on foundations at the selected place c) Pre-Commissioning & commissioning of all supplied equipment d) Test running of the Solar Plant as well as load trials at site Supplier shall arrange for the following: a)All civil jobs including material supply related to erection, installation & commissioning. b) All tools, tackles, crane and test equipment required for commissioning and carrying out tests. c) Boarding & lodging for his engineers and transportation of men and materials to site at hisown expense. 1. Supply of erection / construction materials and consumables The Supplier shall provide all necessary erection equipment, materials (viz., cement, sand, stone chips etc.), tools and tackles including material handlingequipment (cranes/fork-lifts/hydra etc.) compressors and other equipment and instruments and consumables, allcommissioning equipment and instruments, welding equipment, winches, alignment tools, precision levels etc.,which may be required for carrying out the erection and commissioning work (as applicable) efficiently. Unlessotherwise specified, the above erection equipment/materials shall be the property of the Supplier. However,OIL's prior written permission shall be required for removal of these erection equipment / materials from the site. The Supplier shall ensure that proper documentation is followed at entry gate of OIL's premises for suchitems, which shall be carried back by Supplier after completion of work. 2. Erection, Installation & Civil Works: The Supplier shall strictly adhere to the following as applicable as per scope of work. 2.1 Mobilization and access to site 2.1.1 Communication facilities, if required, shall be arranged by the Supplier. 2.1.2 While execution of work, no person other than the Supplier, Sub-Supplier and his or	

theiremployees shall be allowed on the Site during working hours except with the written permission of the OIL.Facilities to inspect the works at all times shall be afforded by the Supplier to OIL and his representatives andother authorized officials. The labour camps shall not be established by the Supplier inside the site premises.Nothing extra shall be payable by OIL on this account.
2.1.3 The access to the Site shall be exclusive to the Supplier but only to enable him to execute the works.The Supplier shall afford to OIL and to other Suppliers whose names shall have been previouslycommunicated in writing to the Supplier by OIL, reasonable facilities for the execution of the workconcurrently with his own.

2.2 Safety

2.2.1 Upon arrival of Plant and Equipment/Material at the Site, the Supplier shall assume custody thereofand remain responsible thereafter for safe custody until the whole plant is handed over.
2.2.2 Adequate firefighting equipment and extinguishing agents of sufficient capacity and quantity mustalways be available at site and kept ready for immediate use. Sufficient number of workmen must be fullytrained in the use of such equipment and must be available for immediate intervention at all times
2.2.3 For storage of materials and equipment for the construction and erection work, storage must besubdivided into storage units and the distance between such storage units shall be as acceptable to the insurancecompany which issued the policy.
2.2.4 At the beginning of work, all fire-fighting facilities must be checked thoroughly.
2.2.5 The supplier shall for the duration of the execution of the order, maintain in good order and condition all suchprotective apparel and equipment (such as safety helmets, safety belts, gloves etc.) for all their workmen andstaff engaged for the work as may be required to be used by Law and by the OIL. The supplier shallensure that such protective apparel/ equipment are worn and used by their workmen and staff without fail. Incase OIL notices any non-compliance thereto, OIL will not only be entitled to make alternative arrangementsfor the same but recover cost and damages plus OIL's own charges @ 20% or as deemed fit by the company, onhis account.
2.2.6 The supplier shall follow the safety instructions as mentioned in Annexure-Safety Instructions at the end of this document.

2.3 Care of works and security

2.3.1 From the commencement to the completion of work, the Supplier shall take full responsibility for the care of works and for all temporary works from damages, loss or theft, by making suitable securityarrangement. In case any damage or loss shall happen to the works or to any part thereof or to any temporaryworks from any cause whatsoever, the Supplier shall at his own cost replace or repair and make good thesame.
2.3.2 The Supplier shall take all precautions during execution of work so as not to damage OIL's existing equipment such as RCC roof, civil structures, cables, pipe lines, drains etc. and provide all possible protection to these works and in casethey are damaged, rebuild/divert them at his own cost.
2.3.3 All operations necessary for the execution of the works and for the construction of any temporary works shall so far as compliance with the requirements of the Purchase order permits be carried on so as not to interfere unnecessarily or improperly with the public convenience or the access to use and occupation of public or private roads and footpaths or of properties whether in the possession of OIL or any other person and the Supplier shall save harmless and indemnify OIL in respect of all claims demands, proceedings, damages, costs, charges and expenses, whatsoever arising out of or in relation to any such matters.
2.3.4 Due to any emergency, any protective or remedial work is necessary within the Supplier's battery limit, the Supplier shall immediately carry out such work. If the Supplier is unable to or unwilling to do thework, OIL shall carry out such work and all costs incurred due to this shall be deducted from Supplier'spayments.

2.4 Boarding, lodging & transport

The Supplier shall take care of the boarding, lodging, all travel between Supplier's office and site, insurance (if any), medical expensesetc. of his direct and indirect employees.

2.5 Construction Water and Power

The Supplier needs to make suitable arrangement for Construction Water and electrical Power based on siteconditions. To the extent possible, OIL shall facilitate the same. Non availability of Power from OIL should notbe an excuse for delay in completion of the project

2.6 Erection / installation and construction

2.6.1 For completing the work within the time schedule, the Supplier shall carry out the work by providing adequate manpower, however, without violating any labour laws.
2.6.2 The Supplier shall unpack and do visual checking against physical damages to the equipment /cases,clean equipment before start of erection. Damage, if any, will be reported to the OIL and shall be rectified /replaced expeditiously (in case of materials not supplied by the Supplier), so as not to upset the erection andcommissioning schedule. Delay on account of settlement of insurance claims shall not be considered an excusefor delay in Completion.
2.6.3 The Plant and equipment will be installed on the civil foundation/structures to be constructed by the Supplier. Load bearing data of the roof on which the structures will be built will be obtained by the supplier from Civil Engineering Department of OIL. However, if any minor deficiency is noticed in the dimensions,centerlines, levels, locations etc. of the foundation or anchor bolts or other embedment, the Supplier shallmake arrangement for rectification of the same at his own cost. Chipping/dressing of the foundation with air orair and water jet prior to placing the equipment on foundation will also be carried out by the Supplier.However, the procedure for rectification will be finalized by the Supplier with the written approval of OIL.

2.7 Inspection & Testing during erection & commissioning

2.7.1 OIL shall have the right of inspection and testing of the materials brought to site by the Supplier anderection/installation/construction work at any stage and the Supplier on demand from OIL shall carry out suchtests in an appropriate manner in the presence and free of charge to OIL.
2.7.2 Within 15 days after the effective date of award of Purchase order, the Supplier shall submit a detailedQuality Assurance Plan (QAP), covering all activities under scope of supply of the Supplier and all stages ofinspection, for OIL to comment/approve the same.
2.7.3 No work shall be covered up or put out of view without the approval of the OIL. In the event of failureto do so, the Supplier shall uncover any part of the work or make openings in or through the works as OILmay direct and they shall be made good with materials approved by OIL and should match with workmanshipof the surrounding work.
2.7.4 The Supplier shall at his cost, arrange for construction of laboratory equipment, testing materials,consumables etc., at site for testing of construction materials such as cement, aggregates, concrete cubes etc.and other consumables for construction of support structures.
2.7.5 Any special measures or techniques which may be necessary for construction of structures such ascontinuous pouring of concrete etc. shall be deemed to have been taken into account by the Supplier and noextra claim, whatsoever, shall be entertained.
2.7.6 The Supplier shall carry out structural load test on each part of the building/structure at his own cost ifsuch structural load test is warranted due to unsatisfactory test results of concrete cubes and if so directed by OIL.
2.7.7 OIL may during the progress of Work, order the removal and re-erection of part or whole of the workexecuted, that is found not in accordance with the approved drawings/ specifications written instructions. OILshall not be responsible for any costs incurred in connection with any such removal and re-erection; the Supplier shall indemnify OIL for any costs and expenses that OIL may have incurred in connection with suchremoval and re-erection. Re-inspection/retest shall be carried out only after necessary rectificationwork/replacement by the Supplier.
2.7.8 The inspection, examination or testing carried out by OIL shall not relieve the Supplier from any ofhis obligations under this Purchase order.

3. Handing over

3.1 On completion of the work, all rubbish, kilns, vats, tanks, left over materials and temporary structure of any sortor kind used for the purpose or connected with the construction/erection work shall be removed by the Supplier and all pits and excavations in nearby areas filled up and the site handed over in a tidy condition. Nofinal payment in settlement of the account for the said work shall be held to be due or shall be made to the Supplier until such site clearance and restoration shall have been effected by him. Such clearance andrestoration may be made by OIL at the expenses of the Supplier in the event of his failure to comply with thisprovision within seven (7) days after receiving notice in writing from OIL to that effect. If it becomes necessaryfor OIL to have the site cleared as indicated above at the expense of the Supplier, OIL shall under nocircumstances be held liable for any losses or damages to such of Supplier's property as may be on such sitedue to such removal there from, which removal may be effected by means of public sale of such materials andproperty or in such a way as seems fit and most convenient to the OIL.
3.2 For the purpose of removing surplus materials in its original form, the Supplier shall submit thedocuments/records evidencing the entry of materials inside the Plant by producing the Gate Entry Permits andconsumption statements based on approved drawings to establish the surplus quantity of the materials belongingto the Supplier. OIL shall allow the Supplier to remove such materials if it is satisfied, in its sole andabsolute discretion, only after completion of the entire Work.
3.3 No imported Material shall be allowed to be taken out other than imported tools and tackles andinstruments brought by the Supplier on draw back basis and provided, he has carried out necessarydocumentation at the time of taking such items inside the Plant.
3.4 The Supplier shall return to OIL all unused and left over commissioning spares, after successfulcommissioning of the plant.
3.5 OIL shall have the right to take possession or use any completed or partially completed Work. Suchpossession or use shall not be deemed to be an acceptance of any work done not in accordance with the Purchase order. However, any damage to such work solely due to such provision or use shall be to the OILs account.

ITEM NO. 30

AMS FOR 6 YEARS ITEM NO. 10: - QTY = 01 AU

1.0 The supplier of the solar PV plant has to take over the annual maintenance of the plant for 6 (six) years once the plant is successfully handed over to OIL after performance testing. The Annual maintenance service purchase order shall be awarded to the supplier once the supply, installation and testing part is over and the plant is acceptable to OIL.

As Solar PV plants by default are to be cleaned/maintained regularly so as to obtain and maintain full output, the supplier shall have to maintain the plant during the guarantee period of 1 (one) year also. During this (guarantee) period the supplier has to maintain the plant as per the OEMs' recommendations. In case of any defects/breakdown of the plant during this period, the supplier shall repair/replace the defective items/components free of cost as per the guarantee/warranty terms.
Once the guarantee period is over, comprehensive annual maintenance purchase order shall start and thesupplier/supplier shall maintain the plant along with spares for 5 (five) years.

The AMS Purchase order, therefore, shall be of duration of 6 (six) years as follows:
a) Only maintenance of the plant (without supply of spares etc.) for 1 (one) year during the guarantee period.
b) Comprehensive maintenance purchase order for 5 (five) years starting from the end of guarantee period.
Once the PO is awarded, the supplier is to immediately enter into an agreement with OIL for AMS purchase order for 6 (six) years as above.

1.1 The entire work comprising design, engineering, manufacture, inspection and testing of performance atmanufacturer's and/or supplier’s works, delivery to site, erection, testing and commissioning and finalhanding over shall be carried out as per the following schedule:
a) The design, manufacture and supply part (with delivery at site) shall be completed within a period of 6 (six) months from the Award of PO. However supplier shall put his best efforts to expedite the job before schedule.
b) The erection, testing & commissioning and handing over part shall be completed within a period of 3 (three) months from the date of site clearance by OIL.

1.2 Supplier shall visit the site immediately after award of purchase order and arrange for civil structures to be made. He shall also arrange for transportation of items/equipment to site.

1.3 The available area of the rooftop is measured to be approx. 350 square metre. Though the output of the solar plant is estimated at 30KWp (calculated from the available area), actual output may be at variance depending on the orientation and inclination of the PV arrays and shadowed areas ofthe roof. Also, since load bearing capacity of the roof varies from the old portion to new portion, it is in the scope of the supplier to find out the best possible area for installation of the plant based on the available Civil Engineering input data. Hence the KW output is given as 30 KWp (estimated).

ITEM NO. 40

SUPPLY OF GRID INTERACTIVE ROOFTOP MOUNTED SOLAR PHOTO-VOLTAIC SYSTEM – QTY = 01 NO

The scope of supply of the equipment and materials for grid interactive solar PV power plant shall include, but not limited to the following:
a) Solar PV modules of composite capacity as mentioned above including mounting frames, structure, array foundation and module interconnection, Array Junction boxes
b) Power Conditioning Units that are communicable on with remote sensing, DSP and sleeping mode operation
c) DC power junction boxes, bus bars and circuit breakers
d) AC power evacuation panel with bus bars and circuit breakers
e) Metering and protection /Isolation systems. Meters to be communicable on remote sensing
f) LV Power and Control Cables including end terminations and other required accessories for both AC & DC power
g) Earthing system for PV Array, DC power system, PCU, AC power system for LT equipment
h) Lightning protection system including surge protection devices in both DC power side and AC power side
i) Tool kit
j) PVC pipes and accessories
k) Transportation of equipment to site

The above list is indicative only; supplier has to provide all the required equipment/ items for the complete plant.

ANNEXURE - TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS FOR GRID INTERACTIVE ROOFTOP MOUNTED SOLAR PHOTO-VOLTAIC SYSTEM

C ON T E N T S

Sl.No. TOPICS

2 Location
3 Site Description
4 Google Co-ordinates of the site
5 Scope of Specification
6 Codes & Standards
7 Specific Technical Requirements
8 System documentation
9 Tests & Test Reports
10 Maintenance Requirement
11 Layout Requirements
12 Instruction and O&M Manual
13 Customer Training
14 Post Warranty Comprehensive AMS Contract

1.0 INTRODUCTION:

It has been proposed to setup a 24KWp (estimated) grid interactive solar photovoltaic power plant (without battery back-up) at the Zaloni Guest house at Duliajan , which will be a Rooftop installation project.

The Grid interactive Rooftop Mounted Solar PhotoVoltaic (PV) plant shall consist of mainly three major components, viz. the solar photovoltaic (SPV) modules, array (including array mounting structure) and the inverter or power conditioning unit(s). The SPV array converts the solar energy into DC electrical energy. The array mounting structure holds the PV modules in required position. The DC electrical energy from the PV arrays is converted to AC power by the inverter or PCU, which is connected to the captive power grid. The AC power output of the inverter is fed to the AC distribution board through metering panel and isolation panel. The415 V 3Ø AC output of the system can be synchronized with the captive grid and the power can be exported to the grid depending upon solar power generation and local consumption.

2.0 LOCATION:

LocationDetails
Name of State Assam
District Dibrugarh
Location Zaloni Guest house Duliajan(rooftop)
Latitude 27.36 deg. N
Longitude 95.32 deg. E

3.0 SITE DESCRIPTION:

Duliajan is an industrial town and one of the most developed and advanced town from all over India located in Dibrugarh District in the upper north-east corner of India. The town is situated about 45 km east of Dibrugarh City.

In Duliajan, the climate is warm and temperate. In winter there is much less rainfall than in summer. According to Köppen and Geiger, the climate is classified as Cwa. The average annual temperature in Duliajan is 23.2 °C. The average annual rainfall is 2528 mm. The driest month is December with 21 mm. Most precipitation falls in July, with an average of 489 mm. The warmest month of the year is August with an average temperature of 27.8 °C. In January, the average temperature is 16.1 °C. It is the lowest average temperature of the whole year.

However, the equipment for the plant shall be suitable for satisfactory operation under the ambient conditions as follows:

a. Operating Environment: 10 to 50 Deg. C
b. Operating Relative Humidity: 0 to 95%

c. Storage temp.: 15 to 45 Deg. C
d. Elevation: 100 m above MSL

4.0 CO-ORDINATES OF THE SITE:

Latitude 27.36 deg. N
Longitude 95.32 deg. E

5.0 SCOPE OF SPECIFICATION:

5.1 The scope of these specifications shall cover design, engineering, manufacture, quality surveillance, testing at manufacturer's works, packing and supply, erection, testing and commissioning and performance testing of 24 KWp (estimated) grid interactive Rooftop mounted solar photovoltaic system with associated components for installation at Oil India Limited, Duliajan.

5.2 The systems shall be complete with PV modules, inverter, metering, junction boxes, AC, DC distribution boards and cables, communication interface, and any other equipment necessary for safe and efficient operation of the system.

5.3 The work shall also include interconnection of PV system with the existing OIL grid supplying power to the building.

5.4 The civil works for installation of complete system shall also be in scope of supplier.

5.5 It is not the intent of these specifications to specify completely herein all the details of design and construction of equipment. However, the equipment offered shall conform in all respects to high standards of engineering, design and workmanship and be capable of performing in commercial operation up to Bidder's guarantee in a manner acceptable to OIL, who will interpret the meaning of drawings and specifications and shall have the power to reject any work or materials, which in his judgment are not in full accordance therewith.

5.6 It shall be the responsibility of the Bidder to ensure that all the works as per scope of the specification are completed for safe and efficient working of the system.

5.7 All the necessary co-ordination with regard to sub-contracted items shall be carried out by the Bidder. The customer (OIL) will communicate only with the Bidder for all matters pertaining to this contract.

5.8 Even if all components of a system included in these specifications are not explicitly identified and /or listed herein, these shall be supplied under this contract to ensure completion of the system and facilitate proper operation and easy maintenance of the plant. All the fittings and accessories that might not have been mentioned specifically in the specification but are necessary for completeness of the plant, shall be deemed to be included in the specifications and shall be supplied and furnished by the Contractor without any extra charge.

5.9 Considering the reliability of the grid, no electrical storage batteries are envisaged as excess electricity generated by the solar panels which is not required by the equipment/devices in the building premises shall be exported to the grid.

6.0 CODES AND STANDARDS

6.1 All Equipment and accessories shall comply with requirement of standards published by Bureau of Indian Standards (BIS).In case no BIS codes exist the equipment shall meet the requirement of international standard including IEEE for design and installation of grid connected PV system. The list of standards adopted shall be indicated in the bid.

6.2 The SPV Module must be provided with acceptable Test& Certified documents.

6.3 The quality of equipment supplied shall be generally controlled to meet the guidelines for engineering design included in the standards and codes listed in the relevant ISI and other standards, such as:

o IEEE 928: Recommended Criteria for terrestrial PV power systems.
o IEEE 929: Recommended practice for utility interface of residential and intermediate PV systems.
o IEEE 519: Guide for harmonic control and reactive compensation of Static Power Controllers.
o National Electrical NFPA 70-1990 (USA) or Equipment National standard.
o National Electrical Safety Code ANSIC2 (USA) or equipment national standard.
o IEC: 61215 (2005) - Crystalline silicon terrestrial photovoltaic (PV)modules-Design qualification and type approval
o IEC 61683 / IS 61683 - Efficiency Measurements of Power Conditioners/Inverters including MPPT and Protections
o IEC: 61730 -1, -2 Photovoltaic (PV) module safety qualification Part 2: Requirements for testing
o IEC: 60904-1(2006) Photovoltaic Devices-Part-I: Measurement of Photovoltaic current- Voltage Characteristic
o IEC: 62446 (2009)- Grid-Connected Photovoltaic Systems- Minimum Requirements for System Documentation, Commissioning Tests and Inspection
o IS 9000: Basic environmental testing procedure for Electronic and electrical items.

7.0 SPECIFIC TECHNICAL REQUIREMENTS:

a. The Solar PV power system shall be rooftop mounted, grid connected without battery back-up.

b. The PV Array shall consist of a number of individual PV modules or panels that have been wired together in a series and/ or parallel combination and shall meet the generation power capacity of 24 KW peak (estimated).

c. The DC power generated from SPV array shall be converted to AC power with Power Conditioning Unit, consisting of Grid-tie Inverter and the associated control and protection devices. The voltage level shall match the grid voltage (415 Volts AC, 3-phase & Neutral, 50 Hz).

d. Output from Power Conditioning Unit shall be connected to an existing LT power distribution panel, wherein continuous synchronization with grid power shall be automatically active through static circuitry mechanism & devices. The inter-connecting power cable between the ACDB of the SPV Plant and the existing LT power distribution panel will be in the scope of OIL.

e. Maximum available power of Solar PV Plant will be drawn during the daytime and during any shortfall in power generated by Solar PV Plant during time then extra power required shall be drawn from the Utility Source/without interruption to serve the load requirement.

In case of any failure of grid power supply, PV Solar power supply will also automatically get disconnected immediately and the same will be restored automatically at restoration of grid power. In grid interactive systems, it has, however to be ensured that in case the grid fails, the solar power has to be fully utilized or stopped immediately feeding to the grid (if any in excess) so as to safe-guard any grid person/technician from getting shock (electrocuted) while working on the grid for maintenance etc. This feature is termed as 'Islanding Protection'.

f. Solar PV system shall consist of the following minimum equipment. The list is indicative only; bidder has to provide all the required equipment/ items for the complete plant:
o Solar PV modules consisting of required number of PV cells
o Power Conditioning Unit/Inverters
o Mounting structures

o Cables and hardware
o Junction box and distribution boxes
o Surge protection devices in both DC power side and AC power side
o Earthing kit
o Lightning arrestors
o PVC pipes and accessories
o Tool kit
o Civil pedestals

g. DUTY CYCLE: Average Hours of Operation/day: 8-10 hours per day, as per the solar insolation levels of the site.

7.1 PV ARRAYS

7.1.1 Solar PhotoVoltaic Modules shall be MONO/POLY CRYSTALLINE Silicon PV Modules. The peak power output of the PV Module shall be from 250 to 320 Wp under STC. Complete mounting structure, hardware etc. shall be suitable for Rooftop installation/mounting; the same shall be in the scope of Vendor.

7.1.2 The Solar PV module should meet the minimum requirement of MNRE.

7.1.3 SPV modules shall be designed and manufactured to meet the same recognized standard which must have been used extensively throughout the world for more than a decade with an excellent track record of performance. Each module should have two separate interconnected strings with proper by-pass diode(s). Minimum dimension of the SPV module shall be preferred. Bidders should submit the technical literature with detailed technical specifications of the modules as well as the drawings & manuals. Modules should have an efficiency of not less than 15% and the fill factor should be 75%.

7.2 Statutory Approvals and Minimum Technical Requirement

Modules should fulfill the following conditions:

a) The offered PV modules must be tested and approved by Govt. MNRE Authorized test center or equivalent International Labs.

b) The module shall meet IEC 61215 (for Crystalline) along with IEC61730 Part I and Part II (for safety) and IEC 61701 for salt mist corrosion. These shall be Class A only.

c) Each solar PV module shall be warranted by the manufacturer with free replacement if the output under standard light condition falls more than 10% in first 10 (ten) years and 20% in next 15 (fifteen)years.

d) Photo electrical conversion efficiency of the module shall not be less than 15%. The bidder shall indicate minimum module efficiency.

e) Fill factor of the module shall not be less than 0.70.

f) The bidder shall provide the sample solar PV module electrical characteristics including current-voltage (I-V) performance curves and temperature coefficients of power, voltage and current. However, the tabulated document with all the relevant data like voltage, current, power output for all the modules also to be provided.

g) The PV modules shall be suitable for continuous outdoor use.

h) The PV module shall be made of high quality laminated in ultraviolet stabilized polymer material such as Ethyl Vinyl Accelerate (EVA), Tedler, and toughened glass. The size of single

crystalline silicon PV cells shall be so chosen so as to maximize energy density and align with economies of scale.

i) PV module shall be provided with frame of anodized channels for size and simplicity in installation offered as a single module or series parallel combination of modules. The PV module shall be provided with screw-less frame with solar cable and connector.

j) The PV modules shall be equipped with by-pass diode to minimize power drop caused by shade.

k) The PV modules shall be made of lightweight cells, resistant to abrasion, hail impact, rain, water and environmental pollution. The PV modules shall be provided with anti-reflection coating and back surface field (BSF) structure to increase conversion efficiency.

l) The PV module shall use lead wire with weatherproof connector for output terminal.

m) The power output of the PV system under Standard Test Conditions (STC) should be 100% kWp of module size depending upon manufacturer's prudent practice, with nominal output voltage of 24 V. The number of modules to be supplied shall be worked out accordingly.

n) The operating voltage corresponding to the power output mentioned above should be >32.0 V for 24V system.

o) The terminal box on the module should have a provision for opening for replacing the cable, if required.

p) Each PV module must use a RF identification tag (RFID), which must contain the following information:
o Name, monogram or symbol of the manufacturer of PV Module
o Name, monogram or symbol of the Manufacturer of Solar cells
o Type or model number of the module
o Month and year of the manufacture (separately for solar cells and module)
o Polarity of terminals or leads (colour coding is permissible)
o Maximum system voltage for which the module is suitable
o I-V curve for the module
o Peak Wattage, Im, Vm and FF for the module
o Unique Serial No and Model No of the module
o Date and year of obtaining IEC PV module qualification certificate
o Country of origin (separately for solar cells and module)
o Name of the test laboratory issuing IEC certificate
o Other relevant information on traceability of solar cells and module as per
o ISO 9000 series

q) The systems shall perform satisfactorily in relative humidity up to 95% and temperature between 10ºC to +55ºC.

7.3 SUPPLY & INSTALLATION OF DC COMBINER BOX /ARRAY JUNCTION BOX:

7.3.1 Enclosure: The array junction boxes shall be made of PC-GFS (Polycarbonate-Glass fiber substance) thermoplastic having minimum IP65/66 protection in accordance with IEC 60 529 with the help of internally embedded polyurethane gasket.

7.3.2 The enclosure should be double insulated with protection class II. In view of the same, IEC60439/ IEC61439 (new revision) comes as an important standard as it fulfills this requirement of enclosure to be double insulated. (Test certification is required for IP65/ IP 66 degree of protection.) The lid shall be of transparent polycarbonate.

7.3.3 Fuse Protection on Strings: DC fuses rated from 2A to 25A from leading manufacturers to be

used in the combiner box to provide over-current protection.

7.3.4 Surge Protection Device: Surge Protection devices or SPD to be provided to protect the combiner/junction box from any power surge and voltage spike. SPD to be used should meet Type 2 regulations, and to be typically rated between 600 to 1000V.

7.3.5 Input Glands/Connectors: The combiner/array junction box offered is to be provided with IP67 rated Cable Glands or MC 4 connectors at the input side to lead the array strings into the box. Suitable markings should be provided for easy identification and cable ferrules shall be fitted at the cable termination points for identification.

7.3.6 Burning Behavior:
Glow wire test in accordance with IEC 60695-2-UL Subject 94at960C, flame retardant & self-extinguishing.
o Base part of Polycarbonate Enclosure should have V-0 as flammability standard.
o Lid part of PC Enclosure should have V-2 as a flammability standard.

7.3.7 Degree of protection against mechanical load: IK 08 (5 Joule)

7.3.8 Toxic behavior: Halogen/Silicon free, conform to RoHS directive 2002/95/EC

7.3.9 Temperature Tolerance range: -40 deg C to +120 deg C

7.3.10 Chemical Resistance: Acid, Lye, Petrol, Mineral Oil & partially resistant from Benzene.

7.3.11 UV behavior: UV stabilized, even after many years there should be no sign of brittleness.

7.4 INVERTER
7.4.1 As SPV array produce direct current electricity, it is necessary to convert this direct current into alternating current and adjust he voltage levels to match the grid voltage. Conversion shall be achieved using an electronic Inverter and the associated control and protection devices. All these components of the system are termed the "Power Conditioning Unit (PCU)". In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array & the Inverter, to maximize Solar PV array energy input into the System.

7.4.2 Each PCU shall be compliant with IEEE Standard 929-200 or equivalent and should be at least IP54.

7.4.3 The DC power produced is to be fed to inverter for conversion into AC. In a grid interactive system AC power shall be fed to the grid at three phase 415AC bus. Power generated from the solar system during the daytime shall be utilized fully by powering the building loads and feeding excess power to the grid as long as grid is available. In cases, where solar power is not sufficient due to more demand or cloud cover etc. the building loads shall be served by drawing power from the grid. The inverter should always give preference to the Solar Power and will use Captive Grid power only when the Solar Power is insufficient to meet the load requirement.

7.4.4 The output of the inverter must synchronize automatically its AC output to the exact AC voltage and frequency of the captive grid.

7.4.5 Inverter shall continuously monitor the condition of the captive grid and in the event of captive grid failure, the inverter should automatically switch to off-grid supply within 20-50 milliseconds. The solar system should then be resynchronized with the captive grid within two minutes after the restoration of grid.

7.4.6 Captive Grid voltage shall also be continuously monitored and in the event of voltage going below a preset value and above a preset value, the solar system shall be disconnected from the grid within the set time. Both overvoltage and undervoltage relays shall have adjustable voltage (50%

to 130%) and time settings (0 to 5 seconds).

7.4.7 Metal Oxide Varistors (MOVs) shall be provided on DC and AC side of the inverter.

7.4.8 The inverter control unit shall be so designed so as to operate the PV system near its maximum Power Point (MPP), the operating point where the combined values of the current and voltage of the solar modules result in a maximum power output.

7.4.9 The inverter shall be a true sine wave inverter for a grid interactive PV system. It shall be an efficient and reliable solid-state device (IGBT type).

7.4.10 Each Sub-Array Junction Box will have Suitable Reverse Blocking Diodes of maximum DC blocking voltage of1000 V with suitable arrangement for its connection.

7.4.11 The degree of protection of the outdoor inverter panel shall be at least IP-55.
7.4.12 Typical technical features of the inverter shall be as follows:

Continuous output power rating : >= 24 kWp
Maximum input voltage : 1000 V
Nominal AC output voltage : 415V, 3 Phase
Accuracy of AC Voltage control : ± 1%
Output frequency : 50 Hz
Accuracy of frequency control : ± 0.5%
Ambient temperature : 10 deg C to 55 deg C
Captive grid voltage tolerance : -20 % and + 15 %
Power factor control : 0.95 inductive to 0.95 capacitive
No-load losses : < 1% of rated power
Inverter efficiency (minimum) : 96%
Maximum efficiency/ European efficiency : 98% minimum
Power Control : MPPT
Surge Protection Device (SPD) : Required (Type I & 2)
Overload behavior : Current limitation; power limitation
Total Harmonic distortion (TDH) :< 3 % @ nominal apparent power
Protection required :DC reverse-polarity/AC short-circuit current capability/ galvanic isolation
Anti-islanding protection / Grid regulation : As per EN, VDE standard

7.4.13 Liquid crystal display shall at least be provided on the inverters front panel or on separate data logging/display device to display following:
o DC Input Voltage
o DC Input current
o AC Power output(kW)
o Current time and date
o Time active
o Time disabled
o Time Idle
o Temperatures(C)
o Converter status

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

7.4.15 All doors, covers, panels and cable exits shall be gasketed or otherwise designed to limit the entry of dust and moisture. All doors shall be equipped with locks.

7.4.16 Operation Mode:

o Night or sleep mode: Where the Inverter is almost completely turned off, with just the timer and

control systems till in operation, losses shall be less than 2W per 5 kW.

o Standby mode: Where the control system continuously monitors the output of the solar generator until pre-set value is exceeded (typically 10W).

o Operational of MPP tracking mode: the control system shall continuously adjust the voltage of the generator to optimize the power available. The power conditioner shall automatically re-enter standby mode when input power reduces.

o Below the standby mode threshold: Front panel shall provide display of status of the inverter.

7.5 PROTECTIONS AND CONTROL

7.5.1 PV system software and control system shall be equipped with islanding protection as described above. In addition to disconnection from the grid (islanding protection) i.e. on no supply), under and overvoltage conditions, PV systems shall be provided with adequate rating fuses, fuses on inverter input side (DC) as well as output side (AC) side for overload and short circuit protection and disconnecting switches to isolate the DC and AC system for maintenance are needed. Fuses of adequate rating shall also be provided in each solar array module to protect them against short circuit.

7.5.2 A manual disconnect switch beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility personal to carry out any maintenance. This switch shall be locked by the utility personal.

7.6 METERING SCHEME

7.6.1 Metering is required to measure the Solar Gross Generation on continuous basis and register cumulative energy based on 15 minute interval basis, daily, monthly and yearly energy generation.

7.6.2 The average voltage and power factor based on 15 minute interval must also be recorded.

7.6.3 Meter must also display on demand, instantaneous, AC system voltages and currents, frequency, reactive power with sign, total harmonics current and voltage distortion etc.

7.6.4 Meters shall comply with the requirements of CEA Regulations on "Installation and Operation of Meters" and in conformity with IS 13779 or IS 14679.

7.6.5 An integrating pyranometer (class II or better) is to be provided with the sensor mounted in the plane of the array. Readout shall be integrated with data logging.

7.7 POWER QUALITY REQUIREMENTS:

7.7.1 DC Injection in to the grid: The injection of DC power into the grid shall be avoided by using an isolation transformer at the output of the inverter. It is proposed to limit DC injection within 1% of the rated current of the inverter as per IEC 61727.

7.7.2 Harmonics on AC side:
Harmonic distortion is caused principally by non-linear loads such as rectifiers and arc furnaces and can affect the operation of a supply system and can cause overloading of equipment such as capacitors, or even resonance with the system leading to overstressing (excessive voltage & current). Other effects are interference with telephone circuits and broadcasting, metering errors, overheating of rotating machines due to increased iron losses (eddy current effects), overheating of delta connected winding of transformer due to excessive third harmonics or excessive exciting current.

7.7.3 The limits for harmonics shall be as stipulated in the CEA Regulations on grid connectivity which are as follows:

o Total Voltage harmonic Distortion= 5%
o Individual Voltage harmonics Distortion=3%
o Total Current harmonic Distortion=8%

7.7.4 Voltage Unbalance-The Voltage Unbalance in the grid shall not exceed 3.0%.

7.7.5 Voltage Fluctuations:
The permissible limit of voltage fluctuation for step changes which may occur repetitively is 1.5%.
For occasional fluctuations other than step changes the maximum permissible limits is 3%.

7.8 COMMUNICATION INTERFACE:

7.8.1 The project envisages a communication interface which shall be able to support
o Real time data logging
o Event logging
o Supervisory control
o Operational modes
o Set point editing

7.8.2 The following parameters shall also be measured and displayed continuously.
o Solar system temperature
o Ambient temperature
o Solar irradiation/insolation
o DC current and Voltages
o DC injection into the grid (one time measurement at
o Efficiency of the inverter
o Solar system efficiency
o Display of I-V curve of the solar system
o Any other parameter considered necessary by supplier of the solar PV system based on prudent practice

7.8.3 Data logger/PC based monitoring system must record these parameters for study of effect of various environmental & grid parameters on energy generated by the solar system and various analysis would be required to be provided through bar charts, curves, tables, which shall be finalized during approval of drawings.

7.8.4 The communication interface shall be an integral part of inverter and shall be suitable to be connected to local computer and also remotely via the Web using either a standard modem or a GSM/WIFI modem.

7.9 WEATHER MONITORING STATION:

7.9.1 An integrating PYRANOMETER for measuring the Solar Irradiance is to be provided, with the sensor mounted in the plane of the array. Readout is to be integrated with the data logging system.

7.9.2 In addition, temperature probes for recording the Solar panel temperature and ambient temperature are to be provided.

7.10 MOUNTING STRUCTURES:

7.10.1 Module mounting structure should be as per MNRE specifications and supply & installation shall be in scope of Vendor.

7.10.2 The mounting structure shall be of anodised aluminium/ hot dip galvanized MS angles of proper size (minimum35 mm x 35 mm x 5 mm) and shall withstand wind speeds of150 KM/hour

(horizontal). The minimum thickness of galvanization shall be at least 70 microns. All fixing fasteners shall be of stainless steel grade SS 304. Legs assembly shall be of MS Hot Dip galvanized pipes after fabrication/ anodised aluminium.

7.10.3 The structure shall be designed in accordance with the latitude of the place of installation. The array mounting structure shall be designed to allow easy replacement of any module and shall be in line with site requirement. Structure shall be designed for simple mechanical and electrical installation. It shall support SPV modules at a given orientation, absorb and transfer the mechanical loads to the Rooftop properly.

7.10.4 The mounting structures must be suitable to mount the SPV modules/panels/arrays on the Rooftop at an angle for optimum tilt. The module alignment & tilt angle shall be calculated to provide the maximum annual energy output. This shall be decided based on the location of array installation.

7.10.5 The support structure design & foundation shall be designed to withstand wind speed up to 200 kmph using relevant Indian wind load codes.

7.10.6 The minimum clearance of the lowest part of the module/module structure and the developed Rooftop level shall not be less than 300mm.

7.10.7 The legs of the structures shall be fixed suitable angle nosing (in scope of vendor). While making foundation design, due consideration shall be given to the weight of module assembly and maximum wind speed.

7.10.8 The foundation pedestals wherever necessary shall be concrete.

7.10.9 The mounting of solar modules shall be done on rooftop and entire Fabrication of elevated structure and the structure atop sloping roofs shall be done by the Bidder.

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

7.11 POWER AND CONTROL CABLES:

7.11.1 Power Cables of adequate rating shall be required for interconnection of:
o Modules/panels within array
o Array & Charge Controller
o Charge controller & Loads Including Inverter

7.11.2 The cable shall be1.1 kV grade, heavy duty, stranded copper conductor, PVC type A insulated, galvanized steel wire/strip armored, flame retardant low smoke (FRLS) extruded PVC type ST-1 outer sheathed. The cables shall, in general conform to IS-1554 Part I & other relevant standards.

7.11.3 The minimum size of 1.1 kV power cables shall be chosen taking into account fault level contribution to the system and full load current. However, power cables size for 415 V systems shall be chosen taking into account the full load current & voltage drop. The allowable voltage drop at terminal of the connected equipment shall be max. 2.5% at full load. The de-rating factors viz. group deration, temp. deration shall also be considered while choosing the conductor size.

7.11.4 The permissible voltage drop from the SPV Generator to the Charge controller shall not be more than 2% of peak power voltage of the SPV power source (generating system). In the light of this fact the cross-sectional area of the cable chosen should be such that the voltage drop introduced by it shall be within 2% of the system voltage at peak power.

7.11.5 All connections should be properly terminated, soldered and/or sealed from outdoor and

indoor elements. Relevant codes and operating manuals must be followed. Extensive wiring and terminations (connection points) for all PV components is needed along with electrical connection to lighting loads.

7.12 LIGHTNING PROTECTION AND EARTHING:

7.12.1 Required numbers of suitable lightning arrestors should be installed in the array area.
Lightning protection shall be provided by the use of suitable earthing conductors and electrodes so that any lightning strike may find an alternate route to earth. Protection shall meet requirements of Central Electricity Regulations, 2010, and IS 2309:1969 (Protection of Buildings and allied structures from lighting).

7.12.2 Each array structure of the PV system should be grounded properly as per IS: 3043-1987. Provision should be kept for shorting and grounding of the PV array at the time of maintenance work. All metal casing/shielding of the plant should be thoroughly grounded in accordance with Indian Electricity Rules 1956. Earth resistance should be tested in a dry weather in presence of the representative of customer, after earthing work is complete, with a calibrated earth tester and should have a value not more than the value specified in the relevant Code/Rules.

7.12.3 In case the SPV Array cannot be installed close to the equipment to be powered & a separate earth has been provided for SPV System, it shall be ensured that all the earth connections are bonded together to prevent the development of potential difference between any two earths.

7.13 CIVIL WORKS:

7.13.1 Embedment of structures suitable for mounting PV modules.

7.13.2 All the machinery such as hydra, JCBs, fork-lifts, for unloading of materials at site, movement of materials, foundation, erection of structures, module mounting, etc. shall be in the scope of Vendor.

8.0 SYSTEM DOCUMENTATION:

Complete documentation on the system must be provided to OIL. System documentation should include an owner's manual and copies of relevant drawings for whatever system maintenance might be required in the future.

9.0 TESTS AND TEST REPORTS:

Final acceptance tests for the PV plant shall include, but not limited to, the following:

9.1 Visual inspection

9.2.1 Verification that all required system and equipment labels, markings and placards are correct and in the proper locations. This includes ensuring that all equipment is properly listed, identified and labelled, suitable for the conditions of use, and installed according to the listed product instructions.
9.2.2 Wiring & cabling
9.2.3 Earthing connections
9.2.4 Mounting and support structures
9.2.5 Modules
9.2.6 Lightning protection including surge protection

9.2 Insulation Resistance Measurement

9.2.1 Importance of PV system wire insulation for safety and performance

9.2.2 Measurement methods for ac and dc circuits
9.2.3 Interpretation of insulation test data and application of the results
9.2.4 Test equipment selection

9.3 Array Performance Measurement

Electrical measurement, including calculating circuit voltages and currents to verify that the PV array and system operating parameters are within specifications.

9.3.1 I-V Curve Tracing and discrete voltage and current measurement
9.3.2 PV system performance verification, correction and measurement using capacity test
9.3.3 Interpreting I-V curves for performance troubleshooting
9.3.4 Power performance Index and Energy performance index
9.3.5 Calculations of energy yield
9.3.6 Power rating, inverter efficiency, module temperature, array yield, system losses, etc.

a. Type test certificates for all the tests specified for the factory built Solar PV modules, and the component parts shall be submitted by the Bidder along with the bid.
b. Six sets of copies of the compiled and approved test certificates shall be submitted to the Purchaser.

10.0 MAINTENANCE REQUIREMENT:

a. Easy access shall be provided for all components in the SPV plant and grid connecting equipment. Maintenance platform shall be provided for easy inspection of all the equipment.

b. If special tools are required for installation and maintenance, the bidder shall indicate the same and to be supplied free of cost.

c. The Bidder shall furnish operating and maintenance instruction manual to enable the purchaser to carry out maintenance of equipment effectively and safely.

d. Washing / cleaning of SPV panels would be carried out as per the prudent practice of the supplier.

11.0 LAYOUT REQUIREMENT:

The overall dimensions of the SPV Plant shall suit the Rooftop space provided for the layout requirements. The arrangement to suit this space shall be intimated at the time of approving the general arrangement drawing of the equipment.

12.0 INSTRUCTION AND O&M MANUALS:

12.1 Six copies of Instruction and Operation and Maintenance Manual in English should be provided with the system.

12.2 The manual shall be furnished at the time of dispatch of the equipment and shall include the following aspects:

o Erection drawings with written assembly instructions that would enable the Purchaser to carryout erection with his own personnel if opted by him.
o Detailed instructions and procedures for the installation operation and maintenance.
o About solar PV system- its components and expected performance.
o Clear instructions about mounting of PV module (s)
o About the electronics
o DO's and DONT's
o Principles of Operation of various equipment

o Safety and reliability aspects
o Metering scheme
o About power conditioning unit software and controls
o Clear instructions on regular maintenance and troubleshooting of solar power plant
o Name and address of the person or service center to be contacted in case of failure or complaint.
o Rated voltages, current and all other technical information which may be necessary for correct operation of the SV plant.
o Catalogue numbers of all the components which are liable to be replaced during life of the SV plant and all the component parts.
o Trouble shooting and diagnostic procedure

13.0 CUSTOMER TRAINING:

13.1 Bidder shall provide necessary onsite-training and demonstration on the system related today to day operation & maintenance of the system including basic troubleshooting.

13.2 On-site training shall be considered by the Vendors and costs towards this, if any, shall be deemed to have been included in the overall quoted costs of the system. No additional costs towards to & fro travel, boarding &loading shall be made on this account.

14.0 Makes of Components:

Only indigenous brands of components will be used in the solar cell/panel system. Makes of various items will be as under:

14.1 Mono- crystalline solar panel: Maxsolar/ Moserbaer/Indo Solar/SSL/ Euro Multivision/UPV Solar/KL Solar/Goldi Green/Powertrac Solar/ Maglare Technologies/ SunFuel/IB Solar/ HHV Solar Technologies or any other make approved by MNRE(Govt of India)
14.2 Poly-crystalline solar panel: SSL/SunFuel/Evolve India Group/Sirius Solar Energy/Empire Solar/HHV Solar Technologies/Jain Irrigation Systems or any other make approved by MNRE(Govt of India)
14.3 Mono- crystalline solar cell: SSL/Euro Multivision/UPV Solar/KL Solar/CEL or any other make approved by MNRE(Govt of India)
14.4 Poly-crystalline solar cell: SSL/Euro Multivision/UPV Solar/KL Solar/Jupiter Solar or any other make approved by MNRE(Govt of India)
14.5 Inverter/filter on-grid: Evolve India Group/Power One Microsystems/reputed Indian or any other make approved by MNRE(Govt of India)
14.6 EVA film: RenewSys/Allied Glasses/SSL/Dugar Polymers/BrijEncapsulants or any other make approved by MNRE(Govt of India)
14.7 Modular mounting structure: NEPC/RN Solar/reputed Indian or any other make approved by MNRE(Govt of India)

15. DRAWINGS AND DOCUMENTS:

15.1 The supplier shall obtain approval for the following drawings / documents:
a) Detailed design data
b) Verification of site and DNI data
c) GA and layout drawings of the PV arrays, inclination of panels
d) Structural drawing along with foundation details for the structure
e) Electrical Single line diagram, block diagram, wiring diagram, cable route drawing etc.
f) Bill of Materials and datasheets/catalogues of all the components to be used in the system, viz., invertersystem, PCU, MPPT, MCB DB, DCDB, ACDB, meters etc.
g) Spares list and prices of spares for all the items separately.

15.2 Six sets of the following documents ("as-built") shall be submitted with the supply:
a) Approved GA and layout drawings of the PV arrays, inclination of panels
b) Approved Structural drawing along with foundation details for the structure

c) Approved Electrical Single line diagram, block diagram, component layout diagram, wiring diagram,cable route drawing etc. d) Approved Bill of Materials and datasheets/catalogues of all the components to be used in the system,viz., inverter system, PCU, MPPT, MCB DB, DCDB, ACDB, meters etc. e) Approvedspares list and prices of spares along with probable sources for all the BoM items f) Operation and Maintenance manuals of items and complete plant g) Type test and routine test certificates for all the tests specified for the factory built Solar PV modules and the component parts Test certificates h) Type test and routine test certificates of the inverter system from OEM from CPRI or any govt. approved NABLaccredited test laboratory i) Guarantee Certificate (separate) for all items viz. panels, PCU, mounting structures etc. The Supplier shall submit all finaldocuments in 6 copies along with one soft copy, and "as built" documents in 6 copies along with 1 soft copy &1 re-producible. 16. SPARES: 16.1 Supplier shall submit a list of commissioning spares along with the supply. All such spares shall be supplied along with the main equipment. The Supplier shall return to OIL all unused and left over commissioning spares, after successful commissioning of the plant. 16.2 Supplier shall, in addition, provide a list of recommended spares along with prices, quantity and sources. However, the prices shall remain firm for a period of six years after successful commissioning and handing over of the entire plant. 16.3 Supplier has to provide all spares against routine and breakdown maintenance required for the plant during the AMC period.	
ITEM NO. 50 **INSTALLATION AND COMMISSIONING FOR ITEM NO. 40: QTY = 01 AU** Installation and Commissioning of the Grid Interactive Solar Rooftop Power Plant: The erection, installation and commissioning part shall include, but not limited to, the following: a) Erection of civil foundations on rooftop for mounting of arrays (after discussion and analysis of building data with Civil Engineering department of OIL) b) Unloading and erection of all supplied equipment on foundations at the selected place c) Pre-Commissioning & commissioning of all supplied equipment d) Test running of the Solar Plant as well as load trials at site Supplier shall arrange for the following: a) All civil jobs including material supply related to erection, installation & commissioning. b) All tools, tackles, crane and test equipment required for commissioning and carrying out tests. c) Boarding & lodging for his engineers and transportation of men and materials to site at his own expense. 1. Supply of erection / construction materials and consumables The Supplier shall provide all necessary erection equipment, materials (viz., cement, sand, stone chips etc.), tools and tackles including material handling equipment (cranes/fork-lifts/hydra etc.) compressors and other equipment and instruments and consumables, allcommissioning equipment and instruments, welding equipment, winches, alignment tools, precision levels etc.,which may be required for carrying out the erection and commissioning work (as applicable) efficiently. Unless otherwise specified, the above erection equipment/materials shall be the property of the Supplier. However,OIL's prior written permission shall be required for removal of these erection equipment / materials from the site. The Supplier shall ensure that proper documentation is followed at entry gate of OIL's premises for suchitems, which shall be carried back by Supplier after completion of	

work.

2. Erection, Installation & Civil Works:

The Supplier shall strictly adhere to the following as applicable as per scope of work.

2.1 Mobilization and access to site

2.1.1 Communication facilities, if required, shall be arranged by the Supplier.
2.1.2 While execution of work, no person other than the Supplier, Sub-Supplier and his or theiremployees shall be allowed on the Site during working hours except with the written permission of the OIL.Facilities to inspect the works at all times shall be afforded by the Supplier to OIL and his representatives andother authorized officials. The labour camps shall not be established by the Supplier inside the site premises.Nothing extra shall be payable by OIL on this account.
2.1.3 The access to the Site shall be exclusive to the Supplier but only to enable him to execute the works.The Supplier shall afford to OIL and to other Suppliers whose names shall have been previouslycommunicated in writing to the Supplier by OIL, reasonable facilities for the execution of the workconcurrently with his own.

2.2 Safety

2.2.1 Upon arrival of Plant and Equipment/Material at the Site, the Supplier shall assume custody thereofand remain responsible thereafter for safe custody until the whole plant is handed over.
2.2.2 Adequate firefighting equipment and extinguishing agents of sufficient capacity and quantity mustalways be available at site and kept ready for immediate use. Sufficient number of workmen must be fullytrained in the use of such equipment and must be available for immediate intervention at all times
2.2.3 For storage of materials and equipment for the construction and erection work, storage must besubdivided into storage units and the distance between such storage units shall be as acceptable to the insurancecompany which issued the policy.
2.2.4 At the beginning of work, all fire-fighting facilities must be checked thoroughly.
2.2.5 The supplier shall for the duration of the execution of the order, maintain in good order and condition all suchprotective apparel and equipment (such as safety helmets, safety belts, gloves etc.) for all their workmen andstaff engaged for the work as may be required to be used by Law and by the OIL. The supplier shallensure that such protective apparel/ equipment are worn and used by their workmen and staff without fail. Incase OIL notices any non-compliance thereto, OIL will not only be entitled to make alternative arrangementsfor the same but recover cost and damages plus OIL's own charges @ 20% or as deemed fit by the company, on his account.
2.2.6 The supplier shall follow the safety instructions as mentioned in Annexure-Safety Instructions at the end of this document.

2.3 Care of works and security

2.3.1 From the commencement to the completion of work, the Supplier shall take full responsibility for the care of works and for all temporary works from damages, loss or theft, by making suitable securityarrangement. In case any damage or loss shall happen to the works or to any part thereof or to any temporaryworks from any cause whatsoever, the Supplier shall at his own cost replace or repair and make good thesame.
2.3.2 The Supplier shall take all precautions during execution of work so as not to damage OIL's existing equipment such as RCC roof, civil structures, cables, pipe lines, drains etc. and provide all possible protection to these works and in casethey are damaged, rebuild/divert them at his own cost.
2.3.3 All operations necessary for the execution of the works and for the construction of any temporary works shall so far as compliance with the requirements of the Purchase order permits be carried on so as not to interfere unnecessarily or improperly with the public convenience or the access to use and occupation of public or private roads and footpaths or of properties whether in

the possession of OIL or any other person and the Supplier shall save harmless and indemnify OIL in respect of all claims demands, proceedings, damages, costs, charges and expenses, whatsoever arising out of or in relation to any such matters.
2.3.4 Due to any emergency, any protective or remedial work is necessary within the Supplier's battery limit, the Supplier shall immediately carry out such work. If the Supplier is unable to or unwilling to do thework, OIL shall carry out such work and all costs incurred due to this shall be deducted from Supplier'spayments.

2.4 Boarding, lodging & transport

The Supplier shall take care of the boarding, lodging, all travel between Supplier's office and site, insurance (if any), medical expensesetc. of his direct and indirect employees.

2.5 Construction Water and Power

The Supplier needs to make suitable arrangement for Construction Water and electrical Power based on siteconditions. To the extent possible, OIL shall facilitate the same. Non availability of Power from OIL should notbe an excuse for delay in completion of the project

2.6 Erection / installation and construction

2.6.1 For completing the work within the time schedule, the Supplier shall carry out the work by providing adequate manpower, however, without violating any labour laws.
2.6.2 The Supplier shall unpack and do visual checking against physical damages to the equipment /cases,clean equipment before start of erection. Damage, if any, will be reported to the OIL and shall be rectified /replaced expeditiously (in case of materials not supplied by the Supplier), so as not to upset the erection andcommissioning schedule. Delay on account of settlement of insurance claims shall not be considered an excusefor delay in Completion.
2.6.3 The Plant and equipment will be installed on the civil foundation/structures to be constructed by the Supplier. Load bearing data of the roof on which the structures will be built will be obtained by the supplier from Civil Engineering Department of OIL. However, if any minor deficiency is noticed in the dimensions,centerlines, levels, locations etc. of the foundation or anchor bolts or other embedment, the Supplier shallmake arrangement for rectification of the same at his own cost. Chipping/dressing of the foundation with air orair and water jet prior to placing the equipment on foundation will also be carried out by the Supplier.However, the procedure for rectification will be finalized by the Supplier with the written approval of OIL.

2.7 Inspection & Testing during erection & commissioning

2.7.1 OIL shall have the right of inspection and testing of the materials brought to site by the Supplier anderection/installation/construction work at any stage and the Supplier on demand from OIL shall carry out suchtests in an appropriate manner in the presence and free of charge to OIL.
2.7.2 Within 15 days after the effective date of award of Purchase order, the Supplier shall submit a detailedQuality Assurance Plan (QAP), covering all activities under scope of supply of the Supplier and all stages ofinspection, for OIL to comment/approve the same.
2.7.3 No work shall be covered up or put out of view without the approval of the OIL. In the event of failureto do so, the Supplier shall uncover any part of the work or make openings in or through the works as OILmay direct and they shall be made good with materials approved by OIL and should match with workmanshipof the surrounding work.
2.7.4 The Supplier shall at his cost, arrange for construction of laboratory equipment, testing materials,consumables etc., at site for testing of construction materials such as cement, aggregates, concrete cubes etc.and other consumables for construction of support structures.
2.7.5 Any special measures or techniques which may be necessary for construction of structures such ascontinuous pouring of concrete etc. shall be deemed to have been taken into account by the Supplier and noextra claim, whatsoever, shall be entertained.
2.7.6 The Supplier shall carry out structural load test on each part of the building/structure at his own cost ifsuch structural load test is warranted due to unsatisfactory test results of concrete cubes

and if so directed by OIL. 2.7.7 OIL may during the progress of Work, order the removal and re-erection of part or whole of the workexecuted, that is found not in accordance with the approved drawings/ specifications written instructions. OILshall not be responsible for any costs incurred in connection with any such removal and re-erection; the Supplier shall indemnify OIL for any costs and expenses that OIL may have incurred in connection with suchremoval and re-erection. Re-inspection/retest shall be carried out only after necessary rectificationwork/replacement by the Supplier. 2.7.8 The inspection, examination or testing carried out by OIL shall not relieve the Supplier from any ofhis obligations under this Purchase order. 3. Handing over 3.1 On completion of the work, all rubbish, kilns, vats, tanks, left over materials and temporary structure of any sortor kind used for the purpose or connected with the construction/erection work shall be removed by the Supplier and all pits and excavations in nearby areas filled up and the site handed over in a tidy condition. Nofinal payment in settlement of the account for the said work shall be held to be due or shall be made to the Supplier until such site clearance and restoration shall have been effected by him. Such clearance andrestoration may be made by OIL at the expenses of the Supplier in the event of his failure to comply with thisprovision within seven (7) days after receiving notice in writing from OIL to that effect. If it becomes necessaryfor OIL to have the site cleared as indicated above at the expense of the Supplier, OIL shall under nocircumstances be held liable for any losses or damages to such of Supplier's property as may be on such sitedue to such removal there from, which removal may be effected by means of public sale of such materials andproperty or in such a way as seems fit and most convenient to the OIL. 3.2 For the purpose of removing surplus materials in its original form, the Supplier shall submit thedocuments/records evidencing the entry of materials inside the Plant by producing the Gate Entry Permits andconsumption statements based on approved drawings to establish the surplus quantity of the materials belongingto the Supplier. OIL shall allow the Supplier to remove such materials if it is satisfied, in its sole andabsolute discretion, only after completion of the entire Work. 3.3 No imported Material shall be allowed to be taken out other than imported tools and tackles andinstruments brought by the Supplier on draw back basis and provided, he has carried out necessarydocumentation at the time of taking such items inside the Plant. 3.4 The Supplier shall return to OIL all unused and left over commissioning spares, after successfulcommissioning of the plant. 3.5 OIL shall have the right to take possession or use any completed or partially completed Work. Suchpossession or use shall not be deemed to be an acceptance of any work done not in accordance with the Purchase order. However, any damage to such work solely due to such provision or use shall be to the OILs account.	
ITEM NO. 60 **AMS FOR 6 YEARS FOR ITEM NO. 40: - QTY = 01 AU** 1.0 The supplier of the solar PV plant has to take over the annual maintenance of the plant for 6 (six) years once the plant is successfully handed over to OIL after performance testing. The Annual maintenance service purchase order shall be awarded to the supplier once the supply, installation and testing part is over and the plant is acceptable to OIL. As Solar PV plants by default are to be cleaned/maintained regularly so as to obtain and maintain full output, the supplier shall have to maintain the plant during the guarantee period of 1 (one) year also. During this (guarantee) period the supplier has to maintain the plant as per the OEMs' recommendations. In case of any defects/breakdown of the plant during this period, the supplier shall repair/replace the defective items/components free of cost as per the guarantee/warranty terms. Once the guarantee period is over, comprehensive annual maintenance purchase order shall start	

and thesupplier/supplier shall maintain the plant along with spares for 5 (five) years. The AMS Purchase order, therefore, shall be of duration of 6 (six) years as follows: a) Only maintenance of the plant (without supply of spares etc.) for 1 (one) year during the guarantee period. b) Comprehensive maintenance purchase order for 5 (five) years starting from the end of guarantee period. Once the PO is awarded, the supplier is to immediately enter into an agreement with OIL for AMS purchase order for 6 (six) years as above. 1.1 The entire work comprising design, engineering, manufacture, inspection and testing of performance atmanufacturer's and/or supplier's works, delivery to site, erection, testing and commissioning and finalhanding over shall be carried out as per the following schedule: a) The design, manufacture and supply part (with delivery at site) shall be completed within a period of 6 (six) months from the Award of PO. However supplier shall put his best efforts to expedite the job before schedule. b) The erection, testing & commissioning and handing over part shall be completed within a period of 3 (three) months from the date of site clearance by OIL. 1.2 Supplier shall visit the site immediately after award of purchase order and arrange for civil structures to be made. He shall also arrange for transportation of items/equipment to site. 1.3 The available area of the rooftop is measured to be approx. 390 square metre. Though the output of the solar plant is estimated at 24KWp (calculated from the available area), actual output may be at variance depending on the orientation and inclination of the PV arrays and shadowed areas ofthe roof. Also, since load bearing capacity of the roof varies from the old portion to new portion, it is in the scope of the supplier to find out the best possible area for installation of the plant based on the available Civil Engineering input data. Hence the KW output is given as 24 KWp (estimated).	
ITEM NO. 70 **SUPPLY OF GRID INTERACTIVE ROOFTOP MOUNTED SOLAR PHOTO-VOLTAIC SYSTEM. – QTY = 01 NO** The scope of supply of the equipment and materials for grid interactive solar PV power plant shall include, but not limited to the following: a) Solar PV modules of composite capacity as mentioned above including mounting frames, structure, array foundation and module interconnection, Array Junction boxes b) Power Conditioning Units that are communicable on with remote sensing, DSP and sleeping mode operation c) DC power junction boxes, bus bars and circuit breakers d) AC power evacuation panel with bus bars and circuit breakers e) Metering and protection /Isolation systems. Meters to be communicable on remote sensing f) LV Power and Control Cables including end terminations and other required accessories for both AC & DC power g) Earthing system for PV Array, DC power system, PCU, AC power system for LT equipment h) Lightning protection system including surge protection devices in both DC power side and AC power side i) Tool kit j) PVC pipes and accessories k) Transportation of equipment to site The above list is indicative only; supplier has to provide all the required equipment/ items for the complete plant.	

ANNEXURE - TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS FOR GRID INTERACTIVE ROOFTOP MOUNTED SOLAR PHOTO-VOLTAIC SYSTEM

C ON T E N T S

1.0 INTRODUCTION:

It has been proposed to setup a 8KWp (estimated) grid interactive solar photovoltaic power plant (without battery back-up) at the PSS office building at Duliajan , which will be a Rooftop installation project.

The Grid interactive Rooftop Mounted Solar PhotoVoltaic (PV) plant shall consist of mainly three major components, viz. the solar photovoltaic (SPV) modules, array (including array mounting structure) and the inverter or power conditioning unit(s). The SPV array converts the solar energy into DC electrical energy. The array mounting structure holds the PV modules in required position. The DC electrical energy from the PV arrays is converted to AC power by the inverter or PCU, which is connected to the captive power grid. The AC power output of the inverter is fed to the AC distribution board through metering panel and isolation panel. The415 V 3Ø AC output of the system can be synchronized with the captive grid and the power can be exported to the grid depending upon solar power generation and local consumption.

2.0 LOCATION:

LocationDetails
Name of State Assam
District Dibrugarh
Location PSS Office building Duliajan (rooftop)
Latitude 27.36 deg. N
Longitude 95.32 deg. E

3.0 SITE DESCRIPTION:

Duliajan is an industrial town and one of the most developed and advanced town from all over India located in Dibrugarh District in the upper north-east corner of India. The town is situated about 45 km east of Dibrugarh City.

In Duliajan, the climate is warm and temperate. In winter there is much less rainfall than in

summer. According to Köppen and Geiger, the climate is classified as Cwa. The average annual temperature in Duliajan is 23.2 °C. The average annual rainfall is 2528 mm. The driest month is December with 21 mm. Most precipitation falls in July, with an average of 489 mm. The warmest month of the year is August with an average temperature of 27.8 °C. In January, the average temperature is 16.1 °C. It is the lowest average temperature of the whole year.

However, the equipment for the plant shall be suitable for satisfactory operation under the ambient conditions as follows:

a. Operating Environment: 10 to 50 Deg. C
b. Operating Relative Humidity: 0 to 95%
c. Storage temp.: 15 to 45 Deg. C
d. Elevation: 100 m above MSL

4.0 CO-ORDINATES OF THE SITE:

Latitude 27.36 deg. N
Longitude 95.32 deg. E

5.0 SCOPE OF SPECIFICATION:

5.1 The scope of these specifications shall cover design, engineering, manufacture, quality surveillance, testing at manufacturer's works, packing and supply, erection, testing and commissioning and performance testing of 8 KWp (estimated) grid interactive Rooftop mounted solar photovoltaic system with associated components for installation at Oil India Limited, Duliajan.

5.2 The systems shall be complete with PV modules, inverter, metering, junction boxes, AC, DC distribution boards and cables, communication interface, and any other equipment necessary for safe and efficient operation of the system.

5.3 The work shall also include interconnection of PV system with the existing OIL grid supplying power to the building.

5.4 The civil works for installation of complete system shall also be in scope of supplier.

5.5 It is not the intent of these specifications to specify completely herein all the details of design and construction of equipment. However, the equipment offered shall conform in all respects to high standards of engineering, design and workmanship and be capable of performing in commercial operation up to Bidder's guarantee in a manner acceptable to OIL, who will interpret the meaning of drawings and specifications and shall have the power to reject any work or materials, which in his judgment are not in full accordance therewith.

5.6 It shall be the responsibility of the Bidder to ensure that all the works as per scope of the specification are completed for safe and efficient working of the system.

5.7 All the necessary co-ordination with regard to sub-contracted items shall be carried out by the Bidder. The customer (OIL) will communicate only with the Bidder for all matters pertaining to this contract.

5.8 Even if all components of a system included in these specifications are not explicitly identified and /or listed herein, these shall be supplied under this contract to ensure completion of the system and facilitate proper operation and easy maintenance of the plant. All the fittings and accessories that might not have been mentioned specifically in the specification but are necessary for completeness of the plant, shall be deemed to be included in the specifications and shall be supplied and furnished by the Contractor without any extra charge.

5.9 Considering the reliability of the grid, no electrical storage batteries are envisaged as excess

electricity generated by the solar panels which is not required by the equipment/devices in the building premises shall be exported to the grid.

6.0 CODES AND STANDARDS

6.1 All Equipment and accessories shall comply with requirement of standards published by Bureau of Indian Standards (BIS).In case no BIS codes exist the equipment shall meet the requirement of international standard including IEEE for design and installation of grid connected PV system. The list of standards adopted shall be indicated in the bid.

6.2 The SPV Module must be provided with acceptable Test& Certified documents.

6.3 The quality of equipment supplied shall be generally controlled to meet the guidelines for engineering design included in the standards and codes listed in the relevant ISI and other standards, such as:

o IEEE 928: Recommended Criteria for terrestrial PV power systems.
o IEEE 929: Recommended practice for utility interface of residential and intermediate PV systems.
o IEEE 519: Guide for harmonic control and reactive compensation of Static Power Controllers.
o National Electrical NFPA 70-1990 (USA) or Equipment National standard.
o National Electrical Safety Code ANSIC2 (USA) or equipment national standard.
o IEC: 61215 (2005) - Crystalline silicon terrestrial photovoltaic (PV)modules-Design qualification and type approval
o IEC 61683 / IS 61683 - Efficiency Measurements of Power Conditioners/Inverters including MPPT and Protections
o IEC: 61730 -1, -2 Photovoltaic (PV) module safety qualification Part 2: Requirements for testing
o IEC: 60904-1(2006) Photovoltaic Devices-Part-I: Measurement of Photovoltaic current- Voltage Characteristic
o IEC: 62446 (2009)- Grid-Connected Photovoltaic Systems- Minimum Requirements for System Documentation, Commissioning Tests and Inspection
o IS 9000: Basic environmental testing procedure for Electronic and electrical items.

7.0 SPECIFIC TECHNICAL REQUIREMENTS:

a. The Solar PV power system shall be rooftop mounted, grid connected without battery back-up.

b. The PV Array shall consist of a number of individual PV modules or panels that have been wired together in a series and/ or parallel combination and shall meet the generation power capacity of 8 KW peak (estimated).

c. The DC power generated from SPV array shall be converted to AC power with Power Conditioning Unit, consisting of Grid-tie Inverter and the associated control and protection devices. The voltage level shall match the grid voltage (415 Volts AC, 3-phase & Neutral, 50 Hz).

d. Output from Power Conditioning Unit shall be connected to an existing LT power distribution panel, wherein continuous synchronization with grid power shall be automatically active through static circuitry mechanism & devices. The inter-connecting power cable between the ACDB of the SPV Plant and the existing LT power distribution panel will be in the scope of OIL.

e. Maximum available power of Solar PV Plant will be drawn during the daytime and during any shortfall in power generated by Solar PV Plant during time then extra power required shall be drawn from the Utility Source/without interruption to serve the load requirement.

In case of any failure of grid power supply, PV Solar power supply will also automatically get disconnected immediately and the same will be restored automatically at restoration of grid power.

In grid interactive systems, it has, however to be ensured that in case the grid fails, the solar power has to be fully utilized or stopped immediately feeding to the grid (if any in excess) so as to safe-guard any grid person/technician from getting shock (electrocuted) while working on the grid for maintenance etc. This feature is termed as 'Islanding Protection'.

f. Solar PV system shall consist of the following minimum equipment. The list is indicative only; bidder has to provide all the required equipment/ items for the complete plant:
o Solar PV modules consisting of required number of PV cells
o Power Conditioning Unit/Inverters
o Mounting structures
o Cables and hardware
o Junction box and distribution boxes
o Surge protection devices in both DC power side and AC power side
o Earthing kit
o Lightning arrestors
o PVC pipes and accessories
o Tool kit
o Civil pedestals

g. DUTY CYCLE: Average Hours of Operation/day: 8-10 hours per day, as per the solar insolation levels of the site.

7.1 PV ARRAYS

7.1.1 Solar PhotoVoltaic Modules shall be MONO/POLY CRYSTALLINE Silicon PV Modules. The peak power output of the PV Module shall be from 250 to 320 Wp under STC. Complete mounting structure, hardware etc. shall be suitable for Rooftop installation/mounting; the same shall be in the scope of Vendor.

7.1.2 The Solar PV module should meet the minimum requirement of MNRE.

7.1.3 SPV modules shall be designed and manufactured to meet the same recognized standard which must have been used extensively throughout the world for more than a decade with an excellent track record of performance. Each module should have two separate interconnected strings with proper by-pass diode(s). Minimum dimension of the SPV module shall be preferred. Bidders should submit the technical literature with detailed technical specifications of the modules as well as the drawings & manuals. Modules should have an efficiency of not less than 15% and the fill factor should be 75%.

7.2 Statutory Approvals and Minimum Technical Requirement

Modules should fulfill the following conditions:

a) The offered PV modules must be tested and approved by Govt. MNRE Authorized test center or equivalent International Labs.

b) The module shall meet IEC 61215 (for Crystalline) along with IEC61730 Part I and Part II (for safety) and IEC 61701 for salt mist corrosion. These shall be Class A only.

c) Each solar PV module shall be warranted by the manufacturer with free replacement if the output under standard light condition falls more than 10% in first 10 (ten) years and 20% in next 15 (fifteen)years.

d) Photo electrical conversion efficiency of the module shall not be less than 15%. The bidder shall indicate minimum module efficiency.

e) Fill factor of the module shall not be less than 0.70.

f) The bidder shall provide the sample solar PV module electrical characteristics including current-voltage (I-V) performance curves and temperature coefficients of power, voltage and current. However, the tabulated document with all the relevant data like voltage, current, power output for all the modules also to be provided.

g) The PV modules shall be suitable for continuous outdoor use.

h) The PV module shall be made of high quality laminated in ultraviolet stabilized polymer material such as Ethyl Vinyl Accelerate (EVA), Tedler, and toughened glass. The size of single crystalline silicon PV cells shall be so chosen so as to maximize energy density and align with economies of scale.

i) PV module shall be provided with frame of anodized channels for size and simplicity in installation offered as a single module or series parallel combination of modules. The PV module shall be provided with screw-less frame with solar cable and connector.

j) The PV modules shall be equipped with by-pass diode to minimize power drop caused by shade.

k) The PV modules shall be made of lightweight cells, resistant to abrasion, hail impact, rain, water and environmental pollution. The PV modules shall be provided with anti-reflection coating and back surface field (BSF) structure to increase conversion efficiency.

l) The PV module shall use lead wire with weatherproof connector for output terminal.

m) The power output of the PV system under Standard Test Conditions (STC) should be 100% kWp of module size depending upon manufacturer's prudent practice, with nominal output voltage of 24 V. The number of modules to be supplied shall be worked out accordingly.

n) The operating voltage corresponding to the power output mentioned above should be >32.0 V for 24V system.

o) The terminal box on the module should have a provision for opening for replacing the cable, if required.

p) Each PV module must use a RF identification tag (RFID), which must contain the following information:
o Name, monogram or symbol of the manufacturer of PV Module
o Name, monogram or symbol of the Manufacturer of Solar cells
o Type or model number of the module
o Month and year of the manufacture (separately for solar cells and module)
o Polarity of terminals or leads (colour coding is permissible)
o Maximum system voltage for which the module is suitable
o I-V curve for the module
o Peak Wattage, Im, Vm and FF for the module
o Unique Serial No and Model No of the module
o Date and year of obtaining IEC PV module qualification certificate
o Country of origin (separately for solar cells and module)
o Name of the test laboratory issuing IEC certificate
o Other relevant information on traceability of solar cells and module as per
o ISO 9000 series

q) The systems shall perform satisfactorily in relative humidity up to 95% and temperature between 10ºC to +55ºC.

7.3 SUPPLY & INSTALLATION OF DC COMBINER BOX /ARRAY JUNCTION BOX:

7.3.1 Enclosure: The array junction boxes shall be made of PC-GFS (Polycarbonate-Glass fiber substance) thermoplastic having minimum IP65/66 protection in accordance with IEC 60 529 with the help of internally embedded polyurethane gasket.

7.3.2 The enclosure should be double insulated with protection class II. In view of the same, IEC60439/ IEC61439 (new revision) comes as an important standard as it fulfills this requirement of enclosure to be double insulated. (Test certification is required for IP65/ IP 66 degree of protection.) The lid shall be of transparent polycarbonate.

7.3.3 Fuse Protection on Strings: DC fuses rated from 2A to 25A from leading manufacturers to be used in the combiner box to provide over-current protection.

7.3.4 Surge Protection Device: Surge Protection devices or SPD to be provided to protect the combiner/junction box from any power surge and voltage spike. SPD to be used should meet Type 2 regulations, and to be typically rated between 600 to 1000V.

7.3.5 Input Glands/Connectors: The combiner/array junction box offered is to be provided with IP67 rated Cable Glands or MC 4 connectors at the input side to lead the array strings into the box. Suitable markings should be provided for easy identification and cable ferrules shall be fitted at the cable termination points for identification.

7.3.6 Burning Behavior:
Glow wire test in accordance with IEC 60695-2-UL Subject 94at960C, flame retardant & self-extinguishing.
o Base part of Polycarbonate Enclosure should have V-0 as flammability standard.
o Lid part of PC Enclosure should have V-2 as a flammability standard.

7.3.7 Degree of protection against mechanical load: IK 08 (5 Joule)

7.3.8 Toxic behavior: Halogen/Silicon free, conform to RoHS directive 2002/95/EC

7.3.9 Temperature Tolerance range: -40 deg C to +120 deg C

7.3.10 Chemical Resistance: Acid, Lye, Petrol, Mineral Oil & partially resistant from Benzene.

7.3.11 UV behavior: UV stabilized, even after many years there should be no sign of brittleness.

7.4 INVERTER
7.4.1 As SPV array produce direct current electricity, it is necessary to convert this direct current into alternating current and adjust he voltage levels to match the grid voltage. Conversion shall be achieved using an electronic Inverter and the associated control and protection devices. All these components of the system are termed the "Power Conditioning Unit (PCU)". In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array & the Inverter, to maximize Solar PV array energy input into the System.

7.4.2 Each PCU shall be compliant with IEEE Standard 929-200 or equivalent and should be at least IP54.

7.4.3 The DC power produced is to be fed to inverter for conversion into AC. In a grid interactive system AC power shall be fed to the grid at three phase 415AC bus. Power generated from the solar system during the daytime shall be utilized fully by powering the building loads and feeding excess power to the grid as long as grid is available. In cases, where solar power is not sufficient due to more demand or cloud cover etc. the building loads shall be served by drawing power from the grid. The inverter should always give preference to the Solar Power and will use Captive Grid power only when the Solar Power is insufficient to meet the load requirement.

7.4.4 The output of the inverter must synchronize automatically its AC output to the exact AC

voltage and frequency of the captive grid.

7.4.5 Inverter shall continuously monitor the condition of the captive grid and in the event of captive grid failure, the inverter should automatically switch to off-grid supply within 20-50 milliseconds. The solar system should then be resynchronized with the captive grid within two minutes after the restoration of grid.

7.4.6 Captive Grid voltage shall also be continuously monitored and in the event of voltage going below a preset value and above a preset value, the solar system shall be disconnected from the grid within the set time. Both overvoltage and undervoltage relays shall have adjustable voltage (50% to 130%) and time settings (0 to 5 seconds).

7.4.7 Metal Oxide Varistors (MOVs) shall be provided on DC and AC side of the inverter.

7.4.8 The inverter control unit shall be so designed so as to operate the PV system near its maximum Power Point (MPP), the operating point where the combined values of the current and voltage of the solar modules result in a maximum power output.

7.4.9 The inverter shall be a true sine wave inverter for a grid interactive PV system. It shall be an efficient and reliable solid-state device (IGBT type).

7.4.10 Each Sub-Array Junction Box will have Suitable Reverse Blocking Diodes of maximum DC blocking voltage of1000 V with suitable arrangement for its connection.

7.4.11 The degree of protection of the outdoor inverter panel shall be at least IP-55.
7.4.12 Typical technical features of the inverter shall be as follows:

Continuous output power rating : >= 8 kWp
Maximum input voltage : 1000 V
Nominal AC output voltage : 415V, 3 Phase
Accuracy of AC Voltage control : ± 1%
Output frequency : 50 Hz
Accuracy of frequency control : ± 0.5%
Ambient temperature : 10 deg C to 55 deg C
Captive grid voltage tolerance : -20 % and + 15 %
Power factor control : 0.95 inductive to 0.95 capacitive
No-load losses : < 1% of rated power
Inverter efficiency (minimum) : 96%
Maximum efficiency/ European efficiency : 98% minimum
Power Control : MPPT
Surge Protection Device (SPD) : Required (Type I & 2)
Overload behavior : Current limitation; power limitation
Total Harmonic distortion (TDH) :< 3 % @ nominal apparent power
Protection required :DC reverse-polarity/AC short-circuit current capability/ galvanic isolation
Anti-islanding protection / Grid regulation : As per EN, VDE standard

7.4.13 Liquid crystal display shall at least be provided on the inverters front panel or on separate data logging/display device to display following:
o DC Input Voltage
o DC Input current
o AC Power output(kW)
o Current time and date
o Time active
o Time disabled
o Time Idle
o Temperatures(C)
o Converter status

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

7.4.15 All doors, covers, panels and cable exits shall be gasketed or otherwise designed to limit the entry of dust and moisture. All doors shall be equipped with locks.

7.4.16 Operation Mode:

o Night or sleep mode: Where the Inverter is almost completely turned off, with just the timer and control systems till in operation, losses shall be less than 2W per 5 kW.

o Standby mode: Where the control system continuously monitors the output of the solar generator until pre-set value is exceeded (typically 10W).

o Operational of MPP tracking mode: the control system shall continuously adjust the voltage of the generator to optimize the power available. The power conditioner shall automatically re-enter standby mode when input power reduces.

o Below the standby mode threshold: Front panel shall provide display of status of the inverter.

7.5 PROTECTIONS AND CONTROL

7.5.1 PV system software and control system shall be equipped with islanding protection as described above. In addition to disconnection from the grid (islanding protection) i.e. on no supply), under and overvoltage conditions, PV systems shall be provided with adequate rating fuses, fuses on inverter input side (DC) as well as output side (AC) side for overload and short circuit protection and disconnecting switches to isolate the DC and AC system for maintenance are needed. Fuses of adequate rating shall also be provided in each solar array module to protect them against short circuit.

7.5.2 A manual disconnect switch beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility personal to carry out any maintenance. This switch shall be locked by the utility personal.

7.6 METERING SCHEME

7.6.1 Metering is required to measure the Solar Gross Generation on continuous basis and register cumulative energy based on 15 minute interval basis, daily, monthly and yearly energy generation.

7.6.2 The average voltage and power factor based on 15 minute interval must also be recorded.

7.6.3 Meter must also display on demand, instantaneous, AC system voltages and currents, frequency, reactive power with sign, total harmonics current and voltage distortion etc.

7.6.4 Meters shall comply with the requirements of CEA Regulations on "Installation and Operation of Meters" and in conformity with IS 13779 or IS 14679.

7.6.5 An integrating pyranometer (class II or better) is to be provided with the sensor mounted in the plane of the array. Readout shall be integrated with data logging.

7.7 POWER QUALITY REQUIREMENTS:

7.7.1 DC Injection in to the grid: The injection of DC power into the grid shall be avoided by using an isolation transformer at the output of the inverter. It is proposed to limit DC injection within 1% of the rated current of the inverter as per IEC 61727.

7.7.2 Harmonics on AC side:

Harmonic distortion is caused principally by non-linear loads such as rectifiers and arc furnaces and can affect the operation of a supply system and can cause overloading of equipment such as capacitors, or even resonance with the system leading to overstressing (excessive voltage & current). Other effects are interference with telephone circuits and broadcasting, metering errors, overheating of rotating machines due to increased iron losses (eddy current effects), overheating of delta connected winding of transformer due to excessive third harmonics or excessive exciting current.

7.7.3 The limits for harmonics shall be as stipulated in the CEA Regulations on grid connectivity which are as follows:
o Total Voltage harmonic Distortion= 5%
o Individual Voltage harmonics Distortion=3%
o Total Current harmonic Distortion=8%

7.7.4 Voltage Unbalance-The Voltage Unbalance in the grid shall not exceed 3.0%.

7.7.5 Voltage Fluctuations:
The permissible limit of voltage fluctuation for step changes which may occur repetitively is 1.5%.
For occasional fluctuations other than step changes the maximum permissible limits is 3%.

7.8 COMMUNICATION INTERFACE:

7.8.1 The project envisages a communication interface which shall be able to support
o Real time data logging
o Event logging
o Supervisory control
o Operational modes
o Set point editing

7.8.2 The following parameters shall also be measured and displayed continuously.
o Solar system temperature
o Ambient temperature
o Solar irradiation/insolation
o DC current and Voltages
o DC injection into the grid (one time measurement at
o Efficiency of the inverter
o Solar system efficiency
o Display of I-V curve of the solar system
o Any other parameter considered necessary by supplier of the solar PV system based on prudent practice

7.8.3 Data logger/PC based monitoring system must record these parameters for study of effect of various environmental & grid parameters on energy generated by the solar system and various analysis would be required to be provided through bar charts, curves, tables, which shall be finalized during approval of drawings.

7.8.4 The communication interface shall be an integral part of inverter and shall be suitable to be connected to local computer and also remotely via the Web using either a standard modem or a GSM/WIFI modem.

7.9 WEATHER MONITORING STATION:

7.9.1 An integrating PYRANOMETER for measuring the Solar Irradiance is to be provided, with the sensor mounted in the plane of the array. Readout is to be integrated with the data logging system.

7.9.2 In addition, temperature probes for recording the Solar panel temperature and ambient temperature are to be provided.

7.10 MOUNTING STRUCTURES:

7.10.1 Module mounting structure should be as per MNRE specifications and supply & installation shall be in scope of Vendor.

7.10.2 The mounting structure shall be of anodised aluminium/ hot dip galvanized MS angles of proper size (minimum35 mm x 35 mm x 5 mm) and shall withstand wind speeds of150 KM/hour (horizontal). The minimum thickness of galvanization shall be at least 70 microns. All fixing fasteners shall be of stainless steel grade SS 304. Legs assembly shall be of MS Hot Dip galvanized pipes after fabrication/ anodised aluminium.

7.10.3 The structure shall be designed in accordance with the latitude of the place of installation. The array mounting structure shall be designed to allow easy replacement of any module and shall be in line with site requirement. Structure shall be designed for simple mechanical and electrical installation. It shall support SPV modules at a given orientation, absorb and transfer the mechanical loads to the Rooftop properly.

7.10.4 The mounting structures must be suitable to mount the SPV modules/panels/arrays on the Rooftop at an angle for optimum tilt. The module alignment & tilt angle shall be calculated to provide the maximum annual energy output. This shall be decided based on the location of array installation.

7.10.5 The support structure design & foundation shall be designed to withstand wind speed up to 200 kmph using relevant Indian wind load codes.

7.10.6 The minimum clearance of the lowest part of the module/module structure and the developed Rooftop level shall not be less than 300mm.

7.10.7 The legs of the structures shall be fixed suitable angle nosing (in scope of vendor). While making foundation design, due consideration shall be given to the weight of module assembly and maximum wind speed.

7.10.8 The foundation pedestals wherever necessary shall be concrete.

7.10.9 The mounting of solar modules shall be done on rooftop and entire Fabrication of elevated structure and the structure atop sloping roofs shall be done by the Bidder.

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

7.11 POWER AND CONTROL CABLES:

7.11.1 Power Cables of adequate rating shall be required for interconnection of:
o Modules/panels within array
o Array & Charge Controller
o Charge controller & Loads Including Inverter

7.11.2 The cable shall be1.1 kV grade, heavy duty, stranded copper conductor, PVC type A insulated, galvanized steel wire/strip armored, flame retardant low smoke (FRLS) extruded PVC type ST-1 outer sheathed. The cables shall, in general conform to IS-1554 Part I & other relevant standards.

7.11.3 The minimum size of 1.1 kV power cables shall be chosen taking into account fault level contribution to the system and full load current. However, power cables size for 415 V systems

shall be chosen taking into account the full load current & voltage drop. The allowable voltage drop at terminal of the connected equipment shall be max. 2.5% at full load. The de-rating factors viz. group deration, temp. deration shall also be considered while choosing the conductor size.

7.11.4 The permissible voltage drop from the SPV Generator to the Charge controller shall not be more than 2% of peak power voltage of the SPV power source (generating system). In the light of this fact the cross-sectional area of the cable chosen should be such that the voltage drop introduced by it shall be within 2% of the system voltage at peak power.

7.11.5 All connections should be properly terminated, soldered and/or sealed from outdoor and indoor elements. Relevant codes and operating manuals must be followed. Extensive wiring and terminations (connection points) for all PV components is needed along with electrical connection to lighting loads.

7.12 LIGHTNING PROTECTION AND EARTHING:

7.12.1 Required numbers of suitable lightning arrestors should be installed in the array area.
Lightning protection shall be provided by the use of suitable earthing conductors and electrodes so that any lightning strike may find an alternate route to earth. Protection shall meet requirements of Central Electricity Regulations, 2010, and IS 2309:1969 (Protection of Buildings and allied structures from lighting).

7.12.2 Each array structure of the PV system should be grounded properly as per IS: 3043-1987. Provision should be kept for shorting and grounding of the PV array at the time of maintenance work. All metal casing/shielding of the plant should be thoroughly grounded in accordance with Indian Electricity Rules 1956. Earth resistance should be tested in a dry weather in presence of the representative of customer, after earthing work is complete, with a calibrated earth tester and should have a value not more than the value specified in the relevant Code/Rules.

7.12.3 In case the SPV Array cannot be installed close to the equipment to be powered & a separate earth has been provided for SPV System, it shall be ensured that all the earth connections are bonded together to prevent the development of potential difference between any two earths.

7.13 CIVIL WORKS:

7.13.1 Embedment of structures suitable for mounting PV modules.

7.13.2 All the machinery such as hydra, JCBs, fork-lifts, for unloading of materials at site, movement of materials, foundation, erection of structures, module mounting, etc. shall be in the scope of Vendor.

8.0 SYSTEM DOCUMENTATION:

Complete documentation on the system must be provided to OIL. System documentation should include an owner's manual and copies of relevant drawings for whatever system maintenance might be required in the future.

9.0 TESTS AND TEST REPORTS:

Final acceptance tests for the PV plant shall include, but not limited to, the following:

9.1 Visual inspection

9.2.1 Verification that all required system and equipment labels, markings and placards are correct and in the proper locations. This includes ensuring that all equipment is properly listed, identified and labelled, suitable for the conditions of use, and installed according to the listed product

instructions.
9.2.2 Wiring & cabling
9.2.3 Earthing connections
9.2.4 Mounting and support structures
9.2.5 Modules
9.2.6 Lightning protection including surge protection

9.2 Insulation Resistance Measurement

9.2.1 Importance of PV system wire insulation for safety and performance
9.2.2 Measurement methods for ac and dc circuits
9.2.3 Interpretation of insulation test data and application of the results
9.2.4 Test equipment selection

9.3 Array Performance Measurement

Electrical measurement, including calculating circuit voltages and currents to verify that the PV array and system operating parameters are within specifications.

9.3.1 I-V Curve Tracing and discrete voltage and current measurement
9.3.2 PV system performance verification, correction and measurement using capacity test
9.3.3 Interpreting I-V curves for performance troubleshooting
9.3.4 Power performance Index and Energy performance index
9.3.5 Calculations of energy yield
9.3.6 Power rating, inverter efficiency, module temperature, array yield, system losses, etc.

a. Type test certificates for all the tests specified for the factory built Solar PV modules, and the component parts shall be submitted by the Bidder along with the bid.
b. Six sets of copies of the compiled and approved test certificates shall be submitted to the Purchaser.

10.0 MAINTENANCE REQUIREMENT:

a. Easy access shall be provided for all components in the SPV plant and grid connecting equipment. Maintenance platform shall be provided for easy inspection of all the equipment.

b. If special tools are required for installation and maintenance, the bidder shall indicate the same and to be supplied free of cost.

c. The Bidder shall furnish operating and maintenance instruction manual to enable the purchaser to carry out maintenance of equipment effectively and safely.

d. Washing / cleaning of SPV panels would be carried out as per the prudent practice of the supplier.

11.0 LAYOUT REQUIREMENT:

The overall dimensions of the SPV Plant shall suit the Rooftop space provided for the layout requirements. The arrangement to suit this space shall be intimated at the time of approving the general arrangement drawing of the equipment.

12.0 INSTRUCTION AND O&M MANUALS:

12.1 Six copies of Instruction and Operation and Maintenance Manual in English should be provided with the system.

12.2 The manual shall be furnished at the time of dispatch of the equipment and shall include the

following aspects:

o Erection drawings with written assembly instructions that would enable the Purchaser to carryout erection with his own personnel if opted by him.
o Detailed instructions and procedures for the installation operation and maintenance.
o About solar PV system- its components and expected performance.
o Clear instructions about mounting of PV module (s)
o About the electronics
o DO's and DONT's
o Principles of Operation of various equipment
o Safety and reliability aspects
o Metering scheme
o About power conditioning unit software and controls
o Clear instructions on regular maintenance and troubleshooting of solar power plant
o Name and address of the person or service center to be contacted in case of failure or complaint.
o Rated voltages, current and all other technical information which may be necessary for correct operation of the SV plant.
o Catalogue numbers of all the components which are liable to be replaced during life of the SV plant and all the component parts.
o Trouble shooting and diagnostic procedure

13.0 CUSTOMER TRAINING:

13.1 Bidder shall provide necessary onsite-training and demonstration on the system related today to day operation & maintenance of the system including basic troubleshooting.

13.2 On-site training shall be considered by the Vendors and costs towards this, if any, shall be deemed to have been included in the overall quoted costs of the system. No additional costs towards to & fro travel, boarding &loading shall be made on this account.

14.0 Makes of Components:

Only indigenous brands of components will be used in the solar cell/panel system. Makes of various items will be as under:

14.1 Mono- crystalline solar panel: Maxsolar/ Moserbaer/Indo Solar/SSL/ Euro Multivision/UPV Solar/KL Solar/Goldi Green/Powertrac Solar/ Maglare Technologies/ SunFuel/IB Solar/ HHV Solar Technologies or any other make approved by MNRE(Govt of India)
14.2 Poly-crystalline solar panel: SSL/SunFuel/Evolve India Group/Sirius Solar Energy/Empire Solar/HHV Solar Technologies/Jain Irrigation Systems or any other make approved by MNRE(Govt of India)
14.3 Mono- crystalline solar cell: SSL/Euro Multivision/UPV Solar/KL Solar/CEL or any other make approved by MNRE(Govt of India)
14.4 Poly-crystalline solar cell: SSL/Euro Multivision/UPV Solar/KL Solar/Jupiter Solar or any other make approved by MNRE(Govt of India)
14.5 Inverter/filter on-grid: Evolve India Group/Power One Microsystems/reputed Indian or any other make approved by MNRE(Govt of India)
14.6 EVA film: RenewSys/Allied Glasses/SSL/Dugar Polymers/BrijEncapsulants or any other make approved by MNRE(Govt of India)
14.7 Modular mounting structure: NEPC/RN Solar/reputed Indian or any other make approved by MNRE(Govt of India)

15. DRAWINGS AND DOCUMENTS:

15.1 The supplier shall obtain approval for the following drawings / documents:
a) Detailed design data
b) Verification of site and DNI data

c) GA and layout drawings of the PV arrays, inclination of panels d) Structural drawing along with foundation details for the structure e) Electrical Single line diagram, block diagram, wiring diagram, cable route drawing etc. f) Bill of Materials and datasheets/catalogues of all the components to be used in the system, viz., invertersystem, PCU, MPPT, MCB DB, DCDB, ACDB, meters etc. g) Spares list and prices of spares for all the items separately. 15.2 Six sets of the following documents ("as-built") shall be submitted with the supply: a) Approved GA and layout drawings of the PV arrays, inclination of panels b) Approved Structural drawing along with foundation details for the structure c) Approved Electrical Single line diagram, block diagram, component layout diagram, wiring diagram,cable route drawing etc. d) Approved Bill of Materials and datasheets/catalogues of all the components to be used in the system,viz., inverter system, PCU, MPPT, MCB DB, DCDB, ACDB, meters etc. e) Approvedspares list and prices of spares along with probable sources for all the BoM items f) Operation and Maintenance manuals of items and complete plant g) Type test and routine test certificates for all the tests specified for the factory built Solar PV modules and the component parts Test certificates h) Type test and routine test certificates of the inverter system from OEM from CPRI or any govt. approved NABLaccredited test laboratory i) Guarantee Certificate (separate) for all items viz. panels, PCU, mounting structures etc. The Supplier shall submit all finaldocuments in 6 copies along with one soft copy, and "as built" documents in 6 copies along with 1 soft copy &1 re-producible. 16. SPARES: 16.1 Supplier shall submit a list of commissioning spares along with the supply. All such spares shall be supplied along with the main equipment. The Supplier shall return to OIL all unused and left over commissioning spares, after successful commissioning of the plant. 16.2 Supplier shall, in addition, provide a list of recommended spares along with prices, quantity and sources. However, the prices shall remain firm for a period of six years after successful commissioning and handing over of the entire plant. 16.3 Supplier has to provide all spares against routine and breakdown maintenance required for the plant during the AMC period.	
ITEM NO. 80 **INSTALLATION AND COMMISSIONING FOR ITEM NO. 70: QTY = 01 AU** Installation and Commissioning of the Grid Interactive Solar Rooftop Power Plant: The erection, installation and commissioning part shall include, but not limited to, the following: a) Erection of civil foundations on rooftop for mounting of arrays (after discussion and analysis of building data with Civil Engineering department of OIL) b) Unloading and erection of all supplied equipment on foundations at the selected place c) Pre-Commissioning & commissioning of all supplied equipment d) Test running of the Solar Plant as well as load trials at site Supplier shall arrange for the following: a) All civil jobs including material supply related to erection, installation & commissioning. b) All tools, tackles, crane and test equipment required for commissioning and carrying out tests. c) Boarding & lodging for his engineers and transportation of men and materials to site at his own expense. 1. Supply of erection / construction materials and consumables	

The Supplier shall provide all necessary erection equipment, materials (viz., cement, sand, stone chips etc.), tools and tackles including material handling equipment (cranes/fork-lifts/hydra etc.) compressors and other equipment and instruments and consumables, allcommissioning equipment and instruments, welding equipment, winches, alignment tools, precision levels etc.,which may be required for carrying out the erection and commissioning work (as applicable) efficiently. Unless otherwise specified, the above erection equipment/materials shall be the property of the Supplier. However,OIL's prior written permission shall be required for removal of these erection equipment / materials from the site. The Supplier shall ensure that proper documentation is followed at entry gate of OIL's premises for suchitems, which shall be carried back by Supplier after completion of work.

2. Erection, Installation & Civil Works:

The Supplier shall strictly adhere to the following as applicable as per scope of work.

2.1 Mobilization and access to site

2.1.1 Communication facilities, if required, shall be arranged by the Supplier.
2.1.2 While execution of work, no person other than the Supplier, Sub-Supplier and his or theiremployees shall be allowed on the Site during working hours except with the written permission of the OIL.Facilities to inspect the works at all times shall be afforded by the Supplier to OIL and his representatives andother authorized officials. The labour camps shall not be established by the Supplier inside the site premises.Nothing extra shall be payable by OIL on this account.
2.1.3 The access to the Site shall be exclusive to the Supplier but only to enable him to execute the works.The Supplier shall afford to OIL and to other Suppliers whose names shall have been previouslycommunicated in writing to the Supplier by OIL, reasonable facilities for the execution of the workconcurrently with his own.

2.2 Safety

2.2.1 Upon arrival of Plant and Equipment/Material at the Site, the Supplier shall assume custody thereofand remain responsible thereafter for safe custody until the whole plant is handed over.
2.2.2 Adequate firefighting equipment and extinguishing agents of sufficient capacity and quantity mustalways be available at site and kept ready for immediate use. Sufficient number of workmen must be fullytrained in the use of such equipment and must be available for immediate intervention at all times
2.2.3 For storage of materials and equipment for the construction and erection work, storage must besubdivided into storage units and the distance between such storage units shall be as acceptable to the insurancecompany which issued the policy.
2.2.4 At the beginning of work, all fire-fighting facilities must be checked thoroughly.
2.2.5 The supplier shall for the duration of the execution of the order, maintain in good order and condition all suchprotective apparel and equipment (such as safety helmets, safety belts, gloves etc.) for all their workmen andstaff engaged for the work as may be required to be used by Law and by the OIL. The supplier shallensure that such protective apparel/ equipment are worn and used by their workmen and staff without fail. Incase OIL notices any non-compliance thereto, OIL will not only be entitled to make alternative arrangementsfor the same but recover cost and damages plus OIL's own charges @ 20% or as deemed fit by the company, on his account.
2.2.6 The supplier shall follow the safety instructions as mentioned in Annexure-Safety Instructions at the end of this document.

2.3 Care of works and security

2.3.1 From the commencement to the completion of work, the Supplier shall take full responsibility for the care of works and for all temporary works from damages, loss or theft, by making suitable securityarrangement. In case any damage or loss shall happen to the works or to

any part thereof or to any temporaryworks from any cause whatsoever, the Supplier shall at his own cost replace or repair and make good thesame.
2.3.2 The Supplier shall take all precautions during execution of work so as not to damage OIL's existing equipment such as RCC roof, civil structures, cables, pipe lines, drains etc. and provide all possible protection to these works and in casethey are damaged, rebuild/divert them at his own cost.
2.3.3 All operations necessary for the execution of the works and for the construction of any temporary works shall so far as compliance with the requirements of the Purchase order permits be carried on so as not to interfere unnecessarily or improperly with the public convenience or the access to use and occupation of public or private roads and footpaths or of properties whether in the possession of OIL or any other person and the Supplier shall save harmless and indemnify OIL in respect of all claims demands, proceedings, damages, costs, charges and expenses, whatsoever arising out of or in relation to any such matters.
2.3.4 Due to any emergency, any protective or remedial work is necessary within the Supplier's battery limit, the Supplier shall immediately carry out such work. If the Supplier is unable to or unwilling to do thework, OIL shall carry out such work and all costs incurred due to this shall be deducted from Supplier'spayments.

2.4 Boarding, lodging & transport

The Supplier shall take care of the boarding, lodging, all travel between Supplier's office and site, insurance (if any), medical expensesetc. of his direct and indirect employees.

2.5 Construction Water and Power

The Supplier needs to make suitable arrangement for Construction Water and electrical Power based on siteconditions. To the extent possible, OIL shall facilitate the same. Non availability of Power from OIL should notbe an excuse for delay in completion of the project

2.6 Erection / installation and construction

2.6.1 For completing the work within the time schedule, the Supplier shall carry out the work by providing adequate manpower, however, without violating any labour laws.
2.6.2 The Supplier shall unpack and do visual checking against physical damages to the equipment /cases,clean equipment before start of erection. Damage, if any, will be reported to the OIL and shall be rectified /replaced expeditiously (in case of materials not supplied by the Supplier), so as not to upset the erection andcommissioning schedule. Delay on account of settlement of insurance claims shall not be considered an excusefor delay in Completion.
2.6.3 The Plant and equipment will be installed on the civil foundation/structures to be constructed by the Supplier. Load bearing data of the roof on which the structures will be built will be obtained by the supplier from Civil Engineering Department of OIL. However, if any minor deficiency is noticed in the dimensions,centerlines, levels, locations etc. of the foundation or anchor bolts or other embedment, the Supplier shallmake arrangement for rectification of the same at his own cost. Chipping/dressing of the foundation with air orair and water jet prior to placing the equipment on foundation will also be carried out by the Supplier.However, the procedure for rectification will be finalized by the Supplier with the written approval of OIL.

2.7 Inspection & Testing during erection & commissioning

2.7.1 OIL shall have the right of inspection and testing of the materials brought to site by the Supplier anderection/installation/construction work at any stage and the Supplier on demand from OIL shall carry out suchtests in an appropriate manner in the presence and free of charge to OIL.
2.7.2 Within 15 days after the effective date of award of Purchase order, the Supplier shall submit a detailedQuality Assurance Plan (QAP), covering all activities under scope of supply of the Supplier and all stages ofinspection, for OIL to comment/approve the same.
2.7.3 No work shall be covered up or put out of view without the approval of the OIL. In the event of failureto do so, the Supplier shall uncover any part of the work or make openings in or through

the works as OILmay direct and they shall be made good with materials approved by OIL and should match with workmanshipof the surrounding work. 2.7.4 The Supplier shall at his cost, arrange for construction of laboratory equipment, testing materials,consumables etc., at site for testing of construction materials such as cement, aggregates, concrete cubes etc.and other consumables for construction of support structures. 2.7.5 Any special measures or techniques which may be necessary for construction of structures such ascontinuous pouring of concrete etc. shall be deemed to have been taken into account by the Supplier and noextra claim, whatsoever, shall be entertained. 2.7.6 The Supplier shall carry out structural load test on each part of the building/structure at his own cost ifsuch structural load test is warranted due to unsatisfactory test results of concrete cubes and if so directed by OIL. 2.7.7 OIL may during the progress of Work, order the removal and re-erection of part or whole of the workexecuted, that is found not in accordance with the approved drawings/ specifications written instructions. OILshall not be responsible for any costs incurred in connection with any such removal and re-erection; the Supplier shall indemnify OIL for any costs and expenses that OIL may have incurred in connection with suchremoval and re-erection. Re-inspection/retest shall be carried out only after necessary rectificationwork/replacement by the Supplier. 2.7.8 The inspection, examination or testing carried out by OIL shall not relieve the Supplier from any ofhis obligations under this Purchase order. 3. Handing over 3.1 On completion of the work, all rubbish, kilns, vats, tanks, left over materials and temporary structure of any sortor kind used for the purpose or connected with the construction/erection work shall be removed by the Supplier and all pits and excavations in nearby areas filled up and the site handed over in a tidy condition. Nofinal payment in settlement of the account for the said work shall be held to be due or shall be made to the Supplier until such site clearance and restoration shall have been effected by him. Such clearance andrestoration may be made by OIL at the expenses of the Supplier in the event of his failure to comply with thisprovision within seven (7) days after receiving notice in writing from OIL to that effect. If it becomes necessaryfor OIL to have the site cleared as indicated above at the expense of the Supplier, OIL shall under nocircumstances be held liable for any losses or damages to such of Supplier's property as may be on such sitedue to such removal there from, which removal may be effected by means of public sale of such materials andproperty or in such a way as seems fit and most convenient to the OIL. 3.2 For the purpose of removing surplus materials in its original form, the Supplier shall submit thedocuments/records evidencing the entry of materials inside the Plant by producing the Gate Entry Permits andconsumption statements based on approved drawings to establish the surplus quantity of the materials belongingto the Supplier. OIL shall allow the Supplier to remove such materials if it is satisfied, in its sole andabsolute discretion, only after completion of the entire Work. 3.3 No imported Material shall be allowed to be taken out other than imported tools and tackles andinstruments brought by the Supplier on draw back basis and provided, he has carried out necessarydocumentation at the time of taking such items inside the Plant. 3.4 The Supplier shall return to OIL all unused and left over commissioning spares, after successfulcommissioning of the plant. 3.5 OIL shall have the right to take possession or use any completed or partially completed Work. Suchpossession or use shall not be deemed to be an acceptance of any work done not in accordance with the Purchase order. However, any damage to such work solely due to such provision or use shall be to the OILs account.	
ITEM NO. 90 **AMS OF ITEM NO. 70 for 6 years: QTY = 01 AU** 1.0 The supplier of the solar PV plant has to take over the annual maintenance of the plant for 6 (six) years once the plant is successfully handed over to OIL after performance testing. The Annual	

maintenance service purchase order shall be awarded to the supplier once the supply, installation and testing part is over and the plant is acceptable to OIL. As Solar PV plants by default are to be cleaned/maintained regularly so as to obtain and maintain full output, the supplier shall have to maintain the plant during the guarantee period of 1 (one) year also. During this (guarantee) period the supplier has to maintain the plant as per the OEMs' recommendations. In case of any defects/breakdown of the plant during this period, the supplier shall repair/replace the defective items/components free of cost as per the guarantee/warranty terms. Once the guarantee period is over, comprehensive annual maintenance purchase order shall start and thesupplier/supplier shall maintain the plant along with spares for 5 (five) years. The AMS Purchase order, therefore, shall be of duration of 6 (six) years as follows: a) Only maintenance of the plant (without supply of spares etc.) for 1 (one) year during the guarantee period. b) Comprehensive maintenance purchase order for 5 (five) years starting from the end of guarantee period. Once the PO is awarded, the supplier is to immediately enter into an agreement with OIL for AMS purchase order for 6 (six) years as above. 1.1 The entire work comprising design, engineering, manufacture, inspection and testing of performance atmanufacturer's and/or supplier's works, delivery to site, erection, testing and commissioning and finalhanding over shall be carried out as per the following schedule: a) The design, manufacture and supply part (with delivery at site) shall be completed within a period of 6 (six) months from the Award of PO. However supplier shall put his best efforts to expedite the job before schedule. b) The erection, testing & commissioning and handing over part shall be completed within a period of 3 (three) months from the date of site clearance by OIL. 1.2 Supplier shall visit the site immediately after award of purchase order and arrange for civil structures to be made. He shall also arrange for transportation of items/equipment to site. 1.3 The available area of the rooftop is measured to be approx. 90 square metre. Though the output of the solar plant is estimated at 8KWp (calculated from the available area), actual output may be at variance depending on the orientation and inclination of the PV arrays and shadowed areas ofthe roof. Also, since load bearing capacity of the roof varies from the old portion to new portion, it is in the scope of the supplier to find out the best possible area for installation of the plant based on the available Civil Engineering input data. Hence the KW output is given as 8 KWp (estimated).	

SPECIAL TERMS AND CONDITIONS (FOR ALL THE ITEMS)

1.Bidder shall furnish all relevant technical particulars of the solar PV plant system (and components) designed by them as per the technical specifications stated in the NIT. Offer should cover all points mentioned in the detailed descriptions of the items and complete with technical catalogue/ literature and drawings giving details as required by NIT.

2. Bidder must be an indigenous OEM or Indian Dealer/Authorized Distributor/Channel Partner of indigenous OEM of solar photo-voltaic power plant systems. Authorized dealer / distributor / channel partner shall submit valid authorization/dealership/partnership certificate along with the bid. Bids unaccompanied with the relevant credentials will be rejected.

3. Though the output of the solar plants are estimated at 30 KWp,24 KWp and 8 KWp(calculated from the available area), actual output may be at variance depending on the orientation and inclination of the PV arrays and shadowed areas of the roof. Prospective bidders may visit the site before submission of bids to ascertain the exact nos. of PV panels to be used and estimate their costs accordingly. The transportation, boarding& lodging etc. shall be borne by the bidder for the site visit.

4. The rooftop mounted solar PV plant shall be installed and commissioned by the supplier at OIL's designated installation as detailed in the Header Note/Technical details. Successful bidder/ Supplier shall visit the site immediately after award of contract and arrange for civil structures to be made. He shall also arrange for transportation of items/equipment to site. Boarding, lodging and transportation of items/commissioning personnel to worksite will be in the scope of the supplier. Bidder shall quote installation &commissioning charges separately.
A site committee comprising members from various disciplines conducted a reccee of the site. Copy of the site committee report is attached .

5. All necessary manpower, tools and tackles, instruments, Crane, etc. required for installation, testing, pre-commissioning and commissioning shall be in the scope of the supplier/contractor. The supplier/contractor needs to make suitable arrangement for construction water and electrical power based on site conditions. To the extent possible, OIL shall facilitate the same. Non availability of Power from OIL should not be an excuse for delay in completion of the project.

6. Detailed drawings, certificates and documents/catalogues etc. as given in "Special Terms and Conditions" shall be submitted by the bidder along with the technical quotation for scrutiny. In the event of an order, successful bidder/supplier shall submit fresh sets of drawings, based on the actual site parameters, which shall be approved by OIL before installation/commissioning of the solar PV system. Supplier shall submit 'As-Built' drawings and other related documents/brochures/ manuals including technical literature for the solar PV plant (after final assembly and commissioning at site) before handing over the same to OIL.

7. Offered items must be new and in unused condition. No reconstructed/ rebuilt items will be acceptable.

8. Components used in the solar PV system shall be of indigenous reputed make as per the make list and easily available. Bidder shall submit Bill of Materials of all items to OIL for approval before start of installation work (including any additional item to the item list given in the detailed description, if considered essential). If considered necessary, OIL engineer shall also inspect samples of items. Bidder shall also supply all commissioning spares essential for installation and commissioning of the plant.

9. Bidder shall mention any deviations or other items/ points not indicated /included in the specifications but deemed necessary for design, Installation and commissioning, efficient control and successful operation of the solar PV plant. However acceptance of deviation/s shall be entirely at OIL's discretion.

10. The complete solar plant shall be guaranteed for 12 (twelve) months from the date of successful commissioning and handing over to OIL. However, the PCU shall be guaranteed for minimum 5 (five) years and the PV panels shall be guaranteed for minimum 25 (twenty five) years after commissioning. All the jobs carried out by the contractor shall be guaranteed for proper workmanship and safety standards. In case of failure of any job during this period, contractor shall arrange to repair the defect to the satisfaction of OIL engineer in-charge and shall supply all the material required for the job without any cost to company. The make, type and quality of such material shall be same as used during initial work.

11. Bidder must agree to carry out comprehensive annual maintenance contract for a period of 5 years from the date of commissioning. Undertaking in this regard must be submitted along with the bid.
12. An undertaking from the OEM regarding back up services in term of O & M & warranty of the product shall be furnished by the bidder.
13. The successful bidder/supplier of the solar PV plant has to take over the comprehensive annual maintenance service (AMS) of the plant for 6 (six) years once the plant is successfully handed over to OIL after performance testing. The AMS Contract shall cover any routine and breakdown maintenance/repair of the plant installed including supply of spares by the supplier/contractor. The AMSC shall be awarded to the supplier/contractor once the supply, installation and testing part is over and the plant is acceptable to OIL. Bidder for the SITC must agree to this clause, otherwise his bid will be rejected summarily.

12. Terms of Payment and Payment Schedule:

12.1 Part (a): Payment Schedule for Design and supply part:

12.1.1 70% of the total price for Design, Manufacture, Packing & Forwarding, Supply (equipment and materials), to site shall be paid against Design, Verification of site & DNI data, Design of the plant and supplies of materials at OIL's site..
12.1.2 30% of the total price for Design, Manufacture, Packing & Forwarding, Supply (equipment and materials), to site shall be paid after successful completion of erection of the plant, Installation, Hooking up with grid, trial run, successful testing and commissioning of equipment and materials of the solar plant and acceptance by OIL.

12.2 Part (b): Payment Schedule for Installation, Testing and commissioning part:
12.2.1 100% of the total price for Installation, Testing and commissioning of equipment and materials of the solar plant shall be paid upon erection (including civil jobs), and installation of the plant, hooking up with grid including laying of cables, testing, trial runs and completion of acceptance tests at site and acceptance by OIL.

12.3 Payment against AMS Contract:

Against the AMS contract, the contractor shall raise the bills quarterly and shall be paid against the quarterly bills. The contractor shall also make any additional visits during the contract period, as and when required, in the event of breakdown/malfunctioning of the equipment, on intimation by the customer (OIL).
The contractor shall also undertake replacement/repair of any defective part (all components including PV modules, arrays, power supply unit, converter, inverter, all electronic cards, modules, fuses, fans, switches, wires and cables, lamps, transformers, cables etc.) of the solar PV plant free of cost during the currency of the contract period.
Contractor shall submit a monthly certificate/health report/maintenance report to Electrical Engineering department stating the health/condition of the solar PV plant and/or any repair/maintenance job done during their periodic visits to the installation. Bills should be submitted along with the monthly reports. Bills without the accompanying health report/maintenance report will not be entertained.

Before any payment the contractor has to fulfill the following:
Submission of a Performance Bank Guarantee for settlement of claims against the Performance Guarantee Parameters stipulated in Clause 6.0, "Performance Guarantee Parameters" of the "Special Terms and Conditions" of the tender. The PBG shall be equivalent to 10% of the total Contract Price (supply of materials + installation & commissioning + AMS contract for 6 years) valid for a period of 6 years and 3 months (total 75 months) after successful commissioning of the plant.

13. Packing of items shall be done properly to avoid transit damage and water/ moisture ingress.

Special Terms and Conditions:

The following clauses shall be read in conjunction with Technical Specifications (Annexure- I) to the extent applicable. In case of any discrepancies between the stipulations in thesedocuments, these Special Conditions of Purchase order shall stand superseded.

1. Objective:
The objective of the project is to establish a rooftop mounted solar PV plant (grid interactive) to feed part of the power requirement of the OIL's respectives building. The project is taken up as fulfillment of part of the commitment of RPO/ MoPNG directive. Once the plant is successfully installed and commissioned, the suppliershall take over the annual maintenance service (comprehensive) of the plant for a period of 6 (six) years.

2. Scope of Work:

A) Supply, Erection and Installation & Commissioning Part:
2.1 The scope of work shall cover design, engineering, manufacture, quality surveillance, testing atmanufacturer's works, packing and supply, erection, testing and commissioning and performance testing of 30 KWp, 24 KWp and 8 KWp (estimated) grid interactive Rooftop mounted solar photovoltaic system with associated components for installation at Oil India Limited, Duliajan.

B) Annual Maintenance Contract Part:

2.2 The supplier of the solar PV plant has to take over the annual maintenance of the plant for 6 (six) years once the plant is successfully handed over to OIL after performance testing. The Annual maintenance service purchase order shall be awarded to the supplier once the supply, installation and testing part is over and the plant is acceptable to OIL.

As Solar PV plants by default are to be cleaned/maintained regularly so as to obtain and maintain full output, the supplier shall have to maintain the plant during the guarantee period of 1 (one) year also. During this (guarantee) period the supplier has to maintain the plant as per the OEMs' recommendations. In case of any defects/breakdown of the plant during this period, the supplier shall repair/replace the defective items/components free of cost as per the guarantee/warranty terms.
Once the guarantee period is over, comprehensive annual maintenance purchase order shall start and thesupplier/supplier shall maintain the plant along with spares for 5 (five) years.

The AMS Purchase order, therefore, shall be of duration of 6 (six) years as follows:
a) Only maintenance of the plant (without supply of spares etc.) for 1 (one) year during the guarantee period.
b) Comprehensive maintenance purchase order for 5 (five) years starting from the end of guarantee period.
Once the PO is awarded, the supplier is to immediately enter into an agreement with OIL for AMS purchase order for 6 (six) years as above.

2.3 The entire work comprising design, engineering, manufacture, inspection and testing of performance atmanufacturer's and/or supplier's works, delivery to site, erection, testing and commissioning and finalhanding over shall be carried out as per the following schedule:
a) The design, manufacture and supply part (with delivery at site) shall be completed within a period of 6 (six) months from the Award of PO. However supplier shall put his best efforts to expedite the job before schedule.
b) The erection, testing & commissioning and handing over part shall be completed within a period of 3 (three) months from the date of site clearance by OIL.

2.4 Supplier shall visit the site immediately after award of purchase order and arrange for civil structures to be made. He shall also arrange fortransportation of items/equipment to site.

2.5 The available area of the rooftops are measured to be about 350 square metre,390 square metre and 90 square metre. Though the output of the solar plants are estimated at 30 KWp, 24 KWp and 8 KWp (calculated from the available area), actual output may be at variance depending on the orientation and inclination of the PV arrays and shadowed areas ofthe roof.

3. Design of system:

3.1 The supplier is to ensure proper system designing that would include his own independent studies on peaksunshine data at site, resulting in the correct sizing of equipment for the solar energy system. It is therefore veryimportant to form proper design procedures and component sizing before anyactual implementation. Thedesign procedures and all the equipment shall comply with MNRE specifications.
3.2 Offered items must be new and in unused condition. No reconstructed/ rebuilt items will be acceptable.Components used in the solar PV system shall be of indigenous reputed make as per the make list (given below) andeasily available. Supplier shall submit Bill of Materials of all items to OIL for approval before start of installationwork (including any additional item to the item list given in the detailed description, if considered essential). Ifconsidered necessary, OIL engineer shall also inspect samples of items. Supplier shall also supply allcommissioning spares essential for installation and commissioning of the plant.
3.3 The complete solar plant shall be guaranteed for 12 (twelve) months from the date of successfulcommissioning and handing over to OIL. However, the PCU shall be guaranteed for minimum 5 (five) years and the PV panels shall be guaranteed for minimum 25 (twenty five) years after commissioning. All the jobs carried out by the supplier shall be guaranteed for proper workmanship and safety standards. In case of failureof any job during this period, supplier shall arrange to repair the defect to the satisfaction of OIL engineer inchargeand shall supply all the material required for the job without any cost to company. The make, type andquality of such material shall be same as used during initial work.

Makes of Components:

Only indigenous brands of components will be used in the solar cell/panel system. Makes of various items will be as under:

o Mono- crystalline solar panel: Maxsolar/ Moserbaer/Indo Solar/SSL/ Euro Multivision/UPV Solar/KL Solar/Goldi Green/Powertrac Solar/ Maglare Technologies/ SunFuel/IB Solar/ HHV Solar Technologies or MNRE approved.
o Poly-crystalline solar panel: SSL/SunFuel/Evolve India Group/Sirius Solar Energy/Empire Solar/HHV Solar Technologies/Jain Irrigation Systems or MNRE approved.
o Mono- crystalline solar cell: SSL/Euro Multivision/UPV Solar/KL Solar/CEL or MNRE approved
o Poly-crystalline solar cell: SSL/Euro Multivision/UPV Solar/KL Solar/Jupiter Solar or MNRE approved
o Inverter/filter on-grid: Evolve India Group/Power One Microsystems/reputed Indian or MNRE approved
o EVA film: RenewSys/Allied Glasses/SSL/Dugar Polymers/BrijEncapsulants or MNRE approved
o Modular mounting structure: NEPC/RN Solar/reputed Indian or MNRE approved

4.Performance of the Plant:

4.1 The Supplier shall be responsible for the due and faithful performance of the plant in all respectsaccording to the drawings, specifications, particulars and all other documents referred to in this purchase order. Anyapproval which OIL may have given in respect of the stores, materials, supplies or other particulars and thework or the workmanship involved in the Purchase order (whether with or without test carried out by the Supplier orthe OIL) shall not relieve the Supplier from his obligations and notwithstanding any approval or acceptancegiven by the OIL, it shall be lawful for OIL to reject the material, if it is found that the materials supplied and/orerection and/or construction work carried out by the Supplier are not in conformity with the terms andconditions of the Purchase order.
4.2 The Supplier shall co-operate with OIL's other suppliers, if any, for any associated plant and freelyexchange all relevant technical information with them to obtain the most efficient and economical design and toavoid unnecessary duplication of equipment. The Supplier shall also co-ordinate with other suppliers forany interface activity at his battery limits. No remuneration shall be claimed from OIL for such technical cooperation.

4.3 Rejection of Defective Plant:

a) If the completed plant, or any portion thereof, before final handing over, is found to be defective or failsto fulfill the requirements of the Purchase order, OIL shall give the Supplier notice setting forth particular of suchdefects or failure and the Supplier shall forthwith make the defective plant good, or alter the same to make itcomply with the requirements of the Purchase order. Should he fail to do so within a period of time as deemedreasonable by OIL and stated in the said notice, OIL may reject and replace at the risk and cost of theSupplier, the whole or any portion of the plant, as the case may be, which is defective or fails to fulfill therequirements of the Purchase order. However, such rejection/replacement by OIL shall not absolve the Supplier ofany of his responsibilities under this Purchase order.
b) In the event of such rejection, OIL shall be entitled to the use of the plant in a reasonable and propermanner for a time reasonably sufficient to enable him to obtain other replacement plant.

4.4 Type, Quality of Materials and Workmanship:

a) The Supplier shall be deemed to have carefully examined and to have knowledge of the equipment,the general and other conditions, specifications, schedules, drawings, etc. forming part of the Purchase order and alsoto have satisfied himself as to the nature and character of the work to be executed and the type of the equipmentand duties required including wherever necessary of the site conditions and relevant matters and details. Anyinformation thus procured or otherwise obtained from OIL shall not in any way relieve the Supplier from hisresponsibility and executing the works in accordance with the terms of purchase order.
b) The items /works under the scope of the Supplier shall be of the best quality and workmanshipaccording to the latest engineering practice and shall be manufactured from materials of best quality consideringstrength and durability for their best performance and, in any case, in accordance with the specifications setforth in this Purchase order. All material shall be new. Substitution of specified material or variation from the methodof fabrication may be permitted but only with the prior written approval of OIL.
c) The Supplier shall procure and/or fabricate all materials and equipment in accordance with all

requirements of Central and State enactment, rules and regulations governing such work in India and at site.This shall not be construed as relieving the Supplier from complying with any requirement of OIL asenumerated in the Purchase order which may be more rigid than and not contrary to the above mentioned rules, norproviding such construction as may be required by the above mentioned rules and regulations. In case ofvariance of the Technical Specification from the laws, ordinance, rules and regulations governing the work, theSupplier shall immediately notify the same to OIL. It is the sole responsibility of the Supplier, however,to determine that such variance exists. Wherever required by rules and regulations, the Supplier shall alsoobtain the statutory authorities' approval for the plant, machinery and equipment to be supplied by theSupplier.

d) The Supplier shall follow all codes and standards referred in the Purchase order and the documents relatedthereto. Codes and standards of other countries may be followed by the Supplier with the prior writtenapproval of OIL, provided materials, supplies and equipment according to the standard are equal to or betterthan the corresponding standards specified in the Purchase order.

e) Brand names mentioned in the Purchase order documents are for the purpose of establishing the type andquality of products to be used. The Supplier shall not change the brand names and qualities of the bought outitems without the prior written approval of the OIL. All such products and equipment shall be used or installedin strict accordance with original manufacturer's recommendations, unless otherwise directed by the OIL.

5. Performance Guarantee Parameter:

5.1 Solar PV Module: Module shall be having a minimum guarantee for a period of 25 years. In case ofany deviation observed during operations from the performance guarantee parameters cited, the Supplier shallbe informed in writing by OIL. The Supplier shall be responsible to rectify the same within 10 days ofnotification without any extra cost to OIL. Performance guarantee parameters on output of solar module shall beas follows:

End of Year (after successful commissioning)	Minimum Guaranteed Output
1	98.5%
2	97.5%
3	97%
6	94%
8	92%
10	90%
15	85%
20	82%
25	80%

5.2 The above shall be guaranteed at the consumer end and that shall be treated as the measuring point. MU generation will be based on thepeak output of the plant tested and agreed upon by OIL at site at rated site conditions. Penalty shall be levied onan annual basis in terms of revenue lost to the utility for the deviation in output.

5.3 Penalty against degradation of output:

Penalty will be imposed against degradation of output as per the following formula. Penalty shall be applicable till the completion of the AMS purchase order, i.e., 6 (six) years.

Penalty = 1.1* (Tariff) * (MUs guaranteed at the peak output tested and agreed upon at site - MUs generated) at the end of each year.

Tariff shall be as per prevailing APDCL rates (at the end of the year in which penalty is applicable) for power purchased by OIL for field supply (for normal hours).

5.3 Power Conditioning Unit (PCU): PCU shall have a minimum warrantee period of 5 years from thedate of commissioning. Supplier's detailed Warranty/ Guarantee clause shall be furnished. Efficiency of thePCU shall not be less than 97% (EU). In case of any deviation observed during operations from the warrantycited, the Supplier shall be informed in writing by the OIL. The Supplier shall be responsible to rectify thesame within 10 days of notification without any extra cost to OIL.

5.4 The mechanical structures, electrical works and overall workmanship of the grid solar power plants mustbe warranted for a minimum of 6 years.

6.0 Customer Training

6.1 Supplier shall provide necessary onsite-training and demonstration on the system related today to day operation & maintenance of the system including basic troubleshooting.
6.2 On-site training shall be considered by the Vendors and costs towards this, if any, shall bedeemed to have been included in the overall quoted costs of the system. No additional costs towardstravel, boarding &loading shall be made on this account.

Annexure- Safety Instructions

General HSE notes:

1. It will be solely the Supplier's responsibility to fulfill all the legal formalities with respect to the Health, Safety and Environmental aspects of the entire job (namely; the persons employed by him/her, the environment, etc.) under the jurisdiction of the district of Dibrugarh, State of Assam.
2. Supplier must employ a competent person as his/her own supervisor for supervising the jobs under the purchase order. The supervisor should possess valid electrical supervisor's license ofcompetency which shall be valid for operating in Assam.
3. The number of work persons hired/engaged by the supplier shall depend on the quantum and/or exigency of jobs. Company engineer/ company supervisor may direct the supplier/supplier's supervisor to hire more persons if considered essential.
4. Every person deployed by the supplier must wear safety gadgets to be provided by thesupplier. The Supplier shall provide proper Personal Protective Equipment (PPE) as perthe hazard identified and risk assessed for the job and conforming to statutory requirement andcompany PPE schedule. These PPEs shall be approved by the departmental engineer and mustbe supplied to the workmen before commencement of job. Also, proper usage of the PPE bythe working personnel shall be ensured by the supervisor appointed by the supplier.
5. The Supplier shall prepare written Safe Operating Procedure (SOP) for the work to be carried out, including an assessment of risk, wherever possible and safe methods to deal withit/ them. The SOP should clearly state the risk arising to men, machineries & material from theoperation/ operations to be done by the supplier and how it is to be managed. The SOP should be updated /amended from time to time if required. The supplier shall also provide acopy of the SOP to the person designated by the mine owner who shall be supervising thesupplier's work.
6. Supplier has to ensure that all work is carried out in accordance with the Statutes and SOP and for the purpose he may deploy adequate qualified and competent personnel for the purposeof carrying out the job in a safe manner.
7. It will be entirely the responsibility of the Supplier/ his/her Supervisor/ representative to ensure strict adherence to all HSE measures and statutory rules during operation in OIL's installation and safety of workers engaged by him/her. The crew members will not refuse to follow any instruction given by company's Installation Manager/Safety Officer/Engineer/Official/Supervisor/Junior Engineer for safe operation.
8. Any compensation arising out of the job carried out by the Supplier whether related to pollution, Safety or Health will be paid by the supplier only.
9. Any compensation arising due to accident of the Supplier's personnel while carrying out thejob, will be payable by the supplier.
10. The supplier shall have to report all incidents including near miss to Installation Manager/departmental representative of the concerned department of OIL.
11. The supplier has to keep a register of the persons employed by him/ her. The supplier's supervisor shall take and maintain attendance of his men every day for the work andpunctually.
12. If the company arranges any safety class / training for the working personnel at site (company employee, supplier worker, etc) the supplier will not have any objection to any such training.
13. The supplier shall arrange daily tool box meeting and regular site safety meetings and maintain records. The supplier will also carry out jobs safety analysis for all the jobs in the plant.
14. A supplier employee must, while at work, take reasonable care for the health and safety of people who are at the employee's place of work and who may be affected by the employee's actor omissions at work.
15. A supplier employee must, while at work, cooperate with his or her employer or other persons as far as is necessary to enable compliance with any requirement under the act or theregulations that is imposed in the interest of health, safety and welfare of the employee or anyother person.

16. In case Supplier is found non-compliant of HSE laws as required, OIL will have the right for directing the supplier to take action to comply with the requirements, and for further non-compliance,the supplier will be penalized prevailing relevant Acts/ Rules/ Regulations or OIL also reserves the right to terminate the purchase order.
17. When there is a significant risk to health, environment or safety of a person or place arising because of a non-compliance of HSE measures, company will have the right to direct the supplier to cease work until the non-compliance is corrected.
18. The supplier should prevent the frequent change of his/her employees as far as practicable. However for any such change, prior written permission from OIL will be required.
19. The supplier should frame a mutually agreed bridging document between OIL & the supplier with roles and responsibilities clearly defined.
20. For any HSE matters not specified in the purchase order document, the supplier will abide by the relevant and prevailing Acts/ rules/ regulations/ pertaining to Health, Safety and Environment.

21. ALL ITEM TO BE PROCURED FROM THE SAME SOURCE FOR REASON OF COMPATIBILITY AND SINGLE POINT RESPONSIBILITY.

NOTE:
Bidders should submit their bids (preferably in tabular form) explicitly mentioning compliance/ non-compliance to all the NIT terms and conditions of NIT.

ANNEXURE – Technical Evaluation Sheet

TECHNICAL EVALUATION

The check list must be completed and returned with the offer with bidder's comment as per format detailed below. Bidder is to ensure that all the following points are covered in the offer. This will ensure proper evaluation of the offer. Bidder is to elaborate where a detailed response is required.

Srl. No.	Clause No. of Special Terms & Conditions	Description (as per NIT Specifications and Tender Terms and Conditions)	Bidder's Remark Complied/ Not complied/ Deviation	Bidder to indicate relevant page no./ document no. of their bid to support the remarks/ compliance/ deviation
PR Common notes and Special Terms and Conditions				
1	Clause 2A of STC	Scope of work to be carried out		
2	- do –2B of STC	Bidder must agree and quote for AMS contract (AMS contract clauses		
	- do –B2.3 of STC	Completion schedule(supply- 6 months + I & C- 3 months after clearance by OIL)		
3	PR common notes 12	Terms of payment and payment schedule		
4	- do –12.1	Design of system		
5	Clause 5 of STC	Performance Guarantee Parameter		
6	2B-2.3 of STC	Handing over terms and conditions		
7	PR common notes 6	Drawings and documents to be submitted with the offer and supply		
8	PR common notes 8	Supply of spares		
9	As per BEC/BRC	Bidder's Qualification/Experience [(a) to (e)] and Supporting documents for [(a) to (e)]		
Annexure –Bid Evaluation Criteria (BEC)				
	Clause (a)	Bidder's experience		
	Clause (b)	Bidder's annual turnover		
	Clause (c)	Bidder's net worth		
Technical and Financial Criteria				
Annexure- "Technical Specifications"				
1	Clause 5.0 of PR Item No,10,40 and 70	Scope of specifications		
2	- do- 6.0 of PR Item No,10,40 and 70	Codes and standards		
3	- do- 7.0 of PR Item No,10,40 and 70	Specific technical requirements including all sub-clauses from 7.1 to 7.13		
4	- do- 8.0 of PR Item No,10,40 and 70	System documentation , Spl. Terms & Conditions- "Scope of Work")		
5	- do- 9.0 of PR Item No,10,40 and 70	Tests and test reports		
6	- do- 10.0 of PR Item No,10,40 and 70	Maintenance requirement		
7	- do- 11.0 of PR Item No,10,40 and 70	Layout requirement		

8	- do- 12.0 of PR Item No,10,40 and 70	Instruction and O & M Manual		
9	- do- 13.0 of PR Item No,10,40 and 70	Customer training		
10	- do- 14.0 of PR Item No,10,40 and 70	Makes of components and their guarantee/warranty		
Annual Maintenance Service Contract				
		All clauses		

ANNEXURE- DDD

INTEGRITY PACT

Between

Oil India Limited (OIL) hereinafter referred to as "The Principal"

And

(Name of the bidder).....hereinafter referred to as "The Bidder/Contractor"

Preamble:

The Principal intends to award, under laid down organizational procedures, contract/s for **SDI2280P20** The Principal values full compliance with all relevant laws and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder/s and Contractor/s.

In order to achieve these goals, the Principal cooperates with the renowned international Non-Governmental Organization "Transparency International" (TI). Following TI's national and international experience, the Principal will appoint an external independent Monitor who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section: 1 -Commitments of the Principal

(1) The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:

1. No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for him/herself or third person, any material or immaterial benefit which he/she is not legally entitled to.

2. The Principal will, during the tender process treat all Bidders with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidders the same information and will not provide to any Bidder confidential/additional information through which the Bidder could obtain an advantage in relation to the tender process or the contract execution.

3. The Principal will exclude from the process all known prejudiced persons.

(2) If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the relevant Anti-Corruption Laws of India, or if there be a Page 2 of 6 substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section: 2 -Commitments of the Bidder/Contractor

(1) The Bidder/Contractor commits itself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

1. The Bidder/Contractor will not, directly or through any other person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or immaterial benefit which h e/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2. The Bidder/Contractor will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, Subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

3. The Bidder/Contractor will not commit any offence under the relevant Anticorruption Laws of India; further the Bidder/Contractor will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

4. The Bidder/Contractor will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

(2) The Bidder/Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.

(3) The Bidder/Contractor signing Integrity Pact shall not approach the Courts while representing the matters to IEMs and he/she will await their decision in the matter.

Section 3 -Disqualification from tender process and exclusion from future Contracts

If the Bidder, before contract award has committed a transgression through a violation of Section 2 or in any other form such as to put his reliability or risibility 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.

1. If the Bidder/Contractor has committed a transgression through a violation of Section 2 such as to put his reliability or credibility into question, the Principal is entitled also to exclude the Bidder/Contractor from future contract award processes. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the circumstances of the case, in particular the number of transgressions, the position of the transgressions 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.

2. 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.

3. If the Bidder/Contractor can prove that he has restored/recouped the Damage caused by him and has installed a suitable corruption prevention system, the Principal may revoke the exclusion prematurely.

4. A transgression is considered to have occurred if in light of available evidence no reasonable doubt is possible.

5. Integrity Pact, in respect of a particular contract, shall be operative from the date Integrity Pact is signed by both the parties till the final completion of the contract **or as mentioned in Section 9- Pact Duration whichever is later**. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings

ANNEXURE- DDD

Section 4 -Compensation for Damages

1. If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover from the Bidder liquidated damages equivalent to Earnest Money Deposit / Bid Security.

(2) If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to Section 3, the principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to Security Deposit / Performance Bank Guarantee.

3. The bidder agrees and undertakes to pay the said amounts without protest or demur subject only to condition that if the Bidder/Contractor can prove and establish that the exclusion of the Bidder from the tender process or the termination of the contract after the contract award has caused no damage or less damage than the amount or the liquidated damages, the Bidder/Contractor shall compensate the Principal only to the extent of the damage in the amount proved.

Section 5 -Previous transgression

1. The Bidder declares that no previous transgression occurred in the last 3 years with any other Company in any country conforming to the TI approach or with any other 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 the contract, if already awarded, can be terminated for such reason.

Section: 6 -Equal treatment of all Bidders/Contractor/Subcontractors

1. The Principal will enter into Pacts on identical terms with all bidders and contractors.

2. The Bidder / Contractor undertake(s) to procure from all subcontractors a commitment in conformity with this Integrity Pact. The Bidder/Contractor shall be responsible for any violation(s) of the provisions laid down in this agreement/Pact by any of its sub-contractors/sub-vendors.

3. The Principal will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

ANNEXURE- DDD

Section: 7 -Criminal charges against violating Bidders/Contractors/ Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor, which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section: 8 -External Independent Monitor/Monitors

1. The Principal appoints competent and credible external independent Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

2. The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the Chairperson of the Board of the Principal.

3. The Contractor accepts that the Monitor has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder/Contractor/Subcontractor with confidentiality.

4. The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

5. As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or heal the violation, or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action. However, the Independent External Monitor shall give an opportunity to the bidder / contractor to present its case before making its recommendations to the Principal.

6. The Monitor will submit a written report to the Chairperson of the Board of the Principal within 8 to 10 weeks from the date of reference or intimation to

him by the 'Principal' and, should the occasion arise, submit proposals for correcting problematic situations.

7. If the Monitor has reported to the Chairperson of the Board a Substantiated suspicion of an offence under relevant Anti-Corruption Laws of India, and the Chairperson has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8. The word 'Monitor' would include both singular and plural.

Section:9 -Pact Duration

This Pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the respective contract, and for all other Bidders 6 months after the contract has been awarded.
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 Chairperson of the Principal.

Section:10 -Other provisions

1. This agreement is subject to Indian Law. Place of performance and jurisdiction is the Registered Office of the Principal, i.e. New Delhi. The Arbitration clause provided in the main tender document / contract shall not be applicable for any issue / dispute arising under Integrity Pact.

2. Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

3. If the Contractor is a partnership or a consortium, this agreement must be, signed by all partners or consortium members.

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

R BARMAN
DGM (IP)

..... **.....**

For the Principal **For the Bidder/Contractor**

Witness 1: .....

Witness 2: .....

Place. DULIAJAN
Date . 24.08.2019

Technical Bid Checklist **Annexure-EEE**

Tender No.	
Bidder's Name :	

SL. NO.	BEC / TENDER REQUIREMENTS	Compliance by Bidder	
		Indicate 'Confirmed' / 'Not Confirmed' / Not applicable	Indicate Corresponding page ref. of unpriced bid or Comments
1	Confirm that validity has been offered as per NIT.		
2	Confirm that Bid Security / Earnest Money has been submitted as per NIT (Wherever Applicable) ?		
3	Confirm that you shall submit Performance security (in the event of placement of order) (Wherever Applicable) ?		
4	Confirm that duly signed Integrity Pact has been submitted as per NIT (Wherever Applicable) ?		
5	Confirm that you have submitted documentary evidence of successfully executing one Purchase order as stipulated in NIT in any of the preceding 5 financial years (*)		
6	Confirm that you have submitted Balance Sheet and Profit and Loss Account of any of the preceding 3 financial years certified by a chartered accountant.		
7	Confirm that the bid has been signed using Class 3 digital certificate with Organisation's Name as per NIT.		
8	Confirm that you have not taken any exception/deviations to the NIT .		

NOTE: Please fill up the greyed cells only.

(*) Purchase Orders along with copies of any of the documents in respect of satisfactory execution of the Purchase Orders should be submitted – (i) Satisfactory Inspection Report (OR) (ii) Satisfactory Supply Completion / Installation Report (OR) (iii) Consignee Receipted Delivery Challans (OR) (iv) Central Excise Gate Pass / Tax , Invoices issued under relevant rules of Central Excise / VAT (OR) (v) any other documentary evidence that can substantiate the satisfactory execution of the purchase order cited above.

Response Sheet **Annexure-FFF**

Tender No.	
Bidders Name	

Bidders Response Sheet

Sl No.	Description	Remarks
1	Place of Despatch	
2	Whether Freight charges have been included in your quoted prices	
3	Whether Insurance charges have been included in your quoted prices	
4	Make of quoted Product	
5	Offered Validity of Bid as per NIT	
6	Bid Security Submitted (if applicable)	
6	Details of Bid Security Submitted to OIL (if applicable)	
	a) Bid Security Amount (In Rs):	
	b) Bid Security Valid upto:	
7	Whether you shall submit Performance Security in the event of placement of order on you (if applicable)	
8	Integrity Pact Submitted (if applicable)	
9	Whether you have submitted documentary evidence of successfully executing one Purchase order as stipulated in NIT in any of the preceding 5 financial years (*)	
10	Whether you have submitted Balance Sheet and Profit and Loss Account of any of the preceding 3 financial years certified by a chartered accountant.	
11	Delivery Period in weeks from placement of order	
12	Complied to Payment terms of NIT (if applicable) otherwise to Standard Payment Terms of OIL or not.	
13	If bidder is MSE whether you have quoted your own product	
14	If Bid security submitted as Bank Guarantee, Name and Full Address of Issuing Bank including Telephone, Fax Nos and Email id of branch manager	

NOTE: Please fill up the greyed cells only.

(*) Purchase Orders along with copies of any of the documents in respect of satisfactory execution of the Purchase Orders should be submitted – (i) Satisfactory Inspection Report (OR) (ii) Satisfactory Supply Completion / Installation Report (OR) (iii) Consignee Receipted Delivery Challans (OR) (iv) Central Excise Gate Pass / Tax , Invoices issued under relevant rules of Central Excise / VAT (OR) (v) any other documentary evidence that can substantiate the satisfactory

ANNEXURE - GGG

(TO BE FILLED UP BY ALL THE VENDOR IN THEIR OWN LETER HEAD)
(ALL FIELDS ARE MANDATORY)

Tender No.	**:……**
Name of Beneficiary	**:M/s.……**
Vendor Code	**:……...**
Address	**:...……**
	...……...
Phone No. (Land Line)	**:...……**
Mobile No.	**:...……**
E-mail address	**:...……**
Bank Account No. (Minimum	
Eleven Digit No.)	**:...……**
Bank Name	**:...……**
Branch	**:...……**
Complete Address of your	**:...……**
Bank	**:...……**
IFSC Code of your Bank	
a) RTGS	**:……...**
b) NEFT	**:……...**
PAN	**:……...**
VAT Registration No.	**:……...**
CST Registration No.	**:……...**
Service Tax Registration No.	**:……...**
Provident Fund Registration	**:……...**

I/We confirm and agree that all payments due to me/us from Oil India Limited can be remitted to our above mentioned account directly and we shall not hold Oil India Limited responsible if the amount due from Oil India Limited is remitted to wrong account due to incorrect details furnished by us.

……
Office Seal **Signature of Vendor**

Counter Signed by Banker:
Seal of Bank:

Enclosure: Self attested photocopies of the following documents-

1) **PAN Card**
2) **VAT Registration Certificate**
3) **Service Tax Registration**
4) **CST Registration**
5) **Provident Registration Certificate**
6) **Cancelled cheque of the bank account mentioned above (in original).**
7) **Bank Statement not older than 15 days on the date of submission.**